

TRAINEE GUIDE  
FOR  
SICK CALL SCREENERS COURSE (SCSC)

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**LIST OF EFFECTIVE ELEMENTS**

Element No.	Change In Effect

Element No.	Change In Effect



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**SECURITY AWARENESS NOTICE**

This course does not contain any classified material in any class or practical work session.

**SAFETY/HAZARD AWARENESS NOTICE**

Any time a Trainee or instructor has apprehension concerning his or her personal safety or that of another, he or she shall signal for a "Training Time Out" to clarify the situation or procedure and receive or provide additional instruction as appropriate. "Training Time Out" signals, other than verbal, shall be appropriated to the training environment.

Instructors are responsible for maintaining situational awareness and shall remain alert to signs of Trainee panic, fear, extreme fatigue or exhaustion, or lack of confidence that may impair safe completion of the training exercise, and shall immediately stop the training, identify the problem, and make a determination to continue or discontinue training. Instructors shall be constantly alert to any unusual behavior, which may indicate a Trainee is experiencing difficulty, and shall immediately, take appropriate action to ensure the Trainee's safety.

The safety precautions contained in this course are applicable to all personnel. They are basic and general in nature. Personnel who operate and maintain equipment in support of Sick Call Screeners must be thoroughly familiar with all aspects of personnel safety, and strictly adhere to very general as well as specific safety precautions contained in operating and emergency procedures and applicable governing directives.

All personnel must have a comprehensive knowledge of emergency procedures which prescribe courses of action to be followed in the event of an equipment failure or human error as stated in the Pre-Mishap Plan. Strict adherence to approved and verified operating, emergency and maintenance procedures in clinic are MANDATORY.

As a minimum, each individual is responsible for knowing, understanding, and observing all safety precautions applicable to the command, school, course, their work and their work areas. In addition, you are responsible for observing the following general safety precautions:

- A. Each individual shall report to work rested and emotionally prepared for the tasks at hand.
- B. You shall use normal prudence in all your functions, commensurate with the work at hand
- C. You shall report any unsafe conditions, or any equipment or material which you consider to be unsafe, and any unusual or developing hazards.
- D. You shall warn others whom you believe to be endangered by known hazards or by failure to observe safety precautions, and of any
- E. Unusual or developing hazards.
- F. You shall report to the school staff any accident, injury, or evidence of impaired health occurring in the course of your work or during non-training environment.
- G. You shall wear or use the protective clothing and/or equipment of the type required, approved, and supplied for the safe performance of your work.

**SAFETY/HAZARD AWARENESS NOTICE (CONT.)**

All personnel in the immediate vicinity of a designated noise hazardous area or noise hazardous operation shall wear appropriate hearing protective devices (NDSTC Instruction 6260.6 series).

A Training Time Out (TTO) may be called in any training situation where a Trainee or instructor expresses concern for personal safety or requests clarification of procedures or requirements. TTO is also an appropriate means for a Trainee to obtain relief if he or she is experiencing pain, heat stress or other serious physical discomfort. A TTO may be signaled by displaying a "T" sign with your hands. If the signal is not acknowledged, the signaler shall shout "Training Time Out." The instructor shall attempt to relieve and remove the Trainee from the possible hazardous environment. If an adequate number of instructors are available to allow training to continue safely, the lead instructor may elect to do so.

However, if this is not practical, training will be stopped until the situation is corrected.

**ORM**

A decision making tool used by people at all levels to increase operational effectiveness by anticipating hazards and reducing the potential for loss, thereby increasing the probability of a successful mission. (OPNAVINST 3500.39 Series)

**MISHAP**

Any unplanned or unexpected event or series of events that result in damage to DoD property; occupational illness or injury to on-duty DoD military or civilian personnel; or damage to public and private property or injury and illness to non-DoD personnel caused by DoD operations (OPNAVINST 5102.1 Series).

**NEAR MISS**

A condition might exist which, if allowed to go unchecked or uncorrected, has the potential to cause a mishap; or an act or event might result in a near mishap in which injury or damage was avoided merely by chance (OPNAVINST 5102.1 Series).

**UNSAFE CONDITION**

Any unsafe or unhealthful working conditions that can cause harm, damage or loss to personnel, equipment or facilities. Report unsafe conditions in accordance with OPNAVINST 5100.23 Series, Chapter 10.

**TERMINAL OBJECTIVES**

1.0 Perform the duties of a Sick Call Screener

**COURSE MASTER SCHEDULE**

WEEK 1						
Day 1						
Topic No.	Type	Period	Topic Title	Period Length	Ratio	Bottleneck Ratio
1.0	Class	1	Course Introduction	25	16:1	
1.1	Class	1	Scope of Care	25	16:1	
1.2	Class	2	Ethics	25	16:1	
1.3	Class	2	SOAP Note	25	16:1	
1.3	Class	3	SOAP Note	25	16:1	
1.3	Lab	3	SOAP Note	25	Multiple	
1.3	Lab	4	SOAP Note	50	Multiple	
1.3	Lab	5	SOAP Note	50	Multiple	
1.3	PA	6	SOAP Note	50	6:1	
1.3	PA	7	SOAP Note	50	6:1	
1.4	Class	8	Patient Presentation	50	16:1	
Day 2						
2.1	Class	1	HEENT	50	16:1	
2.1	Class	2	HEENT	50	16:1	
2.1	Class	3	HEENT	50	16:1	
2.1	Class	4	HEENT	50	16:1	
2.1	Lab	5	HEENT	50	Multiple	
2.1	Lab	6	HEENT	50	Multiple	
2.1	PA	7	HEENT	50	2:1	
2.1	PA	8	HEENT	50	2:1	
Day 3						
2.2	Class	1	Respiratory	50	16:1	
2.2	Class	2	Respiratory	50	16:1	
2.2	Lab	3	Respiratory	50	Multiple	
2.2	PA	4	Respiratory	50	2:1	
2.3	Class	5	Cardiovascular	50	16:1	
2.3	Class	6	Cardiovascular	50	16:1	
2.3	Lab	7	Cardiovascular	50	Multiple	
2.3	Lab	8	Cardiovascular	50	Multiple	
Day 4						
2.3	PA	1	Cardiovascular	50	2:1	
2.4	Class	2	Gastrointestinal	50	16:1	
2.4	Class	3	Gastrointestinal	50	16:1	
2.4	Lab	4	Gastrointestinal	50	Multiple	
2.4	PA	5	Gastrointestinal	50	2:1	
2.5	Class	6	Genitourinary	50	16:1	

**COURSE MASTER SCHEDULE (CONT.)**

2.5	Class	7	Genitourinary	50	16:1	
2.5	Class	8	Genitourinary	50	16:1	
Day 5						
2.6	Class	1	Neurology	50	16:1	
2.6	Class	2	Neurology	50	16:1	
2.6	Class	3	Neurology	50	16:1	
2.6	Lab	4	Neurology	50	Multiple	
2.6	Lab	5	Neurology	50	Multiple	
2.6	PA	6	Neurology	50	2:1	
2.6	PA	7	Neurology	50	2:1	
2.7	Class	8	Musculoskeletal: Upper Extremities	50	16:1	
Week 2						
Day 6						
2.7	Class	1	Musculoskeletal: Upper Extremities	50	16:1	
2.7	Lab	2	Musculoskeletal: Upper Extremities	50	Multiple	
2.7	Lab	3	Musculoskeletal: Upper Extremities	50	Multiple	
2.7	PA	4	Musculoskeletal: Upper Extremities	50	2:1	
2.7	PA	5	Musculoskeletal: Upper Extremities	50	2:1	
2.8	Class	6	Musculoskeletal: Neck and Spine	50	16:1	
2.8	Class	7	Musculoskeletal: Neck and Spine	50	16:1	
2.8	Lab	8	Musculoskeletal: Neck and Spine	50	Multiple	
Day 7						
2.8	Lab	1	Musculoskeletal: Neck and Spine	50	Multiple	
2.8	PA	2	Musculoskeletal: Neck and Spine	50	2:1	
2.8	PA	3	Musculoskeletal: Neck and Spine	50	2:1	
2.9	Class	4	Musculoskeletal: Lower Extremities	50	16:1	
2.9	Class	5	Musculoskeletal: Lower Extremities	50	16:1	

**COURSE MASTER SCHEDULE (CONT.)**

2.9	Lab	6	Musculoskeletal: Lower Extremities	50	Multiple	
2.9	Lab	7	Musculoskeletal: Lower Extremities	50	Multiple	
2.9	PA	8	Musculoskeletal: Lower Extremities	50	2:1	
<b>Day 8</b>						
2.9	PA	1	Musculoskeletal: Lower Extremities	50	2:1	
2.10	Class	2	Integumentary	50	16:1	
2.10	Class	3	Integumentary	50	16:1	
2.10	Lab	4	Integumentary	50	Multiple	
2.10	Lab	5	Integumentary	50	Multiple	
2.10	PA	6	Integumentary	50	2:1	
2.10	PA	7	Integumentary	50	2:1	
2.11	Class	8	Endocrine	50	16:1	
<b>Day 9</b>						
2.11	Class	1	Endocrine	50	16:1	
2.12	Class	2	Environmental Illness and Injury	50	16:1	
2.12	Class	3	Environmental Illness and Injury	50	16:1	
2.12	Class	4	Environmental Illness and Injury	50	16:1	
2.12	Class	5	Environmental Illness and Injury	50	16:1	
2.12	Lab	6	Environmental Illness and Injury	50	Multiple	
2.12	Lab	7	Environmental Illness and Injury	50	Multiple	
2.12	Lab	8	Environmental Illness and Injury	50	Multiple	
<b>Day 10</b>						
2.12	Lab	1	Environmental Illness and Injury	50	Multiple	
2.12	PA	2	Environmental Illness and Injury	50	2:1	
2.12	PA	3	Environmental Illness and Injury	50	2:1	
2.12	PA	4	Environmental Illness and Injury	50	2:1	
2.12	PA	5	Environmental Illness and Injury	50	2:1	
2.13	Class	6	Pharmacology/Medical Therapeutics	50	16:1	
2.13	Class	7	Pharmacology/Medical Therapeutics	50	16:1	
2.13	Class	8	Pharmacology/Medical Therapeutics	50	16:1	

## OUTLINE SHEET SCSC 1.0-1

## COURSE INTRODUCTION

## A. INTRODUCTION

## B. ENABLING OBJECTIVES

1.1 Describe the Sick Call Screener Program

1.2 Describe the sick call screener course

## C. SCSC 1.0-1 COURSE INTRODUCTION TOPIC OUTLINE

## 1. Introduction

- a. Navy Hospital Corpsmen are vital members of the Health Care Delivery Team. Their roles and responsibilities are expanding, as the demand to provide quality health care is placed on them. Training is required to better prepare Hospital Corpsmen and meet these demands. The Sick Call Screeners Course is a training program directed at the Hospital Corpsmen. Corpsmen are exposed to clinical subjects taught by a staff of highly skilled personnel (Physicians, Nurses, Physician Assistants, and Independent Duty Corpsmen).
- b. Policy and guidance for the Sick Call Screener Program is contained in BUMEDINST 6550.9 series. The goals and objectives are:
  - (1) Improve access to care for active duty personnel with minor medical conditions by permitting supervised hospital corpsmen to provide expeditious, clearly-defined health care services.
  - (2) To train Hospital Corpsman for service with operational units. This training is available to all Hospital Corpsman. However, personnel deploying as Individual Augmentees, or are within 180 days of transferring to an operational platform, will have priority enrollment.
  - (3) To improve the ability of the Hospital Corpsman in assisting medical providers with more complicated cases. The Hospital Corpsman should be able to complete a patient history and perform a basic examination on patients requiring treatment by a medical provider.

## 2. Course Overview

- a. Sick Call Screeners Course is divided into 17 lessons covering administrative and specific areas of medicine. Topics include: Scope of care, Ethics, SOAP format, HEENT, Respiratory, Cardiovascular, Gastrointestinal, Genitourinary, Neurology, Musculoskeletal, Integumentary, Endocrine, Environmental, Patient presentation and Pharmacology.

## OUTLINE SHEET SCSC 1.0-1

## COURSE INTRODUCTION (CONT.)

- b. Each lesson reviews anatomy, physical examination and common diseases of specific organ systems, as well as hands on physical exam techniques during clinical rotations.
- c. This course includes didactic and clinical hours.
  - (1) Didactic
    - (a) 80 hours of didactic taught over 10 consecutive days.
    - (b) Morning routine
      - 1. Lecture
      - 2. Labs
    - (c) Afternoon Routine
      - 1. Practical Applications
      - 2. Labs
      - 3. SOAP Note Seminars
  - (2) Clinical
    - (a) Shadow a Primary Care provider.
    - (b) 10 days of directly supervised clinical application
    - (c) Document care on a SF-600 SOAP Note format IAW SCSC standards.
    - (d) Must complete the NAVEDTRA 43699-2 HM PQS section for Sick Call Screeners.
- 3. Candidate Evaluation
  - a. Each candidate's final grade must be at a minimum of 70% on each of the performance tests in order to be qualified as a sick call screener. The practical examinations (PE) consist of two parts:
    - (1) Practical Examination
    - (2) SOAP Note Composition

## OUTLINE SHEET SCSC 1.0-1

## COURSE INTRODUCTION (CONT.)

- (3) Personnel Qualification Sheet
- b. Breakdown of the evaluations
  - (1) You will perform the following examinations:
    - (a) Patient History
    - (b) HEENT
    - (c) Respiratory
    - (d) Cardiovascular
    - (e) Gastrointestinal
    - (f) Musculoskeletal
      - 1. Upper extremities
      - 2. Spine
      - 3. Lower extremities
    - (g) Neurology
    - (h) Integumentary
    - (i) Environmental
      - 1. Bites and Stings
      - 2. Heat and Cold Injuries
  - (2) How to prepare for the PE section of the evaluation.
    - (a) Take advantage of afternoon practical applications
    - (b) Work with instructors to develop your skills
    - (c) Practice, practice, practice after class
  - (3) SOAP Note Composition

## OUTLINE SHEET SCSC 1.0-1

## COURSE INTRODUCTION (CONT.)

(a) SOAP Note assignments for grade.

1. Turn in two (2) SOAP Notes for grading on each subject
2. Due on Day 9
3. Grading will be based on the applications of concepts taught in class.

(b) How to prepare for the SOAP Note evaluation.

1. Turn in SOAP Notes you've written during Sick Call from Day 1 to Day 8 for review.
2. Synthesize individualized feedback from instructors that review completed notes.
3. Use feedback to refine SOAP Notes.

#### 4. Trainee Obligations

a. Each Trainee is encouraged to:

- (1) Be alert and take an active part in each classroom session.
- (2) Read the material on the lesson topic prior to the classroom lecture.
- (3) Bring all required classroom materials to class.
  - (a) Trainee Guide
  - (b) PE tools
  - (c) Note-taking tools
  - (d) Pen and Paper
- (4) Dedicate yourself to the course and understand that it will take hours of out-of-class time to keep up with the rapid pace of this course.
- (5) Always ask for feedback from the preceptors/instructors
- (6) Attend every session.

## OUTLINE SHEET SCSC 1.0-1

## COURSE INTRODUCTION (CONT.)

- (a) Reschedule all appointments during the training week.
  - (b) This is a very short training period and you **MUST** attend every session outlined in your schedule.
  - (7) Turn in assigned work on time.
  - (8) Be punctual and wear the designated uniform of the day.
  - (9) Practice, practice, practice all of the skills taught during this course.
5. Summary and Review
- 1.1 Describe the Sick Call Screener Program
  - 1.2 Describe the Sick Call Screener Course

## OUTLINE SHEET SCSC 1.1-1

## SCOPE OF CARE

## A. INTRODUCTION

## B. ENABLING OBJECTIVES

1.3 Describe the sick call screener's scope of care.

## C. SCSC 1.1-1 SCOPE OF CARE TOPIC OUTLINE

## 1. Introduction

## 2. Scope of Care

- a. The primary goal of the Sick Call Screener Program is to provide timely, quality care for active duty personnel with minor medical conditions. Screeners are not to function as independent providers. They must work under the direct supervision of a medical officer who is responsible for the care they provide.
- b. Patients reporting to sick call will follow accepted routine designed to enhance both the efficiency and quality of medical care. Upon arrival the patient will proceed to the front desk where he/she will present a valid DOD ID card. The patient's data will be entered in the sick call log in accordance with the local standard operating procedure (SOP).
- c. The medical record clerk will retrieve the patient's records from the file room. The patient will be directed to the appropriate waiting or screening area. Patients will generally be seen in order of arrival.
- d. It is extremely important for all personnel working in the sick call area to be able to recognize those patients who require immediate care. In such cases the supervising Medical Officer will be notified immediately. Routine sick call patients will have their vitals taken and their complaint(s) reviewed by qualified enlisted medical personnel.
- e. The screener may continue with the patient's interview and follow the procedures as outlined in this text. Screeners must realize their own personal limitations and seek assistance from the medical officer or preceptor whenever any doubt exists.
- f. All patients may request to be seen by a Medical Officer/Physician's Assistant/Nurse Practitioner/Independent Duty Corpsman (MO/PA/NP/IDC).
- g. Discuss the guidelines for the scope of care as it is related to the Sick Call Screener. The following guidelines must be followed:
  - (1) The SOAP format must be used when evaluating a patient. This will include the history, physical examination, assessment, and treatment.

## OUTLINE SHEET SCSC 1.1-1

## SCOPE OF CARE (CONT.)

- (2) The Sick Call Screener shall consult with the supervising medical provider prior to the patient leaving the treatment facility.
- (3) Sick Call Screeners will have 100% of their records reviewed by the supervising medical provider and countersigned.
- (4) A Sick Call Screeners may order labs based upon local clinical guidance or policy. Any other labs must be requested by the supervising MO/PA/NP/IDC.
- (5) Sick Call Screeners must evaluate and treat only minor illnesses for which they have been provided approved treatment protocols, under direct supervision of a SCS Supervisor. Routine sick call (triage) patients will have their vitals taken and their complaint(s) reviewed by qualified medical personnel.
  - (a) The following minor illnesses may be treated
    1. Minor headaches
    2. Uncomplicated upper respiratory infections
    3. Uncomplicated otorhinolaryngological conditions
    4. Minor dermatological conditions
    5. Uncomplicated minor musculoskeletal problems
    6. Uncomplicated gastrointestinal conditions
    7. Minor wounds not requiring suturing, interval examination, or dressing changes
    8. Hypertension (limited to the documentation of serial blood pressure checks which have been requested by a referring provider)
    9. Suture removal
    10. Staple removal
- (6) Must be able to assist the medical provider with medical conditions outside of their scope of care. This would also include times when the SCS is only able to obtain a history and perform a basic physical examination. A SCS may be asked to assist with but not limited some of the following:

## OUTLINE SHEET SCSC 1.1-1

## SCOPE OF CARE (CONT.)

- (a) General HEENT complaints
  - (b) General respiratory complaints
  - (c) General cardiovascular complaints
  - (d) General gastrointestinal complaints
  - (e) General neurological complaints
  - (f) General musculoskeletal complaints
  - (g) General skin, hair and nail complaints
  - (h) General endocrine system conditions
  - (i) Environmental illnesses and injuries
  - (j) Mental health complaints
- (7) Conditions which require immediate referral to a medical officer, physician assistant, or nurse practitioner include:
- (a) Fever (oral temperature) equal to or greater than 103 degrees Fahrenheit.
  - (b) Fever (oral temperature) greater than 100.4 degrees Fahrenheit and less than 103 degrees Fahrenheit, persistent for 48 hours.
  - (c) Respiration greater than 28 per minute without apparent reason.
  - (d) Pulse greater than 120 per minute without apparent reason.
  - (e) A persistent diastolic blood pressure exceeding 105 mm/HG over a three-day period.
  - (f) Any suspected infectious disease, such as, chicken pox and tuberculosis.
  - (g) Any patient with chest pain believed to be cardiac in origin or dyspepsia unrelieved by antacids.
  - (h) Any abdominal pain associated with a fever.
  - (i) Any patient with persistent or worsening abdominal pain.

## OUTLINE SHEET SCSC 1.1-1

## SCOPE OF CARE (CONT.)

- (j) Any patient with excessive bleeding or vomiting blood (hematemesis), coughing up blood (hemoptysis), or having rectal bleeding (hematochezia).
  - (k) Any patient with sudden testicular pain where testicular torsion is a possible diagnosis.
  - (l) Any patient with traumatic or unexplained loss of consciousness.
  - (m) Any patient with a compromised airway. (Note: A minimally compromised airway associated with pharyngitis, other head and neck infections, or head and neck trauma may rapidly progress to a life-threatening emergency. Act expeditiously when confronted with any degree of airway compromise).
  - (n) Any return visit within a reasonable time frame, for the same complaint that has not resolved when compliance to treatment is assured.
  - (o) Any loss of limbs, eye injury or significant visual changes
  - (p) Altered mental status with homicidal or suicidal ideations.
  - (q) Any loss of peripheral pulse.
  - (r) Tendon, nerve or vessel damage.
  - (s) Capillary refill greater than three seconds with acute injury.
  - (t) Pain greater than seven on a scale from 1-10.
  - (u) Open fractures, amputations, structural deformities and joint penetrations
- (8) Refer patients to a higher level of care for the following:
- (a) Dermatitis/rashes/skin irritations.
  - (b) Vaccinations
  - (c) Urinary/bladder/yeast infections.
  - (d) Ear aches/infections.
  - (e) Any diagnostic labs/tests.

## OUTLINE SHEET SCSC 1.1-1

## SCOPE OF CARE (CONT.)

- (f) Wellness exams/physicals.
  - (g) Basic health screenings.
  - (h) Medication refill requests.
  - (i) Abnormal vital signs.
  - (j) Signs of inflammation (such as redness, pus at the site).
  - (k) Any contaminated wound.
  - (l) Animal/human bites.
  - (m) Any puncture wounds.
  - (n) Any procedure/situation in which a corpsman is not comfortable with and/or **other conditions not covered in the immediate/emergency care criteria.**
- h. This course **DOES NOT** teach you to function as independent providers.
  - i. You **MUST** work under the guidance of an MO/PA/NP/IDC.
3. Summary and Review
- 1.3 Describe the sick call screener's scope of care

## OUTLINE SHEET SCSC 1.2-1

## ETHICS

## A. INTRODUCTION

## B. ENABLING OBJECTIVES

1.4 Describe the ethical aspects of military medicine.

## C. SCSC 1.2-1 ETHICS TOPIC OUTLINE

## 1. Introduction

## 2. Corpsman Pledge

- a. "I solemnly pledge myself before God and these witnesses to practice faithfully all of my duties as a member of the Hospital Corps. I hold the care of the sick and injured to be a privilege and a sacred trust and will assist the Medical Department Officer with loyalty and honesty. I will not knowingly permit harm to come to any patient. I will not partake of nor administer any unauthorized medication. I will hold all personal matters pertaining to the private lives of patients in strict confidence. I dedicate my heart, mind and strength to the work before me. I shall do all within my power to show in myself an example of all that is honorable and good throughout my Naval career."

## 3. Universal Medical Ethics Principles

- a. Autonomy refers to the right of competent individuals to make informed decisions free from coercion or undue external influences. In the realm of health care, it typically relates to the informed consent process, in which a competent patient is informed of the risks and potential benefits of clinical procedures so he or she can decide whether to receive them.
- b. Beneficence requires that health care professionals act in the patient's best interest, which is usually understood as promoting the patient's health. Beneficence may sometimes conflict with autonomy and one must decide how to balance these principles.
- c. Nonmaleficence requires that the health care professional do no harm or not impose unnecessary or unacceptable burdens on the patient. Nonmaleficence must often be balanced against beneficence because helpful medical treatments may also cause harm.
- d. Justice includes a formal principle and material principles. The formal principle requires that similar cases be treated similarly. Material principles determine what makes cases similar or different.

## 4. The Concept of Moral Injury

## OUTLINE SHEET SCSC 1.2-1

## ETHICS (CONT.)

- a. Military personnel serving in combat zones will be confronted with numerous ethical and moral challenges. Most of these can be resolved with effective communication, training, leadership, clear rules of engagement, and unit cohesion and support. However, the very act of experiencing, witnessing, or participating in troubling events can undermine a Service member's humanity.
  - b. Transgressions can arise from individual acts of commission or omission, the behavior of others, or by bearing witness to intense human suffering or the grotesque aftermath of battle. An act of serious transgression that leads to serious inner conflict because the experience is at odds with core ethical and moral beliefs is called moral injury.
5. Ethical Issues in Military Medical Settings
- a. Military health care professionals serve in a variety of settings, more diverse than is found in the civilian environment. The Military Health System (MHS) is a global, comprehensive, integrated system that includes combat medical services, peacetime health care delivery, public health services, medical education and training, and medical research and development. MHS personnel provide a continuum of health services from austere operational environments through remote, fixed military treatment facilities (MTFs) to major tertiary care medical centers distributed across the United States.
  - b. While military health care professionals face all of the same ethical dilemmas found in the civilian health care sector, they can face even more within the context of military medicine.
  - c. Health care professionals cannot always resolve ethical conflicts alone. Resources and support are needed for addressing conflicts and raising an issue up the medical chain of command. The military values integrity, and support of an individual's ethics is consistent with that value. Most military health care professionals understand that mission requirements may limit their autonomy in patient care decisions.
6. Decision-Making
- a. Ethical decision making in medicine often touches on individuals' deepest identity-conferring beliefs about the nature and meaning of creating and sustaining life. Yet, conscience also may conflict with professional and ethical standards and result in inefficiency, adverse outcomes, violation of patients' rights, and erosion of trust if, for example, one's conscience limits the information or care provided to a patient.
  - b. Finding a balance between respect for conscience and other important values is critical to the ethical practice of medicine
  - c. Because objections to providing care based on conscience affect someone's health or access to care, considerations must also be given to the patient's rights.

## OUTLINE SHEET SCSC 1.2-1

## ETHICS (CONT.)

- (1) Health care professionals have the duty to refer patients in a timely manner to other providers if they do not feel that they can in conscience provide the standard reproductive services that their patients request.
- (2) In an emergency in which referral is not possible or might negatively affect a patient's physical or mental health, providers have an obligation to provide medically indicated and requested care regardless of the provider's personal moral objections.
- (3) Rights to withdraw from caring for an individual should not be a pretext for interfering with patients' rights to health care services.

## 7. Ethics Education and Training

## a. Ethics education

- (1) Stimulate the moral imagination
  - (a) The ability to gain a feel for the lives of others, some sense of the motions and feelings provoked by difficult ethical choices.
  - (b) Insight how moral viewpoints influence the way individuals live their lives.
  - (c) Broaden the moral imagination.
- (2) Recognize ethical issues
  - (a) Structure perceptions
  - (b) Consider possible moral issues
- (3) Develop analytical skills - be able to use concepts in constructing logical, consistent, and defensible arguments in the face of disagreement.
- (4) Elicit a sense of moral obligation and responsibility - replace assumptions and beliefs with nuanced thinking
- (5) Cope with moral ambiguity - we must learn to tolerate disagreements and accept inevitable ambiguities which arise with ethical problems

## 8. Summary and Review

## 1.4 Describe the ethical aspects of military medicine

## OUTLINE SHEET SCSC 1.2-1

## ETHICS (CONT.)

## 9. Assignment

- a. Read Assignment Sheet SOAP Note, Assignment Sheet SCSC 1.3-3
- b. Read SOAP Note, Outline Sheet SCSC 1.3-1 and Sample SOAP Note, Diagram Sheet SCSC 1.3-4

## OUTLINE SHEET SCSC 1.3-1

## SOAP NOTE

## A. INTRODUCTION

## B. ENABLING OBJECTIVES

1.5 Document a patient encounter

## C. SCSC 1.3-1 SOAP NOTE TOPIC OUTLINE

## 1. Introduction

- a. The SOAP note is the standard for documentation in medical treatment records. This lesson is designed to allow the experienced Corpsman to make detailed notes using the SOAP method, and will assist the less experienced Corpsman in making adequate documentation.
- b. The SOAP method is also designed to allow easy reference for follow-up care.

## 2. Subjective

- a. The Subjective is the information gathered from interviewing the patient. Direct quotes from the patient are helpful. Ask the following questions in a sequential format.

(1) Chief Complaint (CC) questions that are asked during the interview.

- (a) What is your reason for seeking care?
- (b) What can I do for you?

(2) History of present illness (HPI)

- (a) Onset: Ask the patient when the problem or symptom first started and the order of events e.g. “When did these symptoms begin? Were you feeling well before the symptoms started? What were you doing when they first started? Also ask about the manner of the onset e.g. “Did the symptoms come on gradually or suddenly?”
- (b) Location: Ask about the pain’s location and if it radiates or stay in the same place e.g. “Where is your pain located? Does your pain radiate or remain in the same location?”
- (c) Duration: Ask about the length of the symptom e.g. “How long do your pain or symptoms last? Does it come and go or is it constant?”

## OUTLINE SHEET SCSC 1.3-1

## SOAP NOTE (CONT.)

- (d) Character: Ask about the nature of the pain e.g. “What are your symptoms, and what your pain feel like?”
  - (e) Aggravating/Associated factors: Ask what makes it worse and if there are any other associated symptoms e.g. “What makes your pain or symptoms worse? “Do you experience any other problems with your symptoms?”
  - (f) Relieving Factors: Ask what makes the symptoms better and the effect on the symptom e.g. “Have you done anything to make your symptoms better and what kind of affect did it have on your symptoms?”
  - (g) Temporal Factors: Ask the patient to describe the symptoms e.g. “Can you describe the typical symptoms?”
  - (h) Severity of the symptoms: Ask about the severity of their symptoms e.g. “How bad does it hurt? On a scale from zero to ten, zero is no pain and ten is the worst pain you have ever felt.” and “Does it interfere with your activities at home or at work?”
- (3) Past medical history (PMHx)
- (a) Ask the patient to list and describe with dates of occurrence any Hospitalizations and/or surgery (including outpatient surgery) e.g. “Have you ever been hospitalized? Have you ever had any surgery? What for? When? Where?”
  - (b) Ask the patient to list and describe with dates of occurrence any serious illnesses e.g. “Have you had any other serious illnesses?”
  - (c) Ask the patient to list and describe with dates of occurrence any serious injuries e.g. “Have you ever been involved in a serious accident?”
  - (d) Ask the patient to list past, recent and current medications, over the counter medications, recreational drugs or herbal remedies being used e.g. “Do you use any medications, over the counter medicines, recreational drugs, supplements, or herbal remedies?”
  - (e) Ask the patient to list Allergies to drugs, foods, environmental allergens e.g. “Do you have any allergies?”
- (4) Family history (FHx)
- (a) Ask the patient to list any family history of major health or genetic disorders, e.g. “Are there any health problems that run in your family?”

## OUTLINE SHEET SCSC 1.3-1

## SOAP NOTE (CONT.)

## (5) Social history (SHx)

(a) The information included in this section varies according to the concerns of the patient and the influence of the health problem on the patient's life.

1. Alcohol consumption and intake
2. Exercise (how often, duration, type)
3. Tobacco use, to include vapes, cigarettes/cigar, dips/chew.
4. Nutrition (caffeine, salt intake, amount)
5. Sleep pattern (number of hours/night)
6. Work stress and anxiety
7. Education: highest level achieved
8. Occupation
9. Religious barriers to care
10. Travel/deployment history
11. Sexual history/activity: number of partners, and contraception

## (6) Depression screening

(a) Over the last two weeks have you felt:

1. Little interest or pleasure in doing things
2. Feeling down, depressed or hopeless
3. Trouble falling or staying asleep or sleeping too much
4. Feeling tired or having little energy
5. Poor appetite or overeating

OUTLINE SHEET SCSC 1.3-1

SOAP NOTE (CONT.)

- 6. Feeling bad about yourself or that you are a failure or have let yourself or your family down
- 7. Trouble concentrating on things, such as reading the newspaper or watching television
- 8. Moving or speaking so slowly that other people could have noticed. Or being so fidgety or restless that you have been moving around a lot more than usual
- 9. Thoughts that you would be better off dead or hurting yourself

(7) Suicidal Ideation/Homicidal Ideation (SI/HI).

- (a) Suicidal and homicidal ideations need to be recognized early in the patient interview process.
- (b) The Columbia-Suicide Severity Rating Scale is used as a screening tool for any patient experiencing SI/HI.
- (c) Ask the patient the following questions:
  - 1. Have you wished you were dead or wished you could go to sleep and not wake up?
  - 2. Have you actually had any thoughts of killing yourself or others?
  - 3. Have you been thinking about how you might kill yourself or others?
  - 4. Have you had these thoughts and had some intentions of acting on them?
  - 5. Have you started to work out or worked out the details of how to kill yourself or someone else?
  - 6. Have you ever done anything, started to do anything, or prepared to do anything to end your life or someone else's.

(8) Review of systems (ROS)

- (a) Constitutional Symptoms:
  - 1. Pain, fever, chills, malaise, fatigue, night sweats, weight loss or gain
- (b) Skin, Hair and Nails:

## OUTLINE SHEET SCSC 1.3-1

## SOAP NOTE (CONT.)

1. Rash, itching, pigmentation change, texture change, abnormal hair or nail growth
- (c) Blood and Lymphatic Systems:
1. Frequent infections, anemia, difficulty healing from cuts/scrapes; easy bruising, lymph node enlargement or tenderness, fatigue or lack of energy
- (d) Head and Neck:
1. Headaches, dizziness, syncope, loss of consciousness, neck stiffness, light headedness
- (e) Eyes:
1. Visual acuity, blurring, diplopia, photophobia, pain, change in vision, glaucoma, use of glasses or contact lenses, use of eye drops/medications, history of trauma
- (f) Ears:
1. Hearing loss, pain, discharge, tinnitus, vertigo
- (g) Nose:
1. Sense of smell, frequency of colds, obstruction, epistaxis, postnasal discharge, sinus pain
- (h) Throat and Mouth:
1. Hoarseness or change in voice, frequency of sore throats, bleeding or swelling of gums, recent tooth abscesses or extractions, soreness of tongue or buccal mucosa, ulcers, disturbance of taste
- (i) Lymph Nodes:
1. Enlargement, tenderness, suppuration
- (j) Chest and Lungs:
1. Pain related to respiration, dyspnea, cyanosis, wheezing, cough, sputum, hemoptysis, exposure to tuberculosis, past chest x-ray

## OUTLINE SHEET SCSC 1.3-1

## SOAP NOTE (CONT.)

## (k) Cardiovascular:

1. Chest pain or distress (precipitating causes, timing and duration, relieving factors), palpitations, orthopnea, edema, hypertension, previous myocardial infarction, exercise tolerance, past electrocardiogram and other cardiac tests, tendency to bruise or bleed

## (l) Breasts:

1. Pain, tenderness, discharge, lumps, galactorrhea, past mammograms, frequency of breast self-examination

## (m) Gastrointestinal:

1. Appetite, digestion, intolerance for any class of foods, dysphagia, heartburn, nausea, vomiting, hematemesis, regularity of bowels, constipation, diarrhea, change in stool color or contents, flatulence, hemorrhoids, jaundice, history of ulcer, gallstones, polyps, tumors, past diagnostic images or tests

## (n) Genitourinary:

1. Dysuria, flank or suprapubic pain, urgency and frequency of urination, nocturia, hematuria, polyuria, dark or discolored urine, hesitancy, dribbling, loss in force of stream, passage of stone, stress incontinence, hernias, STD's

## (o) Musculoskeletal:

1. Joint stiffness, pain, restriction of motion, swelling, redness, heat, bony deformity

## (p) Neurological:

1. Syncope, seizures, weakness or paralysis, abnormalities of sensation or coordination, tremors, loss of memory, ability to concentrate

## (q) Psychological:

1. Depression, mood changes, difficulty concentrating, anxiety, agitation, tension, suicidal thoughts, irritability, sleep disturbances

## (r) Male Specific:

OUTLINE SHEET SCSC 1.3-1

SOAP NOTE (CONT.)

1. Difficulty with erections, penile discharge, testicular pain, scrotal masses

(s) Female Specific:

1. Abnormal bleeding or discharge, itching, date of last Pap smear, pain during intercourse, date of menopause
2. Menses – age at menarche, regularity, duration and amount of flow, dysmenorrhea, last menstrual period (LMP)
3. Pregnancies – number, living children, multiple births, miscarriages, abortions, duration of pregnancy, each type of delivery, any complications during any pregnancy or postpartum period

3. Objective

- a. The Objective is the portion of the note includes all the Corpsman's observations and physical findings.
- b. A complete objective note will contain the following information.

(1) Observations

- (a) General appearance: This is where the Corpsman will form their general impression
- (b) Indications of obvious distress

(2) Physical findings

- (a) Pertinent positive and negative physical findings during examination.
- (b) Vital Signs

(3) Relevant laboratory results, if any from previous encounters

(4) Relevant X-ray studies, if any from previous encounters

4. Assessment

- a. This is where you think through the results of the history and physical examination
- b. It calls for the credentialed providers interpretation and evaluation of the problem, the data, possible implications and the prognosis.

## OUTLINE SHEET SCSC 1.3-1

## SOAP NOTE (CONT.)

- c. There may one diagnosis or several
5. Plan
- a. The Plan includes:
    - (1) An adequate Plan will contain the following information:
      - (a) Medication prescribed
      - (b) Treatments given
      - (c) Physical limitations, if any
      - (d) Follow-up care, if needed.
        - 1. Ancillary test ordered:
          - a. X-rays
          - b. Laboratory
      - (e) Patient education
        - 1. How to take medications and how often
        - 2. What he should know and understand about his medications and therapy
        - 3. As well as self-care for the future
        - 4. Note any educational printed material given
        - 5. Patient's response to education
      - (f) Disposition (duty, profile, quarters, referrals)
        - 1. Light duty, sick in quarters and bed rest should all have specific expiration dates
        - 2. Light Duty Chits should not be written in medical language and should be specific concerning physical limitations



## JOB SHEET SCSC 1.3-3

## SOAP NOTE

## A. INTRODUCTION

Upon successful completion of this lesson the Trainee will be able to: Obtain a comprehensive medical history.

B. EQUIPMENT LIST: The primary instructor is responsible for checking that all of the below equipment is available, functional and in the lab before the lab is scheduled to begin:

1. Pen, Black
2. SF 600 Forms

## C. REFERENCES

1. Seidel's Guide to Physical Examination, 8th Ed., Jane W. Ball, Joyce E. Dains, John A. Flynn, Barry S. Soloman, Rosalyn W. Stewart, Mosby, an imprint of Elsevier Inc., 2015
2. Psychiatric Interviewing, 3rd ed., Shawn C. Shea, Elsevier Inc., 2017
3. Rosen's Emergency Medicine Concepts and Clinical Practices, 9th ed., Ron M. Walls, Robert S. Hockberger, Marianne Gausche-Hill, Elsevier Inc., 2018

## D. SAFETY PRECAUTIONS

1. Instructors, Trainees and visitors must comply with all general safety procedures that are posted in the lab environment or provided in the lesson plan.
2. There are no skill specific safety hazards for this Performance Test.
3. Review TTO procedures in the Safety/Hazard Awareness Notice.
4. Trainees will not practice if an instructor is not present.
5. Trainees may not take equipment out of the lab.

## E. JOB STEPS

Trainee Instructions:

1. The purpose of this Performance Test is to evaluate the Trainee's ability to obtain a comprehensive medical history.
2. The Trainee must attempt to perform and describe or explain each step as they are performing it.
3. The Trainee has 10 minutes to complete this examination.
4. The Trainee is not allowed to use the reference(s) in the performance of this Performance Test.

## JOB SHEET SCSC 1.3-3

## SOAP NOTE (CONT.)

5. The Trainee will wear appropriate attire during the practice and actual Performance Test evaluation per Instructor's guidance.

**AT MEDICAL REPRESENTATIVE DIRECTION, OBTAIN A PATIENT'S CHIEF COMPLAINT BY COMPLETING THE FOLLOWING STEPS:**

1. Ask the patient why they are seeking care e.g. "What is your reason for seeking care?" or "What can I do for you?"

**AT MEDICAL REPRESENTATIVE DIRECTION, OBTAIN A PATIENT'S HISTORY OF PRESENT ILLNESS BY COMPLETING THE FOLLOWING STEPS:**

1. Ask the patient when the problem or symptom first started and the order of events e.g. "When did these symptoms begin? Were you feeling well before the symptoms started? What were you doing when they first started? Also ask about the manner of the onset e.g. "Did the symptoms come on gradually or suddenly?"
2. Ask about the pain's location and if it radiates or stay in the same place e.g. "Where is your pain located? Does your pain radiate or remain in the same location?"
3. Ask about the length of the symptom e.g. "How long did your pain or symptoms last? Does it come and go or is it constant?"
4. Ask about the nature of the pain e.g. "What does your pain or symptoms feel like?"
5. Ask what makes it worse and if there are any other associated symptoms e.g. "What makes your pain or symptoms worse? "Do you experience any other problems with your symptoms?"
6. Ask what makes the symptoms better and the effect on the symptom e.g. "Have you done anything to make your symptoms better and what kind of affect did it have on your symptoms?"
7. Ask the patient to describe the symptoms e.g. "Can you describe the typical symptoms".
8. Ask about the severity of their symptoms e.g. "How bad does it hurt on a scale from zero to ten, zero is no pain and 10 is the worst pain you have ever felt?" and "Does it interfere with your activities at home or at work?"

## JOB SHEET SCSC 1.3-3

## SOAP NOTE (CONT.)

**AT MEDICAL REPRESENTATIVE DIRECTION, OBTAIN A PATIENT'S PAST MEDICAL HISTORY BY COMPLETING THE FOLLOWING STEPS:**

1. Ask the patient to list and describe with dates of occurrence any Hospitalizations and/or surgery (including outpatient surgery) e.g. "Have you ever been hospitalized? Have you ever had any surgery? What for? When? Where?"
2. Ask the patient to list and describe with dates of occurrence any serious illnesses e.g. "Have you had any other serious illnesses?"
3. Ask the patient to list and describe with dates of occurrence any serious injuries e.g. "Have you ever been involved in a serious accident?"
4. Ask the patient to list past, recent and current medications, over the counter medications, recreational drugs or herbal remedies being used e.g. "Do you use any medications, over the counter medicines, recreational drugs or herbal remedies?"
5. Ask the patient to list Allergies to drugs, foods, environmental allergens e.g. "Do you have any allergies?"

**AT MEDICAL REPRESENTATIVE DIRECTION, OBTAIN A PATIENT'S FAMILY HISTORY BY COMPLETING THE FOLLOWING STEPS:**

1. Ask the patient to list any family history of major health or genetic disorders e.g. "Are there any health problems that run in your family?"

**AT MEDICAL REPRESENTATIVE DIRECTION, OBTAIN A PATIENT'S SOCIAL HISTORY BY COMPLETING THE FOLLOWING STEPS:**

1. Alcohol consumption and intake
2. Exercise (how often, duration, type)
3. Tobacco use, to include vapes, cigarettes/cigar, dips/chew.
4. Nutrition (caffeine, salt intake, amount)
5. Sleep pattern (number of hours/night)
6. Work stress and anxiety
7. Education: highest level achieved

## JOB SHEET SCSC 1.3-3

## SOAP NOTE (CONT.)

8. Occupation
9. Religious barriers to care
10. Travel/deployment history
11. Sexual history/activity: number of partners, and contraception

**AT MEDICAL REPRESENTATIVE DIRECTION, ASSESS A PATIENT FOR DEPRESSION BY COMPLETING THE FOLLOWING STEPS:**

1. Over the last two weeks have you felt:
  - a. Little interest or pleasure in doing things
  - b. Feeling down, depressed or hopeless
  - c. Trouble falling or staying asleep or sleeping too much
  - d. Feeling tired or having little energy
  - e. Poor appetite or overeating
  - f. Feeling bad about yourself or that you are a failure or have let yourself or your family down
  - g. Trouble concentrating on things, such as reading the newspaper or watching television
  - h. Moving or speaking so slowly that other people could have noticed. Or being so fidgety or restless that you have been moving around a lot more than usual
  - i. Thoughts that you would be better off dead or hurting yourself

**AT MEDICAL REPRESENTATIVE DIRECTION, ASSESS A PATIENT FOR SUICIDAL/HOMICIDAL IDEATIONS BY COMPLETING THE FOLLOWING STEPS:**

1. Ask the following questions:
  - a. Have you wished you were dead or wished you could go to sleep and not wake up?
  - b. Have you actually had any thoughts of killing yourself or others?
  - c. Have you been thinking about how you might kill yourself or others?

## JOB SHEET SCSC 1.3-3

## SOAP NOTE (CONT.)

- d. Have you had these thoughts and had some intentions of actin on them?
- e. Have you started to work out or worked out the details of how to kill yourself or someone else?
- f. Have you ever done anything, started to do anything, or prepared to do anything to end your life or someone else's.

**AT MEDICAL REPRESENTATIVE DIRECTION, CONDUCT A REVIEW OF SYSTEMS ON A PATIENT BY COMPLETING THE FOLLOWING STEPS:**

1. Constitutional Symptoms:
  - a. Pain, fever, chills, malaise, fatigue, night sweats, weight loss or gain
2. Skin, Hair and Nails:
  - a. Rash, itching, pigmentation change, texture change, abnormal hair or nail growth
3. Blood and Lymphatic Systems:
  - a. Frequent infections, anemia, difficulty healing from cuts/scrapes; easy bruising, lymph node enlargement or tenderness, fatigue or lack of energy
4. Head and Neck:
  - a. Headaches, dizziness, syncope, loss of consciousness, neck stiffness, light headedness
5. Eyes:
  - a. Visual acuity, blurring, diplopia, photophobia, pain, change in vision, glaucoma, use of glasses or contact lenses, use of eye drops/medications, history of trauma
6. Ears:
  - a. Hearing loss, pain, discharge, tinnitus, vertigo
7. Nose:
  - a. Sense of smell, frequency of colds, obstruction, epistaxis, postnasal discharge, sinus pain

## JOB SHEET SCSC 1.3-3

## SOAP NOTE (CONT.)

## 8. Throat and Mouth:

- a. Hoarseness or change in voice, frequency of sore throats, bleeding or swelling of gums, recent tooth abscesses or extractions, soreness of tongue or buccal mucosa, ulcers, disturbance of taste

## 9. Lymph Nodes:

- a. Enlargement, tenderness, suppuration

## 10. Chest and Lungs:

- a. Pain related to respiration, dyspnea, cyanosis, wheezing, cough, sputum, hemoptysis, exposure to tuberculosis, past chest x-ray

## 11. Cardiovascular:

- a. Chest pain or distress (precipitating causes, timing and duration, relieving factors), palpitations, orthopnea, edema, hypertension, previous myocardial infarction, exercise tolerance, past electrocardiogram and other cardiac tests, tendency to bruise or bleed

## 12. Breasts:

- a. Pain, tenderness, discharge, lumps, galactorrhea, past mammograms, frequency of breast self-examination

## 13. Gastrointestinal:

- a. Appetite, digestion, intolerance for any class of foods, dysphagia, heartburn, nausea, vomiting, hematemesis, regularity of bowels, constipation, diarrhea, change in stool color or contents, flatulence, hemorrhoids, jaundice, history of ulcer, gallstones, polyps, tumors, past diagnostic images or tests

## 14. Genitourinary:

- a. Dysuria, flank or suprapubic pain, urgency and frequency of urination, nocturia, hematuria, polyuria, dark or discolored urine, hesitancy, dribbling, loss in force of stream, passage of stone, stress incontinence, hernias, STD's

## 15. Musculoskeletal:

- a. Joint stiffness, pain, restriction of motion, swelling, redness, heat, bony deformity

## JOB SHEET SCSC 1.3-3

## SOAP NOTE (CONT.)

## 16. Neurological:

- a. Syncope, seizures, weakness or paralysis, abnormalities of sensation or coordination, tremors, loss of memory, ability to concentrate

## 17. Psychological:

- a. Depression, mood changes, difficulty concentrating, anxiety, agitation, tension, suicidal thoughts, irritability, sleep disturbances

## 18. Male Specific:

- a. Difficulty with erections, penile discharge, testicular pain, scrotal masses

## 19. Female Specific:

- a. Abnormal bleeding or discharge, itching, date of last Pap smear, pain during intercourse, date of menopause
- b. Menses – age at menarche, regularity, duration and amount of flow, dysmenorrhea, last menstrual period (LMP)
- c. Pregnancies – number, living children, multiple births, miscarriages, abortions, duration of pregnancy, each type of delivery, any complications during any pregnancy or postpartum period

## ASSIGNMENT SHEET SCSC 1.3-4

## SOAP NOTE

## A. INTRODUCTION:

This assignment is to be completed prior to the material being covered in class.

## B. ENABLING OBJECTIVES:

1.5 Document a patient encounter

## C. STUDY ASSIGNMENT:

1. Read SOAP Note, Outline Sheet SCSC 1.3-1

D. DEVELOP A SOAP NOTE FROM THE FOLLOWING SCENARIOS: consider the questions you would like to ask each one and synthesize an appropriate response for each of your questions and the expected findings for the scenario in your SOAP note. Consider the possible assessments and report your findings, assessment and treatment plan to your preceptor.

1. While on duty at a Branch Medical Clinic, a 23 year old male, enters the clinic via assisted ambulation from two other Sailors. The patient is not wearing a shoe on their right foot, appears in pain without acute distress and is complaining of twisting his ankle when he landed after taking a jump shot out on the basketball court. There are no apparent life threats and the patient appears alert and oriented. The vital signs are:

- a. B/P: 132/70
- b. P: 90
- c. RR: 16
- d. Temp: 98.9 F
- e. SPO2: 99%

2. A 22 year old male presents to sick call on board the USS Never Sail, the patient is complaining of a cough for the past two days that is productive with greenish phlegm. The vital signs are:

- a. B/P: 126/76
- b. P: 80
- c. RR: 14
- d. Temp: 97.9 F
- e. SPO2: 98%

## DIAGRAM SHEET SCSC 1.3-5

## SAMPLE SOAP NOTE

## 1. SUBJECTIVE:

- a. 21 y/o male presents c/o of a sprained right ankle x 12 hours. PT injured ankle yesterday by stepping into a hole while running. PT stated he heard a "snap" and can only ambulate with assistance, he borrowed crutches from a shipmate. PT returned to his barracks hoping to "sleep it off" but decided to come in after his right ankle appeared swollen and bruised, with increased pain. PT stated pain worsened in the morning to a 6/10 and the pain was at 5/10 before going to bed. PT stated pain is located on the outside of the ankle, it is constant and sharp; worsens when walking to 8/10 and it radiates to the front of the lower leg. When touched pain increases to 7/10. PT states some pain relief was made when he rested, elevated and placed ice on it, but did not try to wrap it.

## 2. OBJECTIVE:

- a. General impression: 21 y/o Active duty male, A&O x3, no apparent distress, assisted ambulatory to aid station with crutches, well nourished, well developed, well groomed, facial expressions consistent with complaint of pain, noted obvious swelling of the right ankle and patient has no shoe on foot.

(1) Gait and Ambulation: Patient unable to take 5 unassisted steps.

## b. Focused

(1) Right Foot: No obvious gross deformities, no hallux valgus, no varus, no claw toes, no hammer toes.

(2) Right Ankle: Positive diffuse edema, positive ecchymosis to lateral aspect, range of motion with decrease of 10 degrees to dorsiflexion and 20 degrees to eversion in comparison to the left ankle. Positive tenderness to palpation at the posterior superior and anterior aspects of the lateral malleolus and diffusely across the dorsal surface of the foot at the lateral to mid aspect of the foot. Neurovascularly grossly intact and equal bilaterally, strength 4/5 with increase of pain.

## c. Special Examinations

(1) Anterior and Posterior drawers negative for significant laxity.

(2) Talar Tilt positive laxity with end-point, patient expressed significant pain during exam.

(3) Ottawa Criteria positive for inability to ambulate 5 steps unassisted, positive posterior superior tenderness of the lateral malleolus, no tenderness at the base of the fifth metatarsal noted.

## DIAGRAM SHEET SCSC 1.3-4

## SAMPLE SOAP NOTE (CONT.)

(4) Negative Thompson, negative Homans.

3. ASSESSMENT:

a. Grade II right ankle sprain

(1) Positive Ottawa criteria, to be treated as a fracture until ruled out.

4. PLAN:

a. Splint/Boot

b. Rest, Ice, Elevation

c. Motrin 800mg PO TID PRN for sprain

d. Tylenol 325mg 1 to 2 tabs PO Q4-6hrs for fractures

e. Crutches for 72 hours, if fractured use will be longer

f. Light duty for 2 weeks, if fractured it will be longer

g. RTC IMMEDIATELY for numbness, loss of sensation, discoloration of toes past the splint

h. RTC PRN

## OUTLINE SHEET SCSC 1.4-1

## PATIENT PRESENTATION

## A. INTRODUCTION

## B. ENABLING OBJECTIVES

1.6 Perform a patient presentation

## C. SCSC 1.4-1 PATIENT PRESENTATION TOPIC OUTLINE

## 1. Introduction

- a. The patient presentation is the communication of the pertinent history and findings from the Corpsman to the provider.
- b. Effective communication contributes to the safe transfer of patients from one healthcare professional to another.
- c. The patient presentation assist with providing continuity of care and ensuring patient safety

## 2. Presenting a Patient

- a. It is important to identify yourself and build a rapport with the provider you are turning over with if you do not already have a working relationship.
- b. Present the patient's general information first, this includes their rank or title, name, age and gender.
- c. Report the patient's chief complaint
- d. Report all pertinent findings and information from the history of present illness (HPI) utilizing the OLDCARTS mnemonic.
- e. Discuss pertinent past medical history, surgical history, family history and social history
- f. Report all positives or negatives findings from the review of systems and all constitutional.
- g. Report the pertinent positive and negative findings from your physical examination. Report the following finding:
  - (1) General impression of the patient to include signs of distress, mental status, gross deformities, facial expressions, body language and gait.
  - (2) By system and usually from head to toe in a sequential order. You should avoid jumping around body systems when giving the report.

## OUTLINE SHEET SCSC 1.4-1

## PATIENT PRESENTATION (CONT.)

- (3) Vital signs and whether the blood pressure and pulse were taken manually.
- h. Provide assessment to the provider based upon the patient's history, your general observations and your physical examination. Some provider may ask for possible differentials, it is wise to think of a few possibilities prior to presenting the patient
- i. Report the plan that you have begun to develop and take notes for improvement from your provider. The plan may include:
  - (1) Patient education and reassurance provided
  - (2) Medications
  - (3) Rest, patient education on importance of increased sleep
  - (4) Other therapies such as stretches, salt water gargles, etc....
  - (5) Need to follow up for worsening s/s, no change or PRN
  - (6) Duty status/disposition: light duty, sick in quarters (duration), or return to full duty.
- 3. Barriers to Reporting
  - a. Barriers to an effective presentation include the following:
    - (1) Unnecessary information
    - (2) Lengthy report
    - (3) Language barriers
    - (4) Missed information
    - (5) Lack of standardization
    - (6) Interruptions
  - b. The critical component of the presentation is to include a systematic method of providing the information contained in a report.
- 4. Summary and Review
  - 1.6 Perform a patient presentation

OUTLINE SHEET SCSC 2.1-1

HEENT SYSTEM

A. INTRODUCTION

B. ENABLING OBJECTIVES

- 1.7 Utilize head and neck anatomy while assessing a patient with a HEENT complaint
- 1.8 Utilize eye anatomy while assessing a patient with a HEENT complaint
- 1.9 Utilize eye physiology while assessing a patient with a HEENT complaint
- 1.10 Utilizing ears, nose and throat anatomy while assessing a patient with a HEENT complaint
- 1.11 Utilize ears, nose and throat physiology while assessing a patient with a HEENT complaint
- 1.12 Obtain history from patients with common head, eye, ear, nose, and throat complaints
- 1.13 Perform a head, eye, ear, nose and throat examination
- 1.14 List signs and symptoms of common head, eye, ear, nose and throat disorders
- 1.15 List treatments for common head, eye, ear, nose and throat disorders
- 1.16 State Red Flag criteria

C. SCSC 2.1-1 HEENT SYSTEM TOPIC OUTLINE

- 1. Introduction - This lesson will improve your understanding of and your ability to perform examinations of the head, neck, eyes, ears, nose, mouth and throat. These examinations are one of the most common examinations that a Sick Call Screener will perform.
- 2. Anatomy and physiology of the head and neck
  - a. Cranium
    - (1) The skull is composed of seven bones (two frontal, two parietal, two temporal and one occipital) that are fused together and covered by the scalp.
    - (2) The face has cavities for the eyes, nose, and mouth.

OUTLINE SHEET SCSC 2.1-1

HEENT SYSTEM (CONT.)

- (3) The face is formed from the fused frontal, nasal, zygomatic, ethmoid, lacrimal, sphenoid and maxillary bones and the movable mandible.
  - (4) Major facial landmarks are the palpebral fissures and the nasolabial folds.
  - (5) Facial muscles are innervated by the trigeminal (CN V) and Facial (CN VII) cranial nerve.
  - (6) The temporal artery is the major accessible artery of the face, passing just anterior to the ear, over the temporal muscle and onto the forehead.
  - (7) The temporomandibular joint (TMJ) is located anterior to the tragus of the ear.
  - (8) The muscles of mastication (chewing) are innervated by the mandibular division of the trigeminal nerve and are:
    - (a) Masseter muscle, elevates the mandible (closes the mouth). This is also the strongest muscle of mastication.
    - (b) Temporalis muscle, elevates and retracts the mandible.
    - (c) Medial pterygoid, elevates and protracts the mandible and also moves it side to side.
    - (d) Lateral pterygoid, protracts the mandible, depresses the mandible (opens the mouth), and moves the mandible from side to side.
- b. Neck
- (1) The neck is formed by the cervical vertebrae, ligaments, sternocleidomastoid and trapezius muscles, which give it support and movement.
  - (2) The relationship of these muscles to each other and to adjacent bones creates triangles used as anatomic landmarks.
  - (3) The anterior triangle is formed by the medial border of the sternocleidomastoid muscles, mandible, and the midline.
  - (4) The anterior triangle contains the hyoid bone, cricoid cartilage, trachea and anterior cervical lymph nodes.
  - (5) The posterior triangle is formed by the trapezius and sternocleidomastoid muscles and the clavicle.

OUTLINE SHEET SCSC 2.1-1

HEENT SYSTEM (CONT.)

- (6) The posterior triangle contains the posterior cervical lymph nodes.
  - (7) The thyroid is the largest endocrine gland in the body, producing two hormones: thyroxine (T4) and triiodothyronine (T3).
    - (a) Joined by the isthmus below the cricoid cartilage and butterfly in shape, located on each side of the trachea.
    - (b) In pregnant women before the second trimester, they are the primary source of thyroid hormone for the fetus.
    - (c) Pregnant women require increased iodine intake. If there is a deficiency, an enlarged thyroid may be detected.
3. Anatomy and physiology of the eye
- a. The eye measures approx. 2.5 cm in diameter and of this only the anterior 1/6th is exposed, the remainder is recessed and protected by the orbit. The wall of the eyeball contains three layers the fibrous tunic, the vascular tunic and the retina.
  - b. Extrinsic eye muscles, these muscles originate outside the eyeball (in the orbit) and insert on the outer surface of the sclera.
    - (1) Superior rectus: moves the eye superiorly and medially and rotates them medially. Is innervated by the Oculomotor nerve (CN III).
    - (2) Inferior rectus: moves the eye inferiorly and medially and rotates them laterally. Is innervated by the Oculomotor nerve (CN III).
    - (3) Lateral rectus: moves the eyes laterally. Is innervated by the Abducens nerve (CN VI).
    - (4) Medial rectus: moves the eyes medially. Is innervated by the Oculomotor nerve (CN III).
    - (5) Superior oblique: moves the eyes inferiorly and laterally and rotates them medially. Is innervated by the Trochlear nerve (CN IV).
    - (6) Inferior oblique: moves the eyes superiorly and laterally and rotates them laterally. Is innervated by the Oculomotor nerve (CN III).

OUTLINE SHEET SCSC 2.1-1

HEENT SYSTEM (CONT.)

- c. External Eye
  - (1) Eyelids: Composed of skin, conjunctiva and striated muscle
  - (2) Functions:
    - (a) To distribute tears over the surface of the eye
    - (b) To limit the amount of light entering it
    - (c) To protect it from foreign bodies
    - (d) The muscle responsible for elevating the eyelids is the Levator palpebrae superioris and is innervated by the Oculomotor nerve (CN III).
    - (e) The muscle responsible for closing the eyelids is the Orbicularis oculi and is innervated by the Facial nerve (CN VII).
  - (3) Conjunctiva: a thin membrane covering most of the anterior eye and the inner surface of the eyelid in contact with the globe.
  - (4) Lacrimal gland: approx. the size of an almond, secretes lacrimal fluid which drains into the lacrimal ducts, that empty tears on the surface of the conjunctiva of the upper lid, from there the tears pass medially over the anterior surface to enter the two small openings the lacrimal puncta. The lacrimal glands are supplied by the parasympathetic fibers of the Facial nerve (CN VII).
- d. Internal Eye – the outer fibrous layer is made up of the sclera posteriorly and the cornea anteriorly.
  - (1) The sclera is the dense, avascular structure that appears anteriorly as the white of the eye. It physically supports the internal structure of the eye.
  - (2) The cornea is a continuation of the sclera. It is optically clear, has rich sensory innervation, and is avascular. It can sense pain and separates the aqueous humor of the anterior chamber from the external environment and transmits light through the lens to the retina.
- e. Internal Eye – The middle layer (vascular tunic) or Uvea, is composed of the choroid, ciliary body and the iris.

OUTLINE SHEET SCSC 2.1-1

HEENT SYSTEM (CONT.)

- (1) The iris is a circular, contractile muscular disc that gives eyes their color. The hole in the center of the iris is the pupil. The iris controls the amount of light going through the pupil to the retina by dilating and contracting.
  - (2) The lens is located right behind the iris. By stretching it, the thickness changes allowing images from varying distances to be focused on the retina.
  - (3) The choroid is a pigmented, richly vascular layer that supplies oxygen to the outer layer of the retina.
- f. Internal Eye – The inner layer is made up of the retina and lines the posterior three-quarters of the eyeball.
- (1) The retina is the sensory nerve network of the eye – changing light impulses to electrical impulses, which are sent via the optic nerve to the brain. The retina contains several landmarks that can be viewed with an ophthalmoscope to include:
    - (a) The optic disc: the site where the optic nerve (CN II) exits the eye.
    - (b) Macula lutea: a small flat spot in the center of the posterior portion of the retina.
    - (c) Fovea centralis: a small depression in the center of the macula lutea and contains only cones.
  - (2) The retina also contains the photoreceptor cells that are separated into two categories: Approximately 6 million cones and 120 million rods.
    - (a) Rods: Allow us to see in dim light, such as moonlight. Rods do not allow us to see color and so in the dark we only see black, white and shades of gray.
    - (b) Cones: Stimulated by brighter lights and produce color vision. Cones are divided into blue, green and red cones.
4. Anatomy and physiology of the ear:
- a. The ear is divided into three main regions: the external ear, which collects sound waves and channels them inward; the middle ear which conveys sound vibrations to the oval window; and the inner ear, which houses the receptors for hearing and equilibrium.

OUTLINE SHEET SCSC 2.1-1

HEENT SYSTEM (CONT.)

- b. The external (outer) ear consists of the auricle, external auditory canal and the tympanic membrane (eardrum).
  - (1) The auricle (pinna) is a flap of elastic cartilage shaped like the flared end of a trumpet and covered by skin. The rim of the auricle is called the helix and the inferior portion is the lobule.
  - (2) The auditory canal is a curved tube approx. 1 in. long lying within the temporal bone and leads to the tympanic membrane.
  - (3) The tympanic membrane or eardrum is a semitransparent partition between the external auditory canal and the middle ear. Tearing of the tympanic membrane is called a perforated tympanic membrane or perforated eardrum. It can be caused by improper use of cotton swabs, trauma, or a middle ear infection and usually heals within a month.
  - (4) The mastoid portion of the temporal bone is located posterior and inferior to the external auditory meatus, or ear canal, and directs sound waves into the ear. This portion of bone contains several mastoid air cells which communicate with the hollow space of the middle ear. These tiny air-filled compartments are separated from the brain by thin bony partitions.
    - (a) Untreated middle ear infections can spread into the mastoid air cells causing a painful inflammation called mastoiditis.
    - (b) It is important to remember this due to the thin separation from the blood brain barrier.
- c. The middle ear is a small air-filled cavity in the petrous portion of the temporal bone. It is separated from the external ear by the tympanic membrane and the inner ear by a thin bony partition that contains two small openings, the oval window and the round window.
- d. The auditory ossicles extend across the middle ear and are the smallest bones in the body. They are named for their shapes and are the:
  - (1) Malleus: Also known as the hammer. The “handle” of the malleus attaches to the internal surface of the tympanic membrane. The head of the malleus articulates with the body of the incus.
  - (2) Incus: Also known as the anvil. The middle bone in the series, articulates with the head of the stapes.

OUTLINE SHEET SCSC 2.1-1

HEENT SYSTEM (CONT.)

- (3) Stapes: Also known as the stirrup. The base or footplate of the stapes fits into the oval window.
- e. The internal ear is also called the Bony labyrinth because of its complicated series of canals. It consists of two main divisions, the bony labyrinth and the membranous labyrinth.
  - (1) Vestibule: the oval central portion of the bony labyrinth. Projecting superiorly and posteriorly from the vestibule are three semicircular canals, each of which lies at approximately right angles of each other.
  - (2) Cochlea: snail shaped bony spiral canal anterior of the vestibule. Sections in the cochlea show it is divided into three channels: cochlear duct, scala vestibule, and scala tympani.
    - (a) Cochlear duct: is a continuation of the membranous labyrinth into the cochlea and is filled with endolymph.
    - (b) Scala vestibuli: is the perilymph filled channel above the cochlear duct ends at the oval window. Separated from the cochlear duct by the vestibular membrane.
    - (c) Scala tympani: is the perilymph filled channel below the cochlear duct ends at the round window. Separated from the cochlear duct by the basilar membrane.
  - (3) Organ of Corti: a spiral organ that is a coiled sheet of epithelial cells, including supporting cells and approximately 16,000 hair cells, which are the receptors for hearing. Vestibulocochlear nerve (CN VIII)
- f. The physiology of hearing.
  - (1) The auricle directs sound waves into the external auditory canal.
  - (2) When sound waves strike the tympanic membrane, the tympanic membrane vibrates back and forth.
  - (3) The tympanic membrane vibrates slowly for low frequency (low-pitched) sounds and fast for high frequency (high-pitched) sounds.
  - (4) The tympanic membrane connects to the malleus and vibrates transmitting the vibration to incus and then the stapes.

OUTLINE SHEET SCSC 2.1-1

HEENT SYSTEM (CONT.)

- (5) As the stapes moves with the vibration, its oval shaped footplate attached with a ligament to the oval window, transmit vibrations to the oval window.
  - (6) The movement of the stapes at the oval window sets up fluid pressure waves in the perilymph of the cochlea. As the oval window bulges inward, it pushes the perilymph of the scala vestibuli.
  - (7) Pressure waves are transmitted from the scala vestibuli to the scala tympani and to the round window causing it to bulge outward into the middle ear.
  - (8) The pressure waves travel through the perilymph of the scala vestibuli, then the vestibular membrane and move into the endolymph in the cochlear duct.
  - (9) The pressure waves in the endolymph cause the basilar membrane to vibrate, this moves the hair cells of the Organ of Corti.
  - (10) The hair cells transduce mechanical vibrations into electrical signals.
5. Anatomy and physiology of the nose.
- a. The nose is a specialized organ at the entrance of the respiratory system, it consists of a visible external portion and an internal portion inside the skull called the nasal cavity.
  - b. The external nose is the portion visible on the face and consists of a supporting framework of bone and hyaline cartilage covered with muscle and skin and lined by a mucous membrane.
  - c. The bony framework of the external nose is made up of the frontal bone, the nasal bones and the maxillae.
  - d. The cartilaginous framework of the external nose consists of several pieces of hyaline cartilage connected to each other and certain skull bones by fibrous connective tissue.
    - (1) Septal nasal cartilage forms the anterior portion of the nasal septum
    - (2) Lateral nasal cartilages are inferior to the nasal bones
    - (3) Alar cartilages form a portion of the walls of the nostrils
  - e. The interior structures of the external nose have three functions
    - (1) Warming, moistening and filtering incoming air

OUTLINE SHEET SCSC 2.1-1

HEENT SYSTEM (CONT.)

- (2) Detecting olfactory stimuli
- (3) Modifying speech vibrations as they pass through the large hollow resonating chambers.
- f. The nasal cavity is a large space in the anterior aspect of the skull, it lies inferior to the nasal bone and superior to the oral cavity. A vertical partition called the nasal septum divides the cavity into left and right sides.
- g. The paranasal sinuses are cavities lined with mucous membranes which are continuous with the lining of the nasal cavity. The bones containing these sinuses are the frontal, sphenoid, ethmoid and maxillae.
- h. The lateral walls of the internal nose are formed by the ethmoid, maxillae, lacrimal, palatine and inferior nasal conchae bones.
- i. The ethmoid bone also forms the roof.
- j. The palatine bones and the palatine processes of the maxillae form the hard palate and the floor of the internal nose.
- k. Approximately the upper third of the nose is supported by bone, the lower two thirds by cartilage. Air enters the nasal cavity by way of the anterior naris on either side, then passes into a widened area known as the vestibule and on through the narrow nasal passage to the nasopharynx.
- l. The medial wall of each nasal cavity is formed by the nasal septum, which, like the external nose, is supported by both bone and cartilage. It is covered by a mucous membrane well supplied with blood. The vestibule, unlike the rest of the nasal cavity, is lined with hair-bearing skin, not mucosa.
- m. The olfactory epithelium is in the superior portion of the nasal cavity covering the inferior surface of the cribriform plate and is approximately 5cm<sup>2</sup> or less than 1in<sup>2</sup> and contains between 10 million to 100 million olfactory receptors and assists with the detection of more than 10,000 scents.
- n. On each side of the nose, about 40 bundles of slender unmyelinated axons of olfactory receptor cells extend through about 20 olfactory foramina in the cribriform plate of the ethmoid bone. These 40 axons collectively form the right and left Olfactory (I) nerves.

OUTLINE SHEET SCSC 2.1-1

HEENT SYSTEM (CONT.)

- o. Olfactory sensations are the only sensations that reach the cerebral cortex without first synapsing in the thalamus. Other axons of the olfactory tract project to the limbic system and hypothalamus; these connections account for our emotional and memory-evoked responses to odors.

6. Anatomy and Physiology of the Mouth and Throat

- a. The mouth or oral (buccal) cavity is formed by the cheeks, hard and soft palate. Buccinator muscles and connective tissue lie between the skin and mucous membranes of the cheeks. The buccinators and orbicularis oris muscles both assist in speech.
- b. The lips are fleshy folds surrounding the opening of the mouth and contain the orbicularis oris muscle and are covered externally by skin and internally by a mucous membrane.
- c. The hard palate is the anterior portion of the roof of the mouth is formed by the maxillae and palatine bones and is covered by a mucous membrane and forms a bony partition between the oral and nasal cavities.
- d. The soft palate forms the posterior portion of the roof of the mouth, is an arch shaped muscular partition between the oropharynx and nasopharynx that is lined with mucous membrane.
- e. The uvula hangs from the free border of the soft palate and during swallowing the uvula and the soft palate are drawn superiorly to prevent foods and liquids from entering the nasal cavity.
- f. The major salivary glands lie beyond the oral mucosa into ducts leading to the oral cavity. There are three pairs of major salivary glands: the parotid, submandibular and sublingual gland.
  - (1) The parotid glands are located inferior and anterior to the ears, between the skin and the masseter muscle.
  - (2) The submandibular glands are found in the floor of the mouth, they are medial and partly inferior to the body of the mandible.
  - (3) The sublingual glands are beneath the tongue and superior of the submandibular glands.
- g. The tongue is an accessory digestive organ composed of skeletal muscle covered with mucous membrane. It forms the floor of the mouth with associated muscles it is

OUTLINE SHEET SCSC 2.1-1

HEENT SYSTEM (CONT.)

divided into symmetrical lateral halves by a median septum and each half consists of an identical complement of extrinsic and intrinsic muscles.

- h. The extrinsic muscles of the tongue are the hypoglossus, genioglossus and styloglossus muscles. These muscles move the tongue side to side and in and out to maneuver food for chewing, shape food into a rounded mass and force the food to the back of the mouth for swallowing.
- i. The intrinsic muscles of the tongue are the longitudinalis superior, longitudinalis inferior, transversus linguae and verticalis linguae muscles. These muscles alter the shape and size of the tongue for speech and swallowing.
- j. The dorsal (upper) surface and lateral surface of the tongue are covered in papillae that contain the taste buds, the receptors for gustation (taste), Facial (CN VII) and Glossopharyngeal (CN IX).
- k. The pharynx is a funnel shaped tube that extends from the internal nares to the esophagus posteriorly and to the larynx anteriorly. It is divided into three parts the nasopharynx, oropharynx and laryngopharynx.
- l. The nasopharynx functions only in respiration. The oropharynx and laryngopharynx both have digestive as well as respiratory functions.
- m. The esophagus is a collapsible muscular tube about 25cm (10 in) long and lies posterior to the trachea. The esophagus begins at the inferior end of the laryngopharynx, passes through the inferior aspect of the neck, enters the mediastinum anterior of the vertebral column and pierces the diaphragm through an opening called the esophageal hiatus and ends in the superior portion of the stomach.
- n. The epiglottis closes off the opening to the larynx when swallowing food and liquids to prevent them from entering the respiratory tract.
- o. There are five tonsils that form a ring at the junction of the oral cavity and oropharynx and at the junction of the nasal cavity and nasopharynx. The tonsils are positioned to participate in immune responses against inhaled or ingested foreign substances.
  - (1) The single pharyngeal tonsil or adenoid is embedded in the posterior wall of the nasopharynx.
  - (2) The two palatine tonsils lie at the posterior region of the oral cavity, one on either side, these are the tonsils commonly removed during a tonsillectomy.

OUTLINE SHEET SCSC 2.1-1

HEENT SYSTEM (CONT.)

(3) The lingual tonsils are located at the base of the tongue and may also require removal during a tonsillectomy.

7. Obtain a history from a patient with an HEENT complaint

a. SUBJECTIVE (S) – “What the patient tells you.”

(1) Chief Complaint (CC) – headache, red eye, eye pain, itchy eyes, ear pain, throat pain, difficulty swallowing, etc.

(2) History of present illness (HPI)

(a) Onset: When the complaint started, was it gradual or abrupt Specific MOI

(b) Location: Where is the pain or discomfort, is it unilateral or bilateral, does it move from one place to another or stay in the same location.

(c) Duration: Constant or come and go, does it last for weeks, days, hours, minutes, resolve spontaneously, come in clusters or waves

(d) Character: Throbbing, pounding, stinging, stabbing, boring, dull, nagging, achy, constant pressure

(e) Aggravating: Anything that makes the symptoms better or worse? Worse with wind, exposure to bright light, movement, position, touch, weight bearing, etc....

(f) Relieves: What makes it better? Rest, ice, compression, elevation, medication, position, movement, massage, etc....

(g) Temporal factors: Time of day in which symptoms are worse or better. Morning, night, day

(h) Severity: Pain measured on a scale from 1 (mild) to 10 (severe).

(3) Associated symptoms:

(a) Head and neck: head pain, headache, laceration, change in breathing pattern, blurred or double vision, discharge from the nose or ears, nausea, vomiting, incontinence, paralysis, loss of sensation, light headed, neck swelling, neck pain, fever, etc....

OUTLINE SHEET SCSC 2.1-1

HEENT SYSTEM (CONT.)

- (b) Eyes: pain, visual disturbance (blurry, double, floaters, flashes of lights, halos, photophobias), redness, purulent discharge, crusting, mating of the eyelids, headaches, dizziness, tearing, itchiness, pressure, foreign body sensation, both eyes affected or just one, etc....
  - (c) Ears: Nausea, vomiting, tinnitus, hearing loss or change, headache, double vision, ear fullness, unsteadiness, pain, fever, discharge, itchiness, vertigo, association with diving or flying, etc....
  - (d) Nose: sneezing, congestion, itching, sniffing, obstruction, mouth breathing, bad breath, sore throat, cough, snoring, sleep issues, bleeding, allergies, sinus pain or pressure, etc....
  - (e) Mouth and Throat: Tooth pain, difficulty swallowing, difficulty speaking or hoarse voice, fever, swollen tonsils, post nasal drip, cough, runny nose, inhalation of smoke or irritants, gastroesophageal reflux, drooling, feeling of obstruction, etc....
- (4) Remedies tried already:
- (a) Head and neck: NSAIDS, analgesics, caffeine, antidepressants -- effective or ineffective
  - (b) Eyes: NSAIDS, eye drops, artificial tears, steroids, topical antibiotics - effective or ineffective
  - (c) Ears: NSAIDS, antibiotics, ear drops e.g. (steroids, acetic acid, anesthetic, cerumen softener) - effective or ineffective
  - (d) Nose: decongestants, saline spray, steroid spray- effective or ineffective
  - (e) Mouth and throat: mouth rinse, antibiotics, lozenges, sprays - effective or ineffective
- (5) Preceding events
- (a) Head and neck: Trauma (motor vehicle accident, blunt trauma, fall) fever, illness
  - (b) Eyes: Trauma (chemical spill, mechanical blow to the eye, high intensity light exposure), recent URI; foreign body in the eye
  - (c) Ears: Diving, flying, foreign object, head trauma, recent URI, swimming

OUTLINE SHEET SCSC 2.1-1

HEENT SYSTEM (CONT.)

- (d) Nose: Blunt trauma, recent URI, dry climate, nose picking, forceful nose blowing, allergies
  - (e) Mouth and Throat: Recent URI, overuse of voice, allergies, inhalation injury, GERD, recent intubation, recent dental work
- (6) Past Medical & Surgical History (PMHx & SurgHx):
- (a) Head and Neck: Traumatic brain injury, concussions, head injuries, syncope, seizures, headaches, surgeries
  - (b) Eyes: Chronic conditions, hospitalizations, infections, corrective eye surgery, use of eyeglasses or contacts
  - (c) Ears: Frequent infections, labyrinthitis, surgeries, tubes in ears as a child
  - (d) Nose: trauma, surgery, nosebleeds, sinusitis, post nasal drip, allergies
  - (e) Mouth and throat: lesions, strep infections, tonsillectomy, adenoidectomy, disorders
  - (f) Medications. Chronic, new, illegal, supplements and vitamins
  - (g) Allergies to food, environment, and medications. Note what happens to patient when taking such food or meds. Ex: penicillin allergy - hives and shortness of breath.
- (7) Family history:
- (a) Head and neck: Headaches, thyroid dysfunction
  - (b) Eyes: Glaucoma, diabetes, macular degeneration, hypertension, cataracts, color blindness, near sighted, far sighted
  - (c) Ears: Hearing problems or loss, Meniere disease
- (8) Social history - tobacco, alcohol, travel, employment.
- (a) Tobacco: Smoke or dip how many/much per day or per week e.g. half pack/half can a day/week, 1-2 cigarettes a day, etc....

OUTLINE SHEET SCSC 2.1-1

HEENT SYSTEM (CONT.)

- (b) Alcohol: Liquor, wine, beer, how much per day, week, month or year, e.g. occasional beer twice a year, 6 beers daily, half a bottle of rum nightly, 1 or 2 drinks a week, etc....
- (c) Travel out of the country or to a location with known parasites, outbreaks or contaminants
- (d) Environmental hazards, exposure to loud noise, dust, metal particles, wood particles.

(9) Review of Systems:

- (a) Constitutional: Fever, chills, night sweats, weight gain/loss, fatigue, malaise
- (b) Respiratory: Cough, sputum, wheezing, dyspnea, hemoptysis, TB exposure, shortness of breath, asthma
- (c) Cardiovascular: Hypertension, chest pain, palpitations, murmur, orthopnea, exercise intolerance
- (d) Endocrine: Diabetes, heat or cold intolerance, sweating, frequent urination, excessive thirst, change in appetite, decreased libido
- (e) Neurological: Numbness, tingling, paresthesia, dizziness, paralysis, visual disturbances, seizures, gait, coordination, syncope, tremors, speech problems, taste disturbances

8. Perform a head and neck examination

- a. General Impression
- b. Review Vital Signs
- c. Head:

- (1) Inspect facial features, eyelids, eyebrows, palpebral fissures, nasolabial folds, and mouth for shape, symmetry, movement, expression. Note any change in shape, symmetry unusual features, swelling, bruising, tics, spasms, and head position.
- (2) Hair – note its quantity, distribution, texture and any pattern of loss. You may see loose flakes of dandruff. Abnormalities - fine hair is seen in hyperthyroidism; coarse hair in hypothyroidism. Tiny white ovoid granules adhered to hairs may be nits.

OUTLINE SHEET SCSC 2.1-1

HEENT SYSTEM (CONT.)

- (3) Scalp – Part the hair in several places and look for scaliness, lumps, nevi or other lesions (nevi plural for nevus – a benign localized growth of melanin forming cells of the skin present at birth or appearing early in life. SYN: Mole, birthmark) Abnormalities - redness, scaling, lumps (cyst), pigmented nevi.
  - (4) Skull – Observe the general size and contour of the skull. Note any deformities, depressions, lumps, or tenderness.
  - (5) Face – note the patient’s facial expression and contours. Observe for asymmetry, involuntary movements, edema, and masses.
  - (6) Skin – Observe the skin, noting its color, pigmentation, texture, thickness, hair distribution and any lesions.
- d. Neck:
- (1) Inspect the neck
    - (a) Note symmetry of the sternocleidomastoid muscles and the trapezius muscles, alignment of the trachea, landmarks of the anterior and posterior triangles
    - (b) Note any jugular vein distension (JVD), or carotid artery prominence and any masses or scars, note any visible lymph nodes
    - (c) Evaluate range of motion (ROM): flexion, extension, rotation and laterally turn the head and neck. Note any difficulty, nuchal rigidity (resistance to flexion) associated with meningeal irritation.
    - (d) Evaluate cranial nerve CN XI (spinal accessory): test trapezius muscle strength (shrug shoulders against resistance), test the sternocleidomastoid muscle strength (turn head side to side against resistance).
  - (2) Palpate the neck:
    - (a) Palpate the trachea for midline position, identify the hyoid bone and the thyroid and cricoid cartilages.
    - (b) Palpate the paravertebral muscles and spinous process for tenderness.
    - (c) Evaluate the thyroid by asking the patient to gently extend their neck and ask them to swallow, giving visualization of symmetry, size and contour as it

OUTLINE SHEET SCSC 2.1-1

HEENT SYSTEM (CONT.)

moves with swallowing. Palpate gently for nodules, size, shape, and tenderness.

(d) Lymph nodes – Knowledge of the lymphatic system is important, when you detect a malignant or inflammatory lesion, look for enlargement of the regional lymph nodes responsible for draining it; when a node is enlarged or tender, look for a source such as infection in its nearby drainage area.

(e) Note the size, shape, delimitation (discrete or matted together), mobility, consistency, and any tenderness of the following lymph nodes:

1. Preauricular – in front of the ear
2. Posterior auricular – superficial to the mastoid process
3. Occipital – at the base of the skull posteriorly
4. Parotid and retropharyngeal (tonsillar) – at the angle of the mandible
5. Submandibular – midway between the angle and the tip of the mandible.
6. Submental – in the midline a few centimeters behind the tip of the mandible
7. Superficial cervical – superficial to the sternocleidomastoid
8. Posterior cervical – along the anterior edge of the trapezius
9. Deep cervical chain – deep to the sternocleidomastoid and often inaccessible to examination
10. Supraclavicular – deep in the angle formed by the clavicle and the sternocleidomastoid. The supraclavicular node above the left clavicle is the sentinel node and could indicate underlying internal conditions.

9. Perform an eye examination

a. Visual acuity

(1) To test the acuity of central vision, use a well-lit Snellen eye chart.

(2) Position the patient 20 feet from the chart.

OUTLINE SHEET SCSC 2.1-1

HEENT SYSTEM (CONT.)

- (3) Patients who use glasses other than for reading should wear them.
  - (4) Ask the patient to cover one eye with a card and read the smallest line of print possible.
  - (5) Coaxing to attempt the next line may improve performance.
  - (6) Determine the smallest line of print from which the patient can identify more than half the letters.
  - (7) Record the visual acuity designate at the side of this line, along with the use of glasses, if any.
  - (8) Visual acuity is expressed as two number (e.g., 20/30): the first indicated the distance of the patient from the chart, the second, and the distance at which a normal eye can read the line of letters.
- b. Abnormalities - Vision of 20/200 means that at 20 feet the patient can read print that a person with normal vision could read at 200 feet. The larger the second number the worse the vision. "20/40 corrected" means the patient could read the 40 line with glasses (a correction)
- (1) Myopia – impaired far vision.
  - (2) Presbyopia is impaired near vision, found in middle aged and older people.
  - (3) Testing near vision with a special hand-held card helps identify the need for reading glasses or bifocals in patients older than 45 years. You can also use this card to test visual acuity at the bedside. Held 14 inches from the patient's eyes, the card simulates a Snellen chart. You may, however, let patients choose their own distance.
  - (4) Position and Alignment of the Eyes – stand in front of the patient and survey the eyes for position and alignment. Look for inward or outward deviation or abnormal protrusion.
- c. Examine:
- (1) Eyebrows – Inspect the eyebrows, noting their quantity and distribution and any scaliness of the underlying skin
  - (2) Eyelids – Note the position of the lids in relation to the eyeballs. Inspect for the following: edema, color, lesions, lashes, adequacy of closure (look for this

OUTLINE SHEET SCSC 2.1-1

HEENT SYSTEM (CONT.)

particularly when the eyes are unusually prominent, when there is facial paralysis or patient is unconscious.

- (3) Conjunctiva and Sclera – Ask the patient to look up as you depress both lower lids with your thumbs, exposing the sclera and conjunctiva. Inspect the sclera and conjunctiva for color and not the vascular pattern. Look for any nodules or swelling. Yellowing of the sclera indicates jaundice.
- (4) Pupils: Inspect the size, shape and symmetry of the pupils. If the pupils are large (>5mm), small (<3mm), or unequal, measure them. Use a card with black circles of varying sizes to measure pupillary size.
  - (a) To test the pupillary reaction to light.
    - (b) Ask the patient to look into the distance and shine a bright light obliquely into each pupil in turn.
      - 1. The direct reaction – pupillary constriction in the same eye
      - 2. The consensual reaction – pupillary constriction in the opposite eye
- d. Assess the extraocular muscle movements are intact (EOMI) looking for:
  - (1) The normal conjugate movements of the eyes in each direction
  - (2) Nystagmus, a fine rhythmic oscillation of the eyes, a few beats of nystagmus on extreme lateral gaze are normal
  - (3) To test the six extraocular movements (EOMs), ask the patient to follow your finger or pencil as you sweep through the six cardinal directions of gaze.
  - (4) Making a wide H in the air, lead the patient’s gaze
    - (a) To the patient’s extreme right
    - (b) To the right and upward
    - (c) Down on the right
    - (d) Without pausing in the middle, to the extreme left
    - (e) To the left and upward

OUTLINE SHEET SCSC 2.1-1

HEENT SYSTEM (CONT.)

- (f) Down on the left
  - (g) Pause during upward and lateral gaze to detect nystagmus.
  - e. Test for convergence. Ask the patient to follow your finger or pencil as you move it in toward the bridge of the nose. The converging eyes normally follow the object to within 5 cm to 8 cm of the nose.
10. Perform an ear examination.
- a. Inspect the external ear (auricle or pinna) bilaterally for size, shape, symmetry, landmarks, color and position. Examine the lateral and medial surfaces for color, deformities, lesions and nodules, discharge.
    - (1) Auricle color may vary with certain conditions.
    - (2) Blueness may indicate a degree of cyanosis, pallor or redness may indicate some type of vasomotor instability, frostbite may also cause pallor.
  - b. Inspect the auditory canal for discharge and note any odors.
    - (1) A purulent foul smelling discharge is associated with otitis externa, perforated acute otitis media, or foreign bodies.
    - (2) In cases of head trauma a bloody or serous discharge is suggestive of a skull fracture.
  - c. Palpate the auricles and mastoid area for tenderness, swelling or nodules. Tenderness or swelling in the mastoid area may indicate mastoiditis.
  - d. Techniques of otoscopic examination.
    - (1) Tip patient's head slightly towards the opposite side of the ear being examined.
    - (2) Gently pull auricle upward and backward to straighten the canal.
    - (3) Insert the speculum of the otoscope into the ear canal, with speculum pointing slightly down and forward.
      - (a) Note cerumen, furuncles, swelling, redness, purulent discharge.
    - (4) Examine tympanic membrane carefully.

OUTLINE SHEET SCSC 2.1-1

HEENT SYSTEM (CONT.)

- (a) Check color, integrity, perforation, white scars (evidence of previous infections)
- (b) Normal ear will be pearly gray and shiny.
- (c) Canal is pink in color and there should be no perforations and scarring.
- (5) Note the anatomical landmarks of the tympanic membranes.
  - (a) Pars tensa – cone of light
  - (b) Umbo – distal aspect of the handle of the malleus
  - (c) Anterior fold – located slightly left and below the short process of the malleus
  - (d) Posterior fold – located slightly right and above the short process of the malleus.
- (6) Check for TM mobility – ask patient to hold his breath, pinch nose and blow through closed mouth (Valsalva procedure). The test is normal if your see the TM retract.
- e. Abnormalities of the tympanic membrane and what they mean:
  - (1) Red and bulging – otitis media
  - (2) Yellow drum with pus/serum behind the membrane – chronic otitis media
  - (3) Amber colored – serous otitis media
  - (4) Bluish drum – blood behind TM, suggestive of skull fracture (aka hemotympanum)
  - (5) Absent light reflex – acute otitis media
  - (6) Absent/diminished landmarks – thickening of the drum due to chronic otitis media or externa.
  - (7) Oval dark areas – perforated TM
  - (8) Malleus prominent – retraction of TM due to obstruction of the Eustachian tube.
- f. Assess gross hearing.

OUTLINE SHEET SCSC 2.1-1

HEENT SYSTEM (CONT.)

- (1) Done in various ways.
- (2) Rub index finger and thumb together 1-2 inches from the patient's ear.
- (3) Ask if patient can hear ticking watch, tuning fork, or whispered voice.
- g. In case of obstruction when performing an exam due to Cerumen Impaction, perform a Cerumen Impaction Removal.

(1) Key Steps

- (a) Examine ear canal.
- (b) Select device for irrigation.
- (c) Irrigate until cerumen is released.
- (d) Conduct follow-up examination.

(2) Instructions

- (a) Inject the water along the sidewall of the ear, gently forcing water around the impacted cerumen.
- (b) Within a few minutes, one can see small fragments of cerumen coming from the ear canal.
- (c) After several minutes of irrigation, the bulk of the cerumen plug is removed.
- (d) Other device options include a 20- to 30-ml syringe with a 16- to 20-gauge IV catheter attached to provide directed water flow into the ear canal.
- (e) Examine the ear after irrigation to ensure that adequate cerumen was removed.

11. Perform a nose and sinus examination

- a. Inspection.
  - (1) Note general shape/contour of nose.
  - (2) Check for signs of inflammation.

OUTLINE SHEET SCSC 2.1-1

HEENT SYSTEM (CONT.)

- (3) Examine nasal mucosa.
  - (a) Ask patient to tilt head backwards
  - (b) Insert speculum of the otoscope into the nares.
  - (c) Inspect the nasal mucosa and turbinate for color, swelling, exudates, crusts, foreign bodies, polyps (common in chronic allergic rhinitis) and sites of bleeding.
  - (d) Normal nasal mucosa is redder than oral mucosa.
- (4) Check nasal septum for deviation, masses, and perforation. Perforated septum is usually caused by trauma.
- b. Check for nasal patency.
  - (1) Compress one side of the nose, ask patient to sniff through the other.
  - (2) Repeat on the other side.
  - (3) Patients with obstruction/septal deviation will have problems breathing through the affected side.
- c. Palpate the sinuses.
  - (1) Frontal sinuses are best palpated by pressing upward under the bony brow on both sides.
  - (2) Maxillary sinuses are assessed by tapping medial to the zygomatic process (cheeks) using index and middle finger, or pressing on it using the thumb.
  - (3) If sinusitis is suspected, transilluminate the sinuses in a dark room.
    - (a) Place a light under each brow close to the nose.
    - (b) Shield the light with your hand.
    - (c) Normally you will see a dim red glow as light is transmitted through the air filled sinus.
    - (d) Repeat the process with light shining downward just below the inner aspect of each eye.

OUTLINE SHEET SCSC 2.1-1

HEENT SYSTEM (CONT.)

- (e) Look through the open mouth for the reddish glow.
- (f) Absence of the red glow suggests thickened secretions in the sinus.

12. Perform examination of the mouth and throat

- a. Inspection. Exam each part of the mouth/throat. Use light source and tongue blade as needed.
  - (1) Lips – check for ulceration, cracking, swelling, and moisture.
  - (2) Gums & Teeth – check for inflammation, swelling, carries, bleeding, discoloration or retraction of gum lines.
  - (3) Tongue & Buccal Mucosa – check for ulcers, white patches, white hair-like lesions, nodules.
  - (4) Throat (Pharynx) with the patient’s mouth open but the tongue not protruded, ask the patient to say “ah”. This may let you see the pharynx well. If not, press a tongue blade firmly down upon the midpoint of the arched tongue – far enough back to visualize the pharynx but not so far that you cause gagging. Simultaneously, ask for an “ah”. Note the rise of the soft palate – a test for CN X (the vagal nerve)
    - (a) Inspect the soft palate, anterior and posterior pillars, uvula, tonsils and posterior pharynx.
    - (b) Note any evidence of exudate, swelling, ulceration or tonsillar enlargement.
    - (c) Make sure uvula is midline and not deviated.
  - (5) Tonsils – if tonsils are swollen, grade them accordingly:
    - (a) 0 = normal. Tonsils are behind pillar and not visible.
    - (b) +1 = tonsils are peaking from behind the pillars.
    - (c) +2 = tonsils are between the pillars and uvula
    - (d) +3 = tonsils are touching the uvula
    - (e) +4 = one or both tonsils extend to the midline and deviate the uvula.

OUTLINE SHEET SCSC 2.1-1

HEENT SYSTEM (CONT.)

13. List signs and symptoms of common head and neck injuries

a. Headaches

(1) Description

- (a) The uncomplicated headache is a common concern and also probably one of the most self-medicated.
- (b) May be described as occasional, constant, recurrent, mild, moderate or severe.
- (c) May feel like a tearing pain, sharp, dull, pressure, tightness, diffuse, localized

(2) Risk Factors

- (a) May be brought on by stress and anxiety
- (b) May be related to caffeine use or dehydration

(3) General Prevention

- (a) Adequate sleep
- (b) Hydration

1. Exercise

(4) Clinical Presentation

(a) History

- 1. Stressful work environment
- 2. Stressful home environment
- 3. Medication use
- 4. Caffeine use
- 5. Vision problems (need for corrective lenses or increased prescription strength)

OUTLINE SHEET SCSC 2.1-1

HEENT SYSTEM (CONT.)

- 6. Characteristics of the prodromal events, pain, location, duration and associated symptoms are important in differentiating headaches from common, tension, cluster, migraines and headaches related to trauma or neurological origins
  - (b) **RED FLAGS:** Red Flags are signs, symptoms or features that should indicate urgent notification of your supervisor, Independent Duty Corpsman, Nurse Practitioner, Physician Assistant, or Medical Officer. Listed below are some Red Flags for HEENT.
    - 1. Abrupt, severe headache (worst headache of their life)
    - 2. Fever and stiff neck
    - 3. Mental confusion
    - 4. Seizures
    - 5. Double vision
    - 6. Any neurological deficit
    - 7. Speaking difficulties
    - 8. Progressively worsening
    - 9. Head injury
  - (c) Physical Exam
    - 1. Assess visual acuity (with glasses if required).
    - 2. Neurological examination is required and will be covered in more detail in the neurological lesson. Report to your supervisor any neurological deficit or suspected abnormal finding of a neurological examination.
- (5) Differential Diagnosis
  - (a) Migraine
  - (b) Cluster headache
- (6) Diagnostic Testing

OUTLINE SHEET SCSC 2.1-1

HEENT SYSTEM (CONT.)

- (a) In some cases the provider may send the patient for a CT or MRI depending on the history and examination findings.
- (b) If the provider suspects infectious origins they may also order a lumbar puncture.

(7) Treatment may include

- (a) Sleep
- (b) Exercise
- (c) Relaxation
- (d) Prescription lenses
- (e) Lifestyle modification e.g. tobacco cessation, decreased alcohol intake
- (f) Analgesics
- (g) NSAIDS
- (h) Caffeine
- (i) Oxygen

(8) Disposition

- (a) LLD
- (b) SIQ

(9) Referral

- (a) Any patient with Red Flag symptoms
- (b) Neurology

14. List signs and symptoms of common eye disorders

- a. Orbital Cellulitis

OUTLINE SHEET SCSC 2.1-1

HEENT SYSTEM (CONT.)

(1) Description

- (a) Acute, severe, vision-threatening infection of orbital contents posterior to orbital septum.
- (b) Preseptal (previously referred to as periorbital) cellulitis is anterior to the septum.
- (c) Distinguishing location determines the appropriate workup and treatment.

(2) Risk Factors

- (a) Sinusitis is present in 80-90% of cases.
- (b) Orbital trauma, retained orbital FB, ophthalmic surgery
- (c) Dental, periorbital, skin, or intracranial infection
- (d) Immunosuppressed patients at increased of adverse outcomes

(3) General Prevention

- (a) Appropriate treatment of bacterial sinusitis
- (b) Proper wound care and perioperative monitoring of orbital surgery and trauma
- (c) Avoid trauma to the sinus passages.
- (d) High index of suspicion in febrile patients presenting with eyelid and conjunctival pain, swelling, and erythema.

(4) Diagnosis

(a) History

1. Complaints of acute onset red, swollen, tender eye or eyelid and pain with eye movements.
2. History of surgery, trauma, sinus or upper respiratory infection, dental infection
3. Malaise, fever, stiff neck, mental status changes

OUTLINE SHEET SCSC 2.1-1

HEENT SYSTEM (CONT.)

4. Specific signs of orbital cellulitis include:
  - a. Proptosis/exophthalmos (bulging of the eye anteriorly)
  - b. Double vision
  - c. Ophthalmoplegia (paralysis of eye muscles)
  - d. Vision loss or decreased field of vision
  - e. Pain with eye movement
  - f. Severe septic appearance, mental status changes, contralateral cranial nerve palsy, or bilateral orbital cellulitis may indicate CNS involvement.
  - g. MRSA orbital cellulitis may present without associated upper respiratory infection.

(b) Physical Exam

1. Vital signs
2. Assess visual acuity (with glasses if required).
3. Lid exam and palpation of the orbit
4. Extraocular movements; assess for pain with eye movement—if present, concerning for orbital cellulitis.
5. Red desaturation: Patient views red object with one eye and compares to the other; reduced red color may indicate optic nerve involvement.
6. Confrontation visual field testing

(5) Differential Diagnosis

- (a) Preseptal cellulitis - Eyelid erythema with or without conjunctival erythema, afebrile, no pain on eye movement, no diplopia, normal eye exam, vision intact
- (b) Idiopathic orbital inflammatory disease (orbital pseudo tumor)

OUTLINE SHEET SCSC 2.1-1

HEENT SYSTEM (CONT.)

- (c) Orbital Foreign Body
  - (d) Trauma, insect bite, ruptured dermoid cyst
  - (e) Preseptal infection causes erythema, induration, and tenderness of the eyelid and/or periorbital tissues, and patients rarely show signs of systemic illness. Local skin trauma, lacerations, or bug bites can be seen. Extraocular movements and visual acuity are intact.
  - (f) Orbital cellulitis also presents with complaints of a red, swollen, painful eye or eyelid. It also results in proptosis, conjunctival edema, ophthalmoplegia (diminished ocular movement), or decreased visual acuity.
- (6) Diagnostic Tests
- (a) CBC with differential, C-reactive protein, ESR
  - (b) Cultures of eye secretions or nasopharyngeal aspirates are often contaminated by normal flora but may identify causative organism(s).
- (7) Frequent eye exam and vital signs (q4h) are essential for timely treatment of associated conditions, such as meningitis or orbital abscess.
- (8) Treatment
- (a) Empiric antibiotic therapy to cover pathogens associated with acute sinusitis (*S. pneumoniae*, *H. influenza*, *M. catarrhalis*, *Streptococcus pyogenes*), as well as for *S. aureus*, *S. anginosus*, and anaerobes.
  - (b) IV antibiotic treatment.
  - (c) PO antibiotic therapy.
- ALERT:** In severe orbital cellulitis and in suspected or culture-proven MRSA infection, vancomycin remains the parenteral drug of choice. Use in conjunction with agents to cover gram-negative bacteria.
- (9) Referral
- (a) Notify your supervisor, IDC, NP, PA, or MO ASAP.
  - (b) Always admit to the hospital and consult with ophthalmology.

OUTLINE SHEET SCSC 2.1-1

HEENT SYSTEM (CONT.)

- (c) Consider consultation with ID and ENT for orbital cellulitis; neurology/neurosurgery if intracranial spread is suspected.

b. Blepharitis

- (1) Description: Blepharitis is a chronic inflammation of the eyelid margins which is often refractory to treatment with infectious and noninfectious etiologies.

(2) Clinical Presentation

- (a) Common symptoms: red eyes, burning sensation, excessive tearing, blurred vision, pruritic eyelids.
- (b) Chronically infected lids are usually diffusely erythematous, with exudate at the base of the lashes.
- (c) Lid margins thicken over time, with associated loss of eyelashes and misdirected growth of lashes.
- (d) Associated conjunctivitis with erythema, edema but no discharge.
- (e) Chalazion: chronic sterile inflammation of an oil gland of the eyelid.
- (f) Superficial punctate erosions of the inferior corneal epithelium are common.
- (g) More severe findings, such as corneal pannus, ulcerative keratitis, or lid ectropion, are less common.

(3) Differential Diagnosis

- (a) Keratoconjunctivitis
- (b) Herpes simplex blepharitis
- (c) Molluscum contagiosum
- (d) Allergic blepharitis

- (4) Laboratory Tests: Eyelid cultures and antibiotic sensitivity testing (usually not done unless patient fails to respond to initial treatment regimen).

- (5) Treatment may include

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HEENT SYSTEM (CONT.)

- (a) Alkaline soaps may be beneficial; alcohol and some detergents remove surface lipids and microflora.
- (b) Hot compresses applied to closed lids for 5 to 10 min: heat loosens debris from lid margins and increases meibomian gland fluidity.
- (c) Firm massage of the lid margins to enhance the flow of secretions from glands, followed by cleansing of the lids with cotton-tipped applicators dipped in a 50:50 mixture of baby shampoo and water.
- (d) Lashes and lid margins scrubbed vigorously while the eyelids are closed, followed by thorough rinsing.
- (e) Following local massage and cleansing, the mainstay of treatment is application of topical antibiotic ointment to the eyelid margins.
- (f) Most effective topical treatments include bacitracin and erythromycin
- (g) Ointment is applied 1 to 4 times daily, depending on the severity, for 1 to 2 weeks, followed by once daily, at bedtime, for another 4 to 8 weeks until all signs of inflammation have disappeared.

(h) Oral antibiotics.

(6) Disposition:

- (a) May require light duty or SIQ
- (b) This condition may be difficult to treat and patients should avoid dirty working conditions.

(7) Referral: To an ophthalmologist if patient fails to respond to local therapy.

c. Hordeolum (Stye)

(1) Description

- (a) A hordeolum is an acute inflammatory process affecting the eyelid and arising from the meibomian (posterior) or Zeis (anterior) glands.
- (b) It is most often infectious and usually caused by *Staphylococcus aureus*.
- (c) When infection involves the meibomian glands, it is called meibomianitis.

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HEENT SYSTEM (CONT.)

(2) Clinical Presentation

- (a) Abrupt onset with pain and erythema of the eyelid.
- (b) Localized, tender mass in eyelid.
- (c) May be associated with blepharitis.
- (d) External hordeolum: points toward the skin surface of the lid and may spontaneously drain.
- (e) Internal hordeolum: can point toward the conjunctival side of the lid and may cause conjunctival inflammation.

(3) Differential Diagnosis

- (a) Eyelid abscess.
- (b) Chalazion.
- (c) Allergy or contact dermatitis with conjunctival edema.
- (d) Herpes simplex infection.
- (e) Cellulitis of the eyelid.

(4) Laboratory Tests - Generally, none are necessary.

(5) Treatment

- (a) External sty (eyelash follicle): Usually responds to warm compresses and will drain spontaneously.
- (b) Systemic antibiotics generally not necessary.
- (c) For internal sty, use of hot packs plus oral antibiotics, with special consideration for MRSA.
- (d) For external sty, topical erythromycin ophthalmic ointment applied to the lid margins two to four times daily until resolution may be helpful in some cases.

(6) Disposition

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HEENT SYSTEM (CONT.)

- (a) May require light duty
- (b) Possible relapse if resolution is not complete.

(7) Referral

- (a) For evaluation by an ophthalmologist if visual acuity or ocular movement is affected or if the diagnosis is in doubt.
- (b) For surgical drainage if necessary.

d. Chalazion

(1) Description: Area of focal inflammation within the eyelid secondary to the obstruction of a meibomian gland or gland of Zeis.

(2) Clinical Presentation

- (a) Visible, or palpable, well-defined subcutaneous nodule in the eyelid.
- (b) In some cases, a nodule cannot be identified.
- (c) Blocked meibomian orifice, eyelid swelling and erythema, localized eyelid tenderness, associated blepharitis or acne rosacea.
- (d) May also note "pointing" of mucopurulent material.

(3) Differential Diagnosis

- (a) Preseptal cellulitis
- (b) Sebaceous carcinoma
- (c) Hordeolum

(4) Workup

- (a) History: Previous ocular surgery or trauma? Previous chalazia or eyelid lesions?
- (b) External examination: Palpate the involved eyelid for a nodule.

OUTLINE SHEET SCSC 2.1-1

HEENT SYSTEM (CONT.)

- (c) Slit lamp examination: Evaluate the meibomian glands for inspissation and evert the eyelid. Assess for madarosis (lash loss), poliosis, and ulceration to rule out other etiologies.
- (5) Treatment may include
  - (a) Warm compresses for 15 minutes four times daily (QID) with light massage over the lesion.
  - (b) Antibiotic therapy is not indicated for a granulomatous condition.
- (6) Referral: If the chalazion fails to resolve, is recurrent or atypical, it must be sent for pathology.
- e. Conjunctivitis
  - (1) Description: The term conjunctivitis refers to an inflammation of the conjunctiva resulting from a variety of causes, including allergies and bacterial, viral, and chlamydial infections.
  - (2) Clinical Presentation
    - (a) Bacterial conjunctivitis is incredibly contagious and is spread by direct contact with the patient or contaminated objects or surfaces.
      - 1. Unilateral presentation with gluing of the eyelid and no itching is more indicative of a bacterial cause.
      - 2. Thick yellow/green discharge is also more common with bacterial origins vs the watery discharge of viral or allergic conjunctivitis.
      - 3. Purulent discharge at the lid margins and corners of the eye.
    - (b) Viral conjunctivitis is incredibly contagious and is spread by direct contact with the patient or contaminated objects or surfaces.
      - 1. Typically watery or mucoserous discharge, burning, sandy or gritty feeling in one eye. May have morning crusting but will be watery throughout the day.
      - 2. May have a bumpy appearance to the tarsal conjunctiva.

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HEENT SYSTEM (CONT.)

(c) Allergic conjunctivitis is not contagious and is caused by airborne allergens contacting the eye that causes mast cell degranulation and the release of histamine.

1. Diffuse injection with a bumpy appearance to the tarsal conjunctiva.
2. Profuse watery or mucoserous drainage.
3. Complaint of itching is what clues in that the source is most likely allergy related.
4. History of seasonal allergies/hay fever

(3) Red Flag Criteria

- (a) Reduced visual acuity
- (b) Photophobia
- (c) Severe foreign body sensation
- (d) Fixed pupil
- (e) Severe headache
- (f) Corneal opacity

(4) Differential Diagnosis

- (a) Acute glaucoma (fixed pupil with headache may indicate acute angle closure)
- (b) Corneal abrasion
- (c) Acute iritis
- (d) Keratitis

(5) Workup

- (a) History and physical examination
- (b) Visual acuity and eye examination

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HEENT SYSTEM (CONT.)

(6) Laboratory Tests

- (a) Cultures are useful if not successfully treated with antibiotics.
- (b) Initial culture is usually not necessary, since normal conjunctival flora interferes with helpful culture results.

(7) Treatment may include

- (a) Warm compresses if infective conjunctivitis.
- (b) Cold compresses if irritative or allergic conjunctivitis.
- (c) Contact lenses should be taken out until an infection is completely resolved. Non-disposable lenses should be cleaned thoroughly as recommended by the manufacturer, and a new lens case should be used. Disposable contact lenses should be thrown away.
- (d) Viral conjunctivitis is self-limiting, and no treatment is necessary in uncomplicated cases. Some over the counter medications help symptomatically such as saline solution or refresh tears.
- (e) Antibiotic drops or ointment may be prescribed.
- (f) An oral antihistamine are effective in relieving itching with allergic conjunctivitis.
  - 1. Antihistamine/decongestant combinations such as (Visine A), available over the counter, are effective but have a short duration of relief and can result in rebound vasodilatation with prolonged use.

(8) Disposition

- (a) SIQ is normally given for patients suspected to have viral or bacterial conjunctivitis in order to limit the spread of the disease especially on board ship.
- (b) Follow carefully for the first two weeks to ensure secondary complications do not occur.
- (c) Bacterial keratitis occurs in 30/1000 contact lens wearers.

OUTLINE SHEET SCSC 2.1-1

HEENT SYSTEM (CONT.)

(9) Referral

- (a) To ophthalmologist if symptoms are refractory to initial treatment.
- (b) Indications for Red Flag are listed above.

f. Corneal Abrasions

(1) Description: A corneal abrasion is a loss of surface epithelial tissue of the cornea caused by trauma.

(2) Clinical Presentation

- (a) Redness and injection of the conjunctiva
- (b) Pain and difficulty opening the eye
- (c) Light sensitivity
- (d) Tearing
- (e) Gritty or foreign-body feeling
- (f) Pain on opening or closing eyes

(3) Red Flag Criteria

- (a) Large area of cornea that appears to be avulsed
- (b) Vision loss
- (c) Corneal infiltration
- (d) Corneal opacity
- (e) Purulent discharge
- (f) Corneal laceration

(4) Differential Diagnosis

- (a) Herpes ulcers and other corneal ulcers

OUTLINE SHEET SCSC 2.1-1

HEENT SYSTEM (CONT.)

- (b) Foreign body in the cornea
  - (c) Infective keratitis (be cautious in contact lens wearers; bacterial infections are common, and symptoms are similar)
- (5) Workup
- (a) Fluorescein staining, slit lamp evaluation. After fluorescein staining of the cornea, an abrasion will appear yellow under normal light and green in cobalt blue light.
  - (b) Assessment of visual acuity.
  - (c) Intraocular pressure.
  - (d) Rule out corneal laceration (flattened anterior chamber with perforation; refer urgently).
  - (e) Rule out other eye pathology. Inspect anterior chamber for blood (hyphema) or pus (hypopyon). If present, refer immediately to ophthalmologist.
  - (f) Examine for foreign bodies and remove them if present. (Evert upper eyelid to locate foreign body on the palpebral conjunctiva.)
  - (g) Confirm red reflex to rule out significant globe injury.
- (6) Treatment may include
- (a) Warm compresses.
  - (b) Removal of any foreign objects if present.
  - (c) Topical antibiotics ointment forms are often used and also improve corneal surface lubrication. Antipseudomonal topical antibiotics are, however, recommended for contact lens–related abrasions.
  - (d) Cycloplegics are often prescribed to relieve ciliary muscle spasm; however, their benefit has been questioned and they are no longer routinely recommended.

OUTLINE SHEET SCSC 2.1-1

HEENT SYSTEM (CONT.)

- (e) Topical anesthetic drops immediately improve comfort for purposes of examination, but repeated use can lead to severe problems, delayed or arrested healing, infections, perforations, and loss of the eye.
- (f) Oral NSAIDs for severe pain.

(7) Disposition

- (a) Follow-up in 24 hr. and then every three days until abrasion has cleared and vision has returned to normal.
  - (b) In cases of large abrasions the medical provider may desire to see the patient daily until resolved.
  - (c) Less frequent follow-up is appropriate for abrasions  $\leq 4$  mm or for uncomplicated abrasions.
- (8) Referral - Refer to ophthalmologist if patient has no relief within 24 hour or for patients with deep eye injuries, foreign bodies that need to be removed, or suspected recurrent corneal erosion or infections.

g. Retinal Detachment

(1) Description

- (a) Retinal detachment is the separation of the neurosensory retina (NSR) from the retinal pigment epithelium (RPE) and choroid.
- (b) This results in ischemia, progressive photoreceptor degeneration and the accumulation of subretinal fluid (SRF) in the potential space between the NSR and the RPE.
- (c) The main types of retinal detachment are rhegmatogenous (caused by retinal tear with vitreous fluid passing through the defect), tractional (subretinal fluid caused by fibrous proliferation and pulling from vitreous gel), and exudative (accumulation of subretinal fluid due to inflammation or tumors).

(2) Risk Factors

- (a) Myopia
- (b) Lattice degeneration (peripheral retinal thinning)

OUTLINE SHEET SCSC 2.1-1

HEENT SYSTEM (CONT.)

- (c) Previous ocular surgery (particularly cataract surgery)
  - (d) Family history
  - (e) Contralateral retinal detachment or retinal tear
  - (f) Ocular trauma
  - (g) Fluoroquinolones (controversial)
  - (h) Ocular inflammation (uveitis)
  - (i) Retinal vascular disease (particularly diabetic retinopathy)
  - (j) Intraocular tumor (ocular or metastatic)
- (3) Clinical Presentation
- (a) Sudden onset of flashes of light and floaters associated with a peripheral shadow or curtain coming down
  - (b) May progress rapidly over days to involve central vision
  - (c) Generally, no pain unless associated with ocular inflammation
  - (d) Examination reveals elevation of retina and vessels associated with tears in the retina
- (4) Differential Diagnosis
- (a) Degenerative retinoschisis.
  - (b) Uveal effusion syndrome.
  - (c) Choroidal detachment.
  - (d) Hemorrhage.
  - (e) Tumors.
- (5) Workup

OUTLINE SHEET SCSC 2.1-1

HEENT SYSTEM (CONT.)

- (a) Full eye examination with dilated fundus exam and retinal drawing to document tears and extent of detachment.
- (b) Visual fields.
- (c) Ultrasonography when the view of the fundus is limited due to hemorrhage or cataract to show the retinal detachment or tumors beneath it.
- (d) Medical workup only when inflammation or systemic disease considered.
- (6) Laboratory Tests
  - (a) Usually not necessary unless exudative detachment is being considered.
- (7) Imaging Studies
  - (a) Ultrasonography (US) of the eye.
- (8) Treatment may include
  - (a) Immediate surgery
  - (b) The three principal methods for reattachment of the retina in patients with primary retinal detachment are scleral buckling, vitrectomy, and pneumatic retinoplexy.
  - (c) Early surgery to repair the detachment.
  - (d) Treatment of the underlying disorder.
  - (e) Occasionally, steroids or other treatment of underlying inflammatory disease, if indicated.
- (9) Disposition
  - (a) Immediately refer to an ophthalmologist.
  - (b) Early intervention improves outcome.
- (10) Referral
  - (a) Immediately.

OUTLINE SHEET SCSC 2.1-1

HEENT SYSTEM (CONT.)

15. List signs and symptoms of common ear disorders

a. Otitis Externa (Swimmer’s Ear)

(1) Description

- (a) Otitis externa refers to a variety of conditions causing inflammation and/or infection of the external auditory canal (and/or auricle and tympanic membrane).
- (b) The breakdown of the skin-cerumen barrier results in inflammation and edema that leads to pruritus and obstruction.
- (c) Swimming or water exposure is a well-documented risk factor for otitis externa. The excess moisture leads to skin maceration and the breakdown of the skin-cerumen barrier.
- (d) Excessive cleaning with Q-tips may lead to abrasions in the canal possibly allowing organisms’ access to deeper tissue.

(2) Clinical Presentation

- (a) The most common symptoms are otalgia, ranging from pruritus to severe pain exacerbated by motion (e.g., chewing), otorrhea, edema, erythema, and tenderness.
- (b) Patients may also experience aural fullness and hearing loss as a result of swelling with occlusion of the canal.
- (c) More intense symptoms may occur with bacterial otitis externa, with or without fever, and lymphadenopathy (anterior to tragus).
- (d) In secondary infection (fungal infection superimposed on bacterial infection), major symptom is pain
- (e) Tympanic membrane may appear dull and infected
- (f) Usually absence of systemic symptoms such as fever, chills

(3) Differential Diagnosis

- (a) Otomycosis

OUTLINE SHEET SCSC 2.1-1

HEENT SYSTEM (CONT.)

- (b) Mastoiditis
- (c) Foreign bodies
- (d) Neoplasms
- (e) Contact dermatitis
- (4) Workup
  - (a) Thorough history and physical examination
- (5) Laboratory Tests
  - (a) Cultures from the canal are usually not necessary unless the condition does not respond to treatment.
- (6) Treatment
  - (a) Cleansing and debridement of the ear canal with cotton swabs and hydrogen peroxide or other antiseptic solution may be necessary.
  - (b) If the canal is edematous and too narrow to allow adequate cleansing, a cotton wick or gauze strip inserted into the canal serves as a conduit for topical medications to be drawn into the canal. Usually remove wick after two days.
  - (c) 2% acetic acid inhibits growth of bacteria and fungi
  - (d) Topical antibiotics (in the form of otic or ophthalmic solutions) or antifungals, often in combination with an acidifying agent and a steroid preparation
  - (e) NSAIDs for pain control
  - (f) Topical corticosteroids may be prescribed to reduce swelling and inflammation
  - (g) Patients prone to recurrent infections should try to identify and avoid precipitants to infection.
  - (h) Swimmers should try tight-fitting ear plugs or tight-fitting bathing caps and remove all excess water from the ears after swimming.
- (7) Disposition

OUTLINE SHEET SCSC 2.1-1

HEENT SYSTEM (CONT.)

- (a) Light duty in cases where the patient may be exposed to moist environments
- (b) Inadequate treatment of otitis externa may lead to Necrotizing otitis externa and mastoiditis.

(8) Referral

- (a) To an otolaryngologist:
  - 1. Mastoid tenderness
  - 2. Treatment failure
  - 3. Severe pain
  - 4. Appearance of necrosis

b. Otitis Media

- (1) Description - Otitis media is a common infection of the middle ear, marked by the presence of fluid behind the tympanic membrane.
- (2) Clinical Presentation
  - (a) Moderate to severe bulging of the tympanic membrane
  - (b) Fluid in the middle ear along with signs and symptoms of local inflammation
  - (c) As infection progresses, middle ear exudation occurs (exudative phase); the exudate rapidly changes from serous to purulent (suppurative phase).
    - 1. Retraction and poor motility of the tympanic membrane, which then becomes bulging and convex
  - (d) At any time during the suppurative phase the tympanic membrane may rupture, releasing the middle ear contents (otorrhea).
  - (e) Symptoms:
    - 1. Rapid- or recent-onset otalgia, ranging from slight discomfort to severe, spreading to the temporal region

OUTLINE SHEET SCSC 2.1-1

HEENT SYSTEM (CONT.)

- 2. Ear stuffiness and hearing loss may precede or follow otalgia
- 3. Otorrhea if tympanic membrane has ruptured
- 4. Vertigo, nystagmus, tinnitus, fever, lethargy, irritability, nausea, vomiting, anorexia

(3) Differential Diagnosis

- (a) Otitis externa
- (b) Mastoiditis
- (c) Labyrinthitis

(4) Workup

- (a) Thorough otoscopic examination.
- (b) Adequate visualization of the tympanic membrane may require removal of cerumen and debris.

1. Tympanometry

- a. Measures compliance of the tympanic membrane and middle ear pressure
- b. Detects the presence of fluid
- c. Increased reflected sound correlated with the presence of effusion

(5) Laboratory and Imaging

- (a) Cultures of the nasopharynx: sensitive but not specific
- (b) Blood counts (generally not necessary): usually show a leukocytosis with polymorphonuclear elevation
- (c) Plain mastoid radiographs: generally, not indicated; will reveal haziness in the periantral cells extending to the entire mastoid
- (d) CT or MRI may be indicated if serious complications suspected (meningitis, brain abscess, severe mastoiditis)

OUTLINE SHEET SCSC 2.1-1

HEENT SYSTEM (CONT.)

- (6) Treatment may include
  - 1. Hydration
  - 2. Avoidance of irritants (e.g., tobacco smoke)
  - 3. Nasal systemic decongestants
  - 4. Cool mist humidifier
  - 5. Antibiotics
  
- (7) Red flags
  - (a) Mastoid tenderness
  - (b) Facial paralysis
  - (c) Labyrinthitis
  - (d) Hearing loss
  - (e) Neurological deficits
  - (f) Neck stiffness
  - (g) Seizure
  - (h) Vertigo
  
- (8) Disposition
  - (a) SIQ may be required depending on severity of symptoms
  
- (9) Referral – Refer to ENT for medical treatment
  
- c. Perforated Tympanic Membrane
  - (1) Description

OUTLINE SHEET SCSC 2.1-1

HEENT SYSTEM (CONT.)

- (a) The tympanic membrane (TM), or "ear drum," is a thin barrier separating the external auditory canal from the middle ear. Along with the ossicles of the middle ear, it transmits and amplifies sound vibrations to the cochlea.
  - (b) Rupture of the TM can disrupt hearing and can allow pathogens access to the middle ear space from the external auditory canal.
  - (c) Perforations may be:
    - 1. Central: doesn't involve the annulus and is more likely to heal spontaneously
    - 2. Marginal: lies in the periphery, is less likely to heal and harder to repair
    - 3. Involvement of the malleus decreases chance of healing.
    - 4. Perforations of the posterior superior quadrant overlies the ossicles and the cochlea and are associated with more extensive damage.
  - (d) Perforations may occur from:
    - 1. Infection: acute/chronic suppurative otitis media
    - 2. Traumatic: barotrauma, (e.g., diving), acoustic trauma, (e.g., explosion), self-inflicted/penetrating (cotton tips)
    - 3. Middle ear mass: cholesteatoma or neoplasm
  - (e) The TM possesses the ability for spontaneous closure resulting in formation of a dimeric membrane (outer squamous and inner mucosal).
- (2) Risk Factors
- (a) Eustachian tube dysfunction and inability to equalize middle ear pressures
  - (b) Rapid changes in ambient pressures (air flight or diving)
  - (c) Insertion of objects into ears
  - (d) Head trauma, exposure to explosions
- (3) Diagnosis

## OUTLINE SHEET SCSC 2.1-1

## HEENT SYSTEM (CONT.)

## (a) History

1. Otorrhea/ear drainage (pus, blood, or clear fluid)
2. Otolgia or earache consistent with AOM (perhaps associated with sudden relief)
3. Tinnitus or buzzing
4. Self-audible whistling from the ear with Valsalva maneuver or nose blowing
5. Hearing loss or change
6. Difficulty equalizing pressures, especially with altitude change or diving underwater
7. Ear surgery (e.g., prior placement of PE tubes)
8. Recurrent ear infections

## (b) Physical Exam

1. Otoscope exam: Pay attention to location and size of any TM defect as well as involvement of the annulus or the malleus. Also, inspect ear canal to look for evidence of otomycosis.
2. Fogging of the otoscope, in what otherwise appears to be a dry ear, may reveal occult perforation.
3. Note foreign bodies (cotton swabs, PE tubes).
4. Thinned TM segment indicates past, healed perforation.
5. Keratin debris consistent with cholesteatoma (pearly white +/- chronic drainage)
6. Mass in the middle ear space behind the TM (cholesteatoma, paragangliomas, CN VII schwannomas, etc.)
7. An ulceration of the external auditory canal, contiguous with the TM annulus, should lead to suspicion of squamous cell carcinoma.

OUTLINE SHEET SCSC 2.1-1

HEENT SYSTEM (CONT.)

8. If history of hearing loss on that side: Weber (512-kHz tuning fork to center of forehead; if conductive hearing loss, sound should lateralize to the perforated side) and Rinne tests (place tuning fork to mastoid; when vibration no longer heard, transfer tuning fork next to outside ear canal; air conduction should be greater than bone conduction)

9. Inspection of oropharynx for tonsillar asymmetry or neoplasm can cause eustachian tube obstruction

10. Hemotympanum

(4) Diagnostic Tests

(a) Audiogram can reveal normal hearing or a mild conductive hearing loss:

1. A simple perforation will typically result in a low-frequency conductive hearing loss.
2. An audiogram that demonstrates a worse-than-expected conductive hearing loss or sensorineural hearing loss is more suspicious for ossicular chain damage or middle ear pathology.

(b) If there is suspicion for cholesteatoma or CN VII palsy, then obtain non-contrast CT of the temporal bone as initial imaging study.

(5) Differential Diagnosis

- (a) Prior perforation (thin, healed membrane may be hard to discern)
- (b) Cholesteatoma without perforation may still demonstrate chronic drainage.

(6) Treatment

(a) Medication

1. Topical antibiotic and combined antibiotic/anti-inflammatory drops are the mainstay of treatment
2. Oral antibiotics are not recommended for perforations because antibiotic drops are more effective. Oral antibiotics should be used in AOM prior to perforation.
3. Oral antibiotics are not indicated for the isolated TM perforation.

OUTLINE SHEET SCSC 2.1-1

HEENT SYSTEM (CONT.)

(7) Additional Therapies - Dry ear precautions (cotton ball with petroleum jelly while showering and use of hairdryer to dry out ear if water enters the auditory canal)

(8) Surgery

(a) A case-by-case risk-benefit analysis must be performed in cases of conductive hearing loss because surgery entails the risk of hearing loss.

(b) Potential major complications of surgery include worsening of hearing, facial nerve damage, CSF leak, bleeding, and repair failure.

(9) Disposition

(a) Light duty and SIQ both may be required

d. Tinnitus

(1) Description

(a) Tinnitus is a perceived sound in the absence of acoustic stimulus external to the head.

(b) It may be unilateral, bilateral, or lateral dominant.

(c) It is commonly described as a ringing, buzzing, roaring, hissing, whistling, humming, cricket-like, or pulsing sound.

(d) It is frequently a symptom associated with hearing loss, Ménière's disease, acoustic neuroma, drug toxicity, depression, or an autoimmune inner ear disease.

(e) The sound may be internal and perceived only by the patient, called subjective or tonal tinnitus, or it may be heard by both the patient and the examiner, called objective or nontonal tinnitus.

(2) Risk Factors

(a) Any condition causing hearing loss or damage to the auditory system can produce tinnitus.

(b) Cochlear damage from exposure to noise is the most common cause. Exposure to ototoxic drugs is also important.

OUTLINE SHEET SCSC 2.1-1

HEENT SYSTEM (CONT.)

(3) Clinical Presentation

- (a) History should focus on exposure to loud noises, evidence of hearing loss, and ototoxic drugs.
- (b) Patient should be screened for depression.
- (c) Patient who complains of sound in ear may also complain of ear pain or fullness.
- (d) Objective tinnitus is pulsatile and coincides with patient's pulse.
- (e) Physical examination should focus on HEENT, neck, and neurologic exam.
- (f) There may be no significant physical findings.

(4) Differential Diagnosis

- (a) Otologic: tympanic membrane disorder, inner ear disorder (hair cells, organ of Corti), Ménière's disease
- (b) Ototoxic medications
- (c) Neurologic: multiple sclerosis, head trauma, cochlear nerve lesion, acoustic schwannoma, neurofibroma, meningioma
- (d) Metabolic: thyroid disorder, hyperlipidemia (leading to plaque formation), vitamin B 12 deficiency
- (e) Psychogenic: depression, anxiety, fibromyalgia
- (f) Infectious: otitis media, Lyme disease, meningitis, syphilis

(5) Objective/nontonal tinnitus:

- (a) Vascular: arterial bruit, venous hum, arteriovenous malformation, vascular tumors
- (b) Neurologic: contraction of muscles of the eustachian tube, contraction of the stapedius muscle, contraction of the tensor tympani muscles, or a palatal myoclonus, glomus jugulare tumor

OUTLINE SHEET SCSC 2.1-1

HEENT SYSTEM (CONT.)

- (c) Conductive: patulous (wide-open) Eustachian tube
- (6) Workup
  - (a) Audiometry
  - (b) Tympanometry
  - (c) Electronystagmography is used to evaluate for Ménière’s disease.
- (7) Laboratory Tests
  - (a) Evaluate for metabolic abnormalities: TSH, CBC, B12, and lipid panel.
- (8) Imaging Studies
  - (a) CT/MRI: to evaluate for subjective tinnitus
  - (b) MRI/MRA: to evaluate objective tinnitus
- (9) Treatment may include
  - (a) Avoid exposure to excessive noise, ototoxic agents, and to wear protective equipment in noisy environments, or mask the tinnitus through amplification of normal sounds with a hearing aid.
  - (b) Habituation techniques such as tinnitus retraining therapy may help. Cognitive behavioral therapy helps patients cope with tinnitus distress through biofeedback.
  - (c) If the tinnitus is severe enough to cause suicidal symptoms, immediate referral to a psychiatrist and an otolaryngologist is recommended to minimize the time to diagnosis and optimize treatment.
  - (d) Patients with persistent symptoms or tinnitus accompanied by visual changes or headache should be evaluated for tumors such as acoustic neuroma.
  - (e) There is insufficient evidence to support the use of any medication, vitamin, or nutritional supplement to treat tinnitus. .
- (10) Disposition

OUTLINE SHEET SCSC 2.1-1

HEENT SYSTEM (CONT.)

- (a) Clinical course is variable. About 20% to 25% of patients with chronic tinnitus consider it a significant problem.
- (b) Individualized tinnitus management programs can be beneficial in most patients.

e. Mastoiditis

(1) Description - Mastoiditis is inflammation of the mastoid process and air cells, a complication of otitis media.

(2) Clinical Presentation

- (a) Acute mastoiditis is usually a complication of acute otitis media.
- (b) Most common presenting symptom is pain and tenderness in the postauricular region.

(c) Other signs or symptoms include:

1. Fever
2. Postauricular erythema and edema
3. Protrusion of the pinna inferiorly and anteriorly
4. Tympanic membrane usually intact with signs of acute otitis media

(d) Complications of acute mastoiditis include:

1. Subperiosteal abscess (most common complication)
2. Hearing loss
3. Facial nerve palsy
4. Labyrinthitis

(3) Differential Diagnosis

- (a) Fulminant otitis externa
- (b) Otitis media

OUTLINE SHEET SCSC 2.1-1

HEENT SYSTEM (CONT.)

- (c) Metastatic disease
- (4) Workup – A thorough history and physical examination are important in establishing diagnosis.
- (5) Laboratory Tests – If there is a perforation in the tympanic membrane with drainage, cultures of this may be taken after carefully cleaning the external canal.
- (6) Imaging Studies
  - (a) Plain x-rays of the mastoid region may demonstrate clouding or opacification in areas of pneumatization.
  - (b) CT scan can demonstrate early involvement of bone (mastoiditis with bone destruction).
  - (c) MRI is more sensitive than CT scan in evaluating soft-tissue involvement and is useful in conjunction with CT scan to investigate other complications of mastoiditis.
- (7) Treatment may include
  - (a) Myringotomy if the ear is not already draining
  - (b) IV antibiotics
  - (c) Mastoidectomy
- (8) Disposition
  - (a) Expect patient to require longer recovery time depending on response to medication and or surgery
- (9) Referral
  - (a) Otorhinolaryngology
  - (b) Neurology

16. List signs and symptoms of common nose disorders

- a. Sinusitis

OUTLINE SHEET SCSC 2.1-1

HEENT SYSTEM (CONT.)

(1) Description

- (a) Sinusitis is inflammation of the mucous membranes lining one or more of the paranasal sinuses.
- (b) The various presentations are:
  1. Acute sinusitis: infection lasting <4 wk., with complete resolution of symptoms.
  2. Subacute infection: lasts from 4 to 12 wk., with complete resolution of symptoms.
  3. Chronic sinusitis: inflammation of the paranasal sinuses and nasal cavities lasting >12 wk., with persistent upper respiratory symptoms.

(2) Clinical Presentation

- (a) Patients often give a history of a recent upper respiratory illness with some improvement, then a relapse.
- (b) Mucopurulent secretions in the nasal passage:
  1. Purulent nasal and postnasal discharge lasting 7 to 10 days
  2. Facial tightness, pressure, or pain
  3. Nasal obstruction
  4. Headache
  5. Decreased sense of smell
  6. Purulent pharyngeal secretions, brought up with cough, often worse at night
- (c) Erythema, swelling, and tenderness over the infected sinus in a small proportion of patients:
  1. Diagnosis cannot be excluded by the absence of such findings.
  2. These findings are not common

OUTLINE SHEET SCSC 2.1-1

HEENT SYSTEM (CONT.)

- (d) Intermittent low-grade fever in about half of adults with acute bacterial sinusitis.
- (e) Toothache is a common complaint when the maxillary sinus is involved.
- (f) Periorbital cellulitis and excessive tearing with ethmoid sinusitis. Orbital extension of infection, chemosis, proptosis and impaired extraocular movements
- (g) Symptoms of chronic sinusitis (may or may not be present):
  - 1. Nasal or postnasal discharge
  - 2. Fever
  - 3. Facial pain or pressure
  - 4. Headache
- (3) Differential Diagnosis
  - (a) Temporomandibular joint disease
  - (b) Migraine headache
  - (c) Cluster headache
  - (d) Dental infection
  - (e) Trigeminal neuralgia
  - (f) Allergic rhinitis
- (4) Workup. The diagnosis is generally based on clinical signs and symptoms (purulent rhinorrhea and facial pain). Radiologic tests and cultures are not recommended initially and should be considered only when treatment is ineffective and sinusitis persists.
  - (a) Transillumination. Used for diagnosis of frontal and maxillary sinusitis
  - (b) Absence of light transmission indicates that sinus is filled with fluid

OUTLINE SHEET SCSC 2.1-1

HEENT SYSTEM (CONT.)

- (c) Dullness (decreased light transmission) is less helpful in diagnosing infection
- (5) Laboratory Tests: No laboratory test required.
- (6) Imaging Studies: No imaging studies required.
- (7) Treatment
  - (a) To help promote sinus drainage:
    1. Air humidification with vaporizers (for steam) or humidifiers (for a cool mist)
    2. Application of hot, wet towel over the face
    3. Sipping hot beverages
    4. Hydration
  - (b) Systemic decongestants
  - (c) Nasal irrigation, with hypertonic or normal saline
  - (d) Analgesics, antipyretics
  - (e) Most cases of acute sinusitis have a viral cause and will resolve within two weeks without antibiotics.
  - (f) Antimicrobial therapy:
    1. Not usually prescribed for mild to moderate sinusitis within the first week of illness.
    2. Usually reserved for those with severe symptoms who meet the criteria for diagnosis of sinusitis.
    3. Hospitalization and IV antibiotics may be required for more severe infection and those with suspected intracranial complications.
  - (g) Surgery. Surgical drainage may be indicated
    1. If intracranial or orbital complications suspected

OUTLINE SHEET SCSC 2.1-1

HEENT SYSTEM (CONT.)

- 2. Many cases of frontal and sphenoid sinusitis
- 3. Chronic sinusitis resistant to medical therapy
- 4. Surgical debridement imperative in the treatment of fungal sinusitis

(8) Complications:

- (a) Untreated, sinusitis may lead to a number of serious, life-threatening complications.
- (b) Intracranial complications include meningitis, brain abscess, and epidural and subdural empyema.
- (c) Intracranial sequelae are more common with frontal and ethmoid infections.
- (d) Extracranial complications include orbital cellulitis, blindness, orbital abscess, and osteomyelitis.
- (e) Extracranial sequelae are more commonly seen with ethmoid sinusitis.

(9) Referral – Refer to Otorhinolaryngology

b. Allergic Rhinitis

(1) Description

- (a) Allergic rhinitis is an IgE-mediated hypersensitivity response to nasally inhaled allergens that involves mucosal inflammation driven by type 2 helper T (Th2) cells that causes sneezing, rhinorrhea, nasal pruritus, and congestion.
- (b) It may be seasonal or perennial.

(2) Clinical Presentation

- (a) Pale or violaceous mucosa of the turbinate caused by venous engorgement (this can distinguish it from erythema present in viral rhinitis)
- (b) Nasal polyps
- (c) Posterior oropharynx with cobblestone appearance
- (d) Erythema of the throat, conjunctival and scleral injection

OUTLINE SHEET SCSC 2.1-1

HEENT SYSTEM (CONT.)

- (e) Clear nasal discharge
- (f) Sneezing
- (g) Nasal congestion
- (h) Cough
- (i) Postnasal drip
- (3) Differential Diagnosis
  - (a) Infections (sinusitis; viral, bacterial, or fungal rhinitis)
  - (b) Septal obstruction (e.g., deviated septum), nasal polyps, nasal neoplasms
- (4) Workup, is often unnecessary if the diagnosis is apparent. A detailed medical history is useful in identifying the culprit allergen.
- (5) Laboratory Tests
  - (a) Selected patients with allergic rhinitis that is not controlled with standard therapy may benefit from allergy testing to target allergen avoidance measures or guide immunotherapy.
- (6) Imaging Studies
  - (a) No imaging studies required
- (7) Treatment may include
  - (a) Maintain allergen-free environment by covering mattresses and pillows with allergen-proof casings, eliminating carpeting, eliminating animal products, and removing dust-collecting fixtures.
  - (b) Use of air purifiers and dust filters is helpful
  - (c) Maintain humidity in the environment below 50% to prevent dust mites and mold.
  - (d) Remove pets from homes of patients with suspected sensitivity to animal allergens.

OUTLINE SHEET SCSC 2.1-1

HEENT SYSTEM (CONT.)

- (e) Antihistamines
- (f) Topical nasal steroids
- (8) Disposition
  - (a) Most patients experience significant relief with avoidance of allergens and proper use of medications.
- (9) Referral
  - (a) Allergy testing in patients with severe symptoms who are unresponsive to therapy or when the diagnosis is uncertain.
- c. Nonallergic Rhinitis
  - (1) Description. Non-allergic rhinitis (NAR) is characterized by chronic episodic or perennial symptoms of rhinitis (congestion, rhinorrhea, and postnasal drainage) are not the result of allergies.
  - (2) Clinical Presentation
    - (a) Physical exam can be completely unremarkable
    - (b) Swollen erythematous turbinate may be present
    - (c) Clear or mucoid nasal secretions
    - (d) Nasal congestions
    - (e) Rhinorrhea with often associated postnasal drip
    - (f) Sneezing
  - (3) Differential Diagnosis
    - (a) Allergic rhinitis (sensitivity to pollens, indoor allergens, occupational allergens)
    - (b) Mechanical obstruction (e.g., deviated septum, nasal polyps, nasal neoplasms, foreign bodies)

OUTLINE SHEET SCSC 2.1-1

HEENT SYSTEM (CONT.)

- (4) Workup – A detailed history and physical exam can be helpful to determine if diagnostic testing is necessary. Most cases can be empirically treated without further testing
- (5) Laboratory Tests - No laboratory tests required
- (6) Imaging Studies - No imaging studies required
- (7) Treatment may include
  - (a) Identification and avoidance of specific triggers
  - (b) Daily nasal lavage and over-the-counter nasal saline sprays have been shown to improve symptoms.
- (8) Disposition - Most patients experience mild to moderate symptomatic relief with avoidance of triggers and appropriate use of medications.
- (9) Referral – Refer to allergist and/or ENT may be appropriate when severe symptoms are unresponsive to therapy and/or diagnosis is uncertain.

17. List signs and symptoms of common throat disorders

a. Acute Pharyngitis

- (1) Description - Inflammation of the pharynx or tonsils that is usually cause by a virus and is self-limited. Other causes of pharyngitis include bacteria such as streptococcus.
- (2) Clinical Presentation
  - (a) Viral Pharyngitis:
    - 1. Sore throat
    - 2. Fatigue
    - 3. Nasal congestion
    - 4. Cough
    - 5. Sneezing

OUTLINE SHEET SCSC 2.1-1

HEENT SYSTEM (CONT.)

- 6. Ear pain
- 7. Sinus pain
- 8. Oral ulcer (cold sore)
- 9. Minimal lymphadenopathy

(b) Bacterial Pharyngitis

- 1. Acute onset of sore throat
- 2. Fever
- 3. Difficulty swallowing
- 4. Absence of cough
- 5. Pharyngeal edema
- 6. Tonsillar exudates
- 7. Tonsillar hypertrophy
- 8. Prominent and tender anterior cervical lymphadenopathy
- 9. Palatal petechiae
- 10. High fever
- 11. Systemic signs of infection

(c) Red Flags:

- 1. Hot-potato voice
- 2. Uvula displacement
- 3. Trismus
- 4. Severe unilateral sore throat
- 5. Drooling or pooling saliva

OUTLINE SHEET SCSC 2.1-1

HEENT SYSTEM (CONT.)

- 6. Stridor
- 7. Tachypnea
- 8. Dyspnea
- 9. Stiff neck (inability to touch chin to chest)
- 10. Fever with rigors
- 11. Toxic appearance

(3) Differential Diagnosis

- (a) Sore throat associated with post-nasal drip
- (b) Peritonsillar abscess
- (c) Tonsillar hypertrophy associated with lymphoma

(4) Workup

- (a) The Centor criteria is to identify patients at risk for Group A Streptococcus or bacterial pharyngitis and gives one point for each of the following:
  - 1. Fever subjective or measured  $> (100.5^{\circ} \text{ F})$
  - 2. Absence of cough
  - 3. Tonsillar exudates
  - 4. Tender anterior cervical lymphadenopathy
- (b) Patients with  $\leq 1$  point criteria are at low risk and do not need additional testing.
- (c) Rapid streptococcal antigen test (culture should be performed if rapid test negative)

(5) Laboratory Tests

- (a) Complete blood count with differential

OUTLINE SHEET SCSC 2.1-1

HEENT SYSTEM (CONT.)

1. May help support diagnosis of bacterial infection when diagnosis is unclear
  2. Streptococcal infection suggested by leukocytosis  $>15,000/\text{mm}^3$
- (b) Viral cultures, serologic studies rarely needed
- (c) Monospot if diagnosis is unclear
- (6) Imaging Studies – Seldom indicated. If necessary to distinguish between tonsillitis and peritonsillar abscess, CT or MRI of the neck can be done.
- (7) Treatment may include
1. Increased clear fluids
  2. Salt water gargles
  3. Analgesics and NSAIDs
  4. Treatment of peritonsillar abscess is drainage through needle or incision.
  5. Tonsillectomy
  6. Tonsillopharyngitis is generally managed in an outpatient setting with follow-up arranged in a week if needed.
- (8) Referral – Admission to the hospital is indicated for local suppurative complications (peritonsillar abscess; lateral pharyngeal or posterior pharyngeal abscess; impending airway closure; or inability to swallow food, medications, or water).
- b. Peritonsillar Abscess
- (1) Description - Peritonsillar abscess is an acute infection located between the capsule of the palatine tonsil and the superior constrictor muscle of the pharynx.
  - (2) Clinical Presentation
    - (a) There is often a delay of 2 to 5 days between abscess formation and local and systemic symptoms.

OUTLINE SHEET SCSC 2.1-1

HEENT SYSTEM (CONT.)

- (b) Sore throat, which may be severe and unilateral
  - (c) Dysphagia and odynophagia
  - (d) Otolgia on the side of abscess
  - (e) Foul-smelling breath
  - (f) Facial swelling
  - (g) Drooling
  - (h) Headache
  - (i) Fever
  - (j) Trismus: the examination of the pharynx can be limited by trismus
  - (k) Hoarseness, muffled voice (also called “hot potato voice”)
  - (l) Tender submandibular and anterior cervical lymph nodes
  - (m) Tonsillar hypertrophy with likely peritonsillar edema
  - (n) Contralateral deflection of the uvula: the distinguishing feature of peritonsillar abscess is inferior medial displacement of the infected tonsil with contralateral deviation of the uvula.
  - (o) Stridor
- (3) Differential Diagnosis
- (a) Hypertrophic tonsillitis
  - (b) Infectious mononucleosis
  - (c) Peritonsillar cellulitis
  - (d) Retropharyngeal abscess
  - (e) Epiglottitis
  - (f) Lymphoma

OUTLINE SHEET SCSC 2.1-1

HEENT SYSTEM (CONT.)

- (g) Ludwig’s angina
- (4) Workup – Based on history and physical exam.
- (5) Laboratory Tests
  - (a) Consider rapid strep antigen testing and/or pharyngeal culture and sensitivity.
  - (b) Aspiration of the abscess for culture and sensitivity.
  - (c) Consider lab testing for mononucleosis (patients with peritonsillar abscess have a 20% incidence of mononucleosis)
- (6) Imaging Studies
  - (a) Consider ultrasound, CT scan, or MRI to help differentiate abscess from cellulitis or mass when diagnosis is unclear.
  - (b) Intraoral ultrasound may improve diagnosis and aspiration of PTA compared with visual inspection in adult patients.
  - (c) MRI provides better soft-tissue differentiation than CT.
- (7) Treatment may include
  - (a) Drainage of the abscess by needle aspiration or by surgical incision and drainage.
  - (b) Intraoral ultrasound-guided needle aspiration is a useful adjunct in the presence of trismus.
  - (c) Antibiotics
- (8) Disposition - Successful treatment is defined by symptomatic improvement in sore throat, fever, and/or tonsillar swelling within 24 hours of intervention.
- (9) Referral – Refer to ENT or diagnostic radiology for drainage of abscess

JOB SHEET SCSC 2.1-3

HEENT SYSTEM

A. INTRODUCTION

Upon successful completion of this lesson the Trainee will be able to obtain a HEENT history and conduct a HEENT examination on a real or simulated patient (a person acting as a patient).

B. EQUIPMENT LIST: The primary instructor is responsible for checking that all of the below equipment is available, functional and in the lab before the lab is scheduled to begin:

1. Real or simulated patient (a person acting as a patient)
2. Oxygen Cylinders
3. Pressure Regulator
4. Flowmeters
5. Non Rebreather Mask
6. Nasal Cannula
7. Mats
8. Pen, Black
9. Soap, Antibacterial
10. Exam Table
11. Stethoscope
12. Electronic BP Machine
13. Pulse Oximeter
14. Blood Pressure Cuff, Manual
15. Thermometer
16. Pen Light
17. Gloves, Non-Sterile
18. Tongue Depressor
19. SF 600 Forms
20. Otoscope

C. REFERENCES

1. Seidel’s Guide to Physical Examination, 8th Ed., Jane W. Ball, Joyce E. Dains, John A. Flynn, Barry S. Soloman, Rosalyn W. Stewart, Mosby, an imprint of Elsevier Inc., 2015
2. Bates’ Guide to Physical Examination and History Taking, 12th Ed., Lynn S. Bickley and Peter G. Szilagy, Wolters Kluwer, 2017, <https://STAT!Ref.com>

D. SAFETY PRECAUTIONS

1. Instructors, Trainees and visitors must comply with all general safety procedures that are posted in the lab environment or provided in the lesson plan.
2. There are no skill specific safety hazards for this Performance Test.
3. Review TTO procedures in the Safety/Hazard Awareness Notice.

JOB SHEET SCSC 2.1-3

HEENT SYSTEM (CONT.)

4. Trainees will not practice if an instructor is not present.
5. Trainees may not take equipment out of the lab.

E. JOB STEPS

1. Trainee Instructions:

- a. The purpose of this Performance Test is to evaluate the Trainee’s ability to complete a HEENT assessment.
- b. The Trainee must attempt to perform and describe or explain each step as they are performing it.
- c. The Trainee has 30 minutes to complete this examination.
- d. The Trainee is not allowed to use the reference in the performance of this Performance Test.
- e. The Trainee will wear appropriate attire during the practice and actual Performance Test evaluation per Instructor’s guidance.

**AT MEDICAL REPRESENTATIVE DIRECTION, OBTAIN PATIENT HISTORY PERTAINING TO HEENT SYSTEM BY COMPLETING THE FOLLOWING STEPS:**

1. \*Ask patient’s chief complaint
2. Ask patient about mechanism of injury
3. \*Ask patient about onset of symptoms and pain
4. \*Ask about pain location, does it radiate or stay in place.
5. Ask about duration, does it come and go or is it constant.
6. Ask about the character of the pain, constant or comes and goes.
7. Ask what makes it worse.
8. Ask what makes it better.
9. Ask if there is a time of day that their symptoms are better or worse.
10. \*Ask about where their pain is on the pain scale of (1-10).

JOB SHEET SCSC 2.1-3

HEENT SYSTEM (CONT.)

11. Ask about any other symptoms they notice.
12. Ask if they have tried any remedies for relief.
13. Ask if there were any events that led up to the injury.
14. Gather patients past medical history, SAMPLE and Past Surgical History, Medications, Tobacco Use and Allergies
15. Ask if there is a family history of any diseases.
16. Ask about their social history.
17. Review of systems, minimum of constitutional questions

**AT MEDICAL REPRESENTATIVE DIRECTION, GATHER A GENERAL IMPRESSION BY COMPLETING THE FOLLOWING STEPS:**

1. \*Form General Impression
2. \*Obtain Vital Signs

**AT MEDICAL REPRESENTATIVE DIRECTION, INSPECT PATIENTS HEAD BY COMPLETING THE FOLLOWING STEPS:**

1. Inspect the hair for abnormalities.
2. Inspect the scalp for abnormalities.
3. Inspect the skull for abnormalities.
4. Inspect the face for abnormalities.
5. Inspect the skin for abnormalities.

**AT MEDICAL REPRESENTATIVE DIRECTION, INSPECT AND PALPATE THE PATIENTS NECK BY COMPLETING THE FOLLOWING STEPS:**

1. Inspect for muscle symmetry
2. Inspect for alignment of trachea

JOB SHEET SCSC 2.1-3

HEENT SYSTEM (CONT.)

3. Inspect for Jugular Vein Distention
4. Inspect for Carotid Artery Prominence
5. Inspect lymph nodes
6. Inspect range of motion
7. Palpate trachea for midline position
8. Palpate paravertebral muscles and spinous process
9. Palpate lymph nodes and assess size, shape and any abnormalities

**AT MEDICAL REPRESENTATIVE DIRECTION, INSPECT PATIENTS EYES BY COMPLETING THE FOLLOWING STEPS:**

1. \*Measures visual acuity: distant, near, & peripheral (utilizes proper charts/technique to evaluate i.e. Snellen chart)
2. \*Inspect for abnormalities.
  - a. Eyebrows
  - b. Eyelids
  - c. Conjunctiva & Sclera
3. \*Assess PERRL: Pupils: size/shape, response to light
4. \*Assess Extraocular Muscle Movements: i.e. EOMI
5. Assess for convergence

**AT MEDICAL REPRESENTATIVE DIRECTION, INSPECT AND PALPATE PATIENTS EARS BY COMPLETING THE FOLLOWING STEPS:**

1. Examine the external ear:
  - a. Inspect the auricles
  - b. Inspect the external auditory canal

JOB SHEET SCSC 2.1-3

HEENT SYSTEM (CONT.)

- c. Palpate the auricles and mastoid area
- 2. Inspect the interior ear structures using an otoscope:
  - a. Auditory canal
  - b. Tympanic membrane
  - c. Assess tympanic membrane mobility
- 3. Assess for abnormalities of the Tympanic Membrane
- 4. Assess gross hearing

**AT MEDICAL REPRESENTATIVE DIRECTION, INSPECT AND PALPATE PATIENTS NOSE BY COMPLETING THE FOLLOWING STEPS:**

- 1. Examine the external nose:
  - a. Inspect the nose
  - b. Observe the nares
  - c. Palpate the bridge and soft tissues of the nose
  - d. Evaluate nasal patency
- 2. Assess the nasal cavity using an otoscope:
  - a. Inspect the nasal mucosa
  - b. Inspect the nasal septum
  - c. Test the sense of smell with vials of different odors
- 3. Inspect and palpate the sinuses:
  - a. Frontal sinuses
  - b. Maxillary sinuses
  - c. Transilluminate the sinuses

JOB SHEET SCSC 2.1-3

HEENT SYSTEM (CONT.)

**AT MEDICAL REPRESENTATIVE DIRECTION, INSPECT AND PALPATE PATIENTS MOUTH AND THROAT BY COMPLETING THE FOLLOWING STEPS:**

1. Inspect and palpate the lips
2. Examine the mouth:
  - a. Observe the mucous membrane
  - b. Inspect the gums
  - c. Palpate the gums
  - d. Inspect the teeth
3. \*Examine the oral cavity:
  - a. Inspect the tongue
  - b. Assess movement of the tongue
  - c. Inspect the floor of the mouth
  - d. Palpate the tongue and the floor of the mouth
  - e. Inspect and palate the uvula
  - f. Evaluate soft palate movement
4. \*Assess the oropharynx using a tongue blade:
  - a. Inspect the oropharynx, tonsils and tonsillar pillars
  - b. Inspect the posterior wall of the pharynx
  - c. Elicit the gag reflex

**AT MEDICAL REPRESENTATIVE DIRECTION, PRESENT A PATIENT BY COMPLETING THE FOLLOWING STEPS:**

1. \*Present findings of focused physical exam to provider
2. \*Document all history, findings interventions and procedures

## INFORMATION SHEET SCSC 2.1-4

## RED FLAG CRITERIA

## A. INTRODUCTION

This information describes the steps to perform an examination of the genitourinary system with the assistance of a provider.

## B. REFERENCES

1. Seidel's Guide to Physical Examination, 8th Ed., Jane W. Ball, Joyce E. Dains, John A. Flynn, Barry S. Soloman, Rosalyn W. Stewart, Mosby, an imprint of Elsevier Inc., 2015
2. Berne & Levy Physiology, Seventh Edition, Bruce M. Koeppen, MD, PhD and Bruce A. Stanton, PhD, Elsevier, Inc. 2018. My Athens, Clinical Key
3. Ferri's Clinical Advisor 2017, Fred F. Ferri, Elsevier Inc.; <https://nMeL>
4. The 5-Minute Clinical Consult 2018, Frank J. Domino, Wolters Kluwer; <https://Statref>
5. Atlas of Clinical Gross Anatomy, Second Edition, Kenneth Prakash Moses MD, John C. Banks PhD, Pedro B. Nava PhD, Darrell K. Petersen, MBA. Saunders, an imprint of Elsevier, Inc. 2013, 2005.
6. Bates' Guide to Physical Examination and History Taking, 12th Ed., Lynn S. Bickley and Peter G. Szilagyi, Wolters Kluwer, 2017, <https://STAT!Ref.com>
7. Centers for Disease Control and Prevention (CDC). (2016). Sexually transmitted disease surveillance (STDs) 2015. Retrieved April 5, 2017, from <https://www.cdc.gov/std/stats15/std-surveillance-2015-print.pdf>
8. Close, J.F. (2018). Gastrointestinal clinical assessment and diagnostic procedures. In L.D. Urden, K.M. Stacy, M.E. Lough (Eds.), Critical care nursing: Diagnosis and management (8th ed., pp. 669-679). St. Louis: Elsevier.
9. Essentials of Musculoskeletal Care, 5th Ed., April D. Armstrong and Mark C. Hubbard, AAOS, 2016; <https://Statref>
10. Current Medical Diagnosis & Treatment 2016 Maxine A. Papadakis
11. BUMEDINST 6550.9B Policy and Guidance for Sickcall Screeners Program

## C. INFORMATION:

The following items are to be considered Red Flag Criteria within their respective sections:

## INFORMATION SHEET SCSC 2.1-4

## RED FLAG CRITERIA (CONT.)

SOAP

1. Chest Pain
2. Febrile Illness with temperature exceeding 102F
3. Acute Distress
4. Pulse above 120 bpm
5. Respiratory above 28 bpm
6. Systolic blood pressure over 180mm Hg
7. Diastolic blood pressure over 100mm Hg
8. Any uncertainty or doubt in the assessment of the medical conditions
9. Any patient presenting to the SCS with the same condition twice during a single episode

HEENT

1. Abrupt, severe headache (worst headache of their life)
2. Fever and stiff neck
3. Mental confusion
4. Seizures
5. Double vision
6. Any neurological deficit
7. Speaking difficulties
8. Progressively worsening
9. Head injury
10. Mastoid tenderness

INFORMATION SHEET SCSC 2.1-4

RED FLAG CRITERIA (CONT.)

11. Facial paralysis
12. Labyrinthitis
13. Hearing loss
14. Neurological deficits
15. Neck stiffness
16. Vertigo
17. Hot-potato voice
18. Uvula displacement
19. Trismus
20. Severe unilateral sore throat
21. Drooling or pooling saliva
22. Stridor
23. Tachypnea
24. Dyspnea
25. Fever with rigors
26. Toxic appearance

RESPIRATORY

1. Prolonged fever
2. Difficulty breathing
3. Pneumonia
4. Respiratory failure

INFORMATION SHEET SCSC 2.1-4

RED FLAG CRITERIA (CONT.)

5. Comorbidities
6. COPD
7. Necrotizing pneumonia
8. Empyema
9. Abscesses
10. Cavitation
11. Bronchopleural fistula
12. Sepsis
13. Bacterial pneumonia
14. Otitis media
15. Sinusitis
16. Asthma
17. Congestive heart failure
18. Atelectasis
19. Air leak syndromes (pneumomediastinum, pneumothorax)
20. Medication-specific side effects/adverse effects/interactions

CARDIOVASCULAR

1. Chest pain
2. Palpitations
3. Hypertension greater than 160 systolic and/or 100 diastolic
4. Easily fatigued
5. Orthopnea

## INFORMATION SHEET SCSC 2.1-4

## RED FLAG CRITERIA (CONT.)

6. Radiating pain especially to the neck, jaws, teeth and/or scapula
7. Crushing pain, e.g. feels like an elephant on their chest
8. Shortness of breath
9. Syncope
10. Pitting edema
11. Thrills
12. Family history of heart disease and/or sudden death

GASTROINTESTINAL

1. Significant mechanism of injury (MOI) is indicative of severe blunt force trauma, direct impact, deceleration injuries, rotary forces, or shear forces. An urgent referral may need to be made.
2. Diffuse abdominal pain
3. Extreme tenderness
4. Severe guarding
5. Rigidity
6. Distention
7. Diminished Bowel Sounds
8. Rebound Tenderness
9. Positive F.A.S.T. exams

GENITOURINARY

1. Ovarian torsion
2. Ruptured ectopic pregnancy

## INFORMATION SHEET SCSC 2.1-4

## RED FLAG CRITERIA (CONT.)

3. Testicular torsion
4. Hernias that are not reducible and lose their blood supply

NEUROLOGY

1. Any positive finding on examination
2. Stroke
3. Seizures
4. Altered mental status
5. Paresthesia
6. Paralysis
7. Numbness and/or tingling
8. Syncope
9. Neck stiffness, e.g. inability to touch chin to chest
10. Concussion
11. Loss of vision
12. Blown pupil

UPPER EXTREMITY

1. Any positive neurological finding
2. Significant loss of range of motion
3. Cyanosis
4. Fractures
5. Snuff box tenderness
6. Loss of pulse

## INFORMATION SHEET SCSC 2.1-4

## RED FLAG CRITERIA (CONT.)

7. Dislocations
8. Positive drop arm
9. Positive apprehension

NECK AND SPINE

1. Cauda equina syndrome
2. Urinary retention
3. Perianal numbness
4. Motor loss
5. Severe single nerve root paralysis
6. Progressive neurologic deficit
7. Radicular symptoms that persist for more than 6 weeks
8. Intractable leg pain
9. Recurrent episodes of sciatica that interfere with the patient's life activities.

LOWER EXTREMITIES

1. Any positive neurological finding
2. Significant loss of range of motion
3. Cyanosis
4. Fractures
5. Navicular tenderness

ENDOCRINE

1. Diabetic ketoacidosis

## INFORMATION SHEET SCSC 2.1-4

## RED FLAG CRITERIA (CONT.)

2. Syncope
3. Hypertension
4. Tachycardia
5. Hyperactive or hypoactive reflexes
6. Any neurological finding

OUTLINE SHEET SCSC 2.2-1

RESPIRATORY SYSTEM

A. INTRODUCTION

B. ENABLING OBJECTIVES

- 1.17 Utilize respiratory system anatomy to perform a physical assessment
- 1.18 Utilize respiratory system physiology to perform a physical assessment
- 1.19 Obtain history from a patient with a common respiratory system complaint
- 1.20 Perform respiratory system examination
- 1.21 List signs and symptoms of common respiratory system disorders
- 1.22 List treatments for common respiratory system disorders
- 1.16 State Red Flag criteria

C. SCSC 2.2-1 RESPIRATORY SYSTEM TOPIC OUTLINE

- 1. Introduction:
  - a. The purpose of the respiratory system is to ventilate and oxygenate the body systems and tissues. The chest and the lungs allow for respiration. Respiration keeps the body supplied with oxygen and protects it from excess accumulation of carbon dioxide. It involves the movement of air back and forth from the alveoli to the outside environment, gas exchange across the alveolar-pulmonary capillary membranes and circulatory system transport of oxygen to, and from, the peripheral tissues. This lesson focuses on the assessment of the respiratory system for the Sick Call Screener. The Trainee will learn how to assess the respiratory system, the proper documentation of their findings during assessment and how to present those findings to a provider.
- 2. Anatomy and Physiology of the Respiratory System
  - a. Upper Respiratory Tract
    - (1) Nose
    - (2) Nasopharynx
    - (3) Oropharynx

OUTLINE SHEET SCSC 2.2-1

RESPIRATORY SYSTEM (CONT.)

b. Lower Respiratory Tract

(1) Larynx

(2) Trachea

(3) Bronchi

(4) Lungs

(a) Extend from the diaphragm to just above the clavicle

(b) Lobes

1. Right: 3 (upper, middle, and lower lobes)

2. Left : 2 (upper and lower lobes)

c. Thorax: The chest, or thorax, is a structure of bone, cartilage, and muscle capable of movement as the lung expand.

(1) Anteriorly, it consists of the sternum, manubrium, xiphoid process, and costal cartilages.

(2) Laterally, it consists of the 12 pairs of ribs

(3) Posteriorly, 12 thoracic vertebrae

(4) All the ribs are connected to the thoracic vertebrae; the upper seven are attached anteriorly to the sternum by the costal cartilages; and ribs 8, 9 and 10 join with the costal cartilage just above them. Ribs 11 and 12, sometimes referred to as floating ribs, attach posteriorly by not anteriorly.

(5) The lateral diameter of the chest generally exceeds the anterior-posterior (AP) diameter in adults.

d. Respiratory Muscles: The primary muscles of respiration are the diaphragm and the intercostal muscles.

(1) The diaphragm is the dominant muscle. It contracts and moves downward during inspiration, lowering the abdominal contents to increase the intrathoracic space.

OUTLINE SHEET SCSC 2.2-1

RESPIRATORY SYSTEM (CONT.)

- (2) The external intercostal muscles increase the Anterior Posterior chest diameter during inspiration, and the internal intercostal decrease the lateral diameter during expiration.
  - (3) The sternocleidomastoid and trapezius muscles may also contribute to respiratory movements. These accessory muscles are used during exercise or when there is pulmonary compromise.
- e. The interior of the chest is divided into three major spaces: the right and left pleural cavities and the mediastinum.
- (1) The mediastinum is between the lungs, contains the heart and major blood vessels.
  - (2) The pleural cavities are lined with serous membranes that enclose the lungs.
  - (3) The spongy and highly elastic lungs are paired but not symmetric, the right having three lobes and the left having two.
    - (a) Each lung has a major fissure, the oblique that divides the upper and lower portions.
    - (b) A lesser horizontal fissure divides the upper portion of the right lung into the upper and middle lobes at the level of the fifth rib in the axilla and the fourth rib anteriorly.
    - (c) The entire lung is shaped by an elastic sub pleural tissue that limits its expansion.
    - (d) Each lung apex is rounded and extends anteriorly about 4 cm above the first rib into the base of the neck in adults.
    - (e) Posteriorly, the apices of the lungs rise to about the level of T1. The lower borders descend on deep inspiration to about T12 and rise on forced expiration to about T9.
- f. The tracheobronchial tree is a tubular system that provides a pathway along which air is filtered, humidified, and warmed as it moves from the upper airway to the alveoli.
- (1) The trachea is 10 to 11 cm and about 2 cm in diameter.
  - (2) It lies anterior to the esophagus and posterior to the isthmus of the thyroid.

OUTLINE SHEET SCSC 2.2-1

RESPIRATORY SYSTEM (CONT.)

- (3) Bronchi: It divides into the right and left main bronchi at about the level of T4 or T5 and just below the manubriosternal joint.
- (4) The right bronchus is wider, shorter, and more vertically placed than the left bronchus (therefore more susceptible to aspiration of foreign bodies).
- (5) The main bronchi are divided into three branches on the right and two on the left, each branch supplying one lobe of the lungs. The branches then begin to subdivide into terminal bronchioles and ultimately into respiratory bronchioles.

g. Anatomic Landmarks

- (1) The nipples. Also known as papilla mammae, is a conic elevation located in the center of the areola at about the fourth intercostal space, slightly below the midpoint of the breast. Although very different in size, the nipples and areolae of women and men are qualitatively identical.
- (2) The manubriosternal junction (angle of Louis). A visible and palpable angulation of the sternum and the point at which the second rib articulates with the sternum. This landmark can be used to count the ribs and intercostal spaces from this point. The number of each intercostal space corresponds to that of the rib immediately above it.
- (3) The suprasternal notch. A depression, easily palpable and most often visible at the base of the ventral aspect of the neck, just superior to the manubriosternal junction.
- (4) Costal angle. The angle formed by the margins at the sternum. It is usually no more than 90 degrees, with the ribs inserted at approximately 45-degree angle.
- (5) Vertebra prominens. The spinous process of C7. It can be more readily seen and felt with the patient's head bent forward. If two prominences are felt, the upper is that of the spinous process of C7, and the lower is that of T1. It is difficult to use this as a guide to counting ribs posteriorly because the spinous processes from T4 down project obliquely, thus overlying the rib below the number of its vertebra.
- (6) The clavicles. The clavicle or collarbone is a long bone that serves as a strut between the shoulder blade and the sternum or breastbone. There are two clavicles, one on the left and one on the right. The clavicle is the only long bone in the body that lies horizontally. Together with the shoulder blade it makes up the shoulder girdle. It is a palpable bone and in people who have less fat in this region, the location of the bone is clearly visible, as it creates a bulge in the skin. It receives its name from the Latin: clavícula because the bone rotates along its

OUTLINE SHEET SCSC 2.2-1

RESPIRATORY SYSTEM (CONT.)

axis like a key when the shoulder is abducted. The clavicle is the most commonly fractured bone. It can easily be fractured due to impacts to the shoulder from the force of falling on outstretched arms or by a direct hit.

3. History and Interview of a Patient with Respiratory System Disorders

a. In this section, we will focus on questions targeted at retrieving information from the patient to provide clues for focusing the physical examination and the development of an appropriate diagnostic evaluation for respiratory disorders. Patient History includes Chief Complaint, History of Present Illness, Review of Systems, Past Medical and Surgical History, Family History, and Social History.

(1) Chief Complaint (CC) - for example “coughing for 2 days”.

(2) History of present illness (HPI) – continuing with the “coughing” example.

(a) Onset: sudden, gradual; duration

(b) Location: where does it hurt, does the pain radiate or stay in one place

(c) Duration: Constant or come and go, exacerbated by, brought on by

(d) Character: Description of pain and other symptoms

1. Nature of cough: dry, moist, wet, hacking, hoarse, barking, whooping, bubbling, productive, nonproductive

2. Sputum production: duration, frequency, with activity, at certain times of day

3. Sputum characteristics: amount, color (clear, purulent, blood-tinged, mostly blood), foul odor

(e) Aggravating factors: What makes it worse, activity, exertion, position, talking

(f) Relieving factors: What makes it better and treatments tried

(g) Temporal factors: Time of day it is worse or better

(h) Severity: tires patient, disrupts sleep or conversation, causes chest pain

OUTLINE SHEET SCSC 2.2-1

RESPIRATORY SYSTEM (CONT.)

- (i) Associated Symptoms: shortness of breath, chest pain or tightness with breathing, fever, chills, nasal congestion, noisy respirations, hoarseness, gagging
- (3) Past Medical History (PMHx) and Surgical History (SurgHx) for the Coughing example. Ask the patient about the following:
- (a) Thoracic, nasal, and/or pharyngotracheal trauma or surgery, hospitalizations for pulmonary disorders, dates
  - (b) Use of oxygen or ventilation-assisting devices including continuous or bi-level positive airway pressure machines (CPAP)
  - (c) Chronic pulmonary diseases: tuberculosis (date, treatment, compliance), bronchitis, emphysema, bronchiectasis, asthma, cystic fibrosis
  - (d) Other chronic disorders: cardiac, cancer, blood clotting disorders
  - (e) Testing: allergy, pulmonary function tests, tuberculin skin tests, chest imaging
  - (f) Immunization against *Streptococcus pneumoniae*, influenza
- (4) Family history (FamHx) for cough. Ask the patient “Do you have a family history of any of the following diseases?”
- (a) Tuberculosis
  - (b) Cystic fibrosis
  - (c) Emphysema
  - (d) Allergy, asthma, atopic dermatitis
  - (e) Malignancy
  - (f) Bronchiectasis
  - (g) Bronchitis
  - (h) Clotting disorders (risk of pulmonary embolism)
- (5) Personal and Social History. Ask the patient “How much of the following (see below) do you do on a daily basis?”

OUTLINE SHEET SCSC 2.2-1

RESPIRATORY SYSTEM (CONT.)

- (a) Tobacco – explore at great length
  - (b) Living with someone who is sick with TB?
  - (c) Exercise
  - (d) Travels to exotic countries
  - (e) Hobbies: bird collections
  - (f) Alcohol
- (6) Review of Systems (ROS). Make sure to ask questions in relation to gastrointestinal, cardiac, respiratory and musculoskeletal systems. Chest pain can also be caused by anxiety, so review the patient's psychiatric history.
- (a) Constitutional Symptoms: Pain, fever, chills, malaise, fatigue, night sweats, weight loss or gain
  - (b) Ear, Nose, Throat: Tinnitus, pain, hearing loss, discharge, epistaxis, sinusitis, change in smell, difficulty swallowing, voice changes, hoarseness, soreness, frequent strep throat
  - (c) Cardiac: hypertension, heart murmurs, paroxysmal nocturnal dyspnea (PND), orthopnea, edema, chest pain/palpitations, shortness of breath, arrhythmias, palpitations.
  - (d) Gastrointestinal: heartburn, appetite, nausea, vomiting, hematemesis, indigestion, frequency of BM's, last BM, change in habit, hematochezia, tarry stools/melena, constipation, diarrhea, abdominal pain, food intolerance, hemorrhoids, jaundice, liver or gall bladder trouble, hepatitis, pancreatitis, esophageal lesions.
4. Lungs and Thorax Examination
- a. Every Respiratory examination will be conducted with a HEENT, abdominal, heart and blood vessel exam.
  - b. As with every examination you should begin with a general impression and obtain/review vital signs.

OUTLINE SHEET SCSC 2.2-1

RESPIRATORY SYSTEM (CONT.)

- c. The steps in examining of the lungs and thorax is inspection, palpation, percussion, and auscultation.

(1) Inspection

- (a) The patient should sit upright, if possible without support, unclothed to the waist. Clothing of any kind is a barrier for inspection, palpation, percussion, and auscultation.
- (b) A drape should cover the patient when full exposure is not necessary.
- (c) Note the shape and symmetry of the chest from both the back and the front, the costal angle, the angle of the ribs, and the intercostal spaces.
- (d) The clavicles are prominent superiorly, the sternum is flat and free of extra overlying tissue. The chest wall will not be absolutely symmetric, but one side can be used to compare to the other.
- (e) The anterior/posterior (AP) diameter of the chest is ordinarily less than the lateral diameter. When the AP diameter approaches or equals the lateral diameter, there is most often a chronic condition present.
- (f) Observing respiration
  - 1. Determine the respiratory rate (should be 12 to 20 respirations per minute)
  - 2. Note the pattern (or rhythm) of respiration and the way in which the chest moves. Expect the patient to breathe easily, regularly, and without apparent distress. The pattern of breathing should be even, neither too shallow nor too deep.
  - 3. Tachypnea is a persistent respiratory rate above 20 breaths per minute in an adult. A symptom of protective splinting from the pain of broken rib or pleurisy. Massive liver enlargement or abdominal ascites may prevent the descent of the diaphragm and produce a similar pattern.
  - 4. Bradypnea is a rate slower than 12 breaths per minute. This symptom can indicate neurologic or electrolyte disturbance, infection, or a conscious response to protect against pain of pleurisy or other irritative phenomena. It can also indicate an excellent level of cardiorespiratory fitness.
  - 5. Cheyne-Stokes respiration is a regular periodic pattern of breathing with intervals of apnea. It occurs in patients who are seriously ill, particularly

OUTLINE SHEET SCSC 2.2-1

RESPIRATORY SYSTEM (CONT.)

those with brain damage at the cerebral level or with drug-associated respiratory compromise.

6. Inspect the chest wall for movement during respiration. Expansion should be symmetric, without apparent use of accessory muscles. Chest asymmetry can be associated with unequal expansion and respiratory compromise caused by a collapsed lung or limitation of expansion by extrapleural air, fluid, or a mass.
  7. Unilateral or bilateral bulging can be a reaction of the ribs and interspaces to respiratory obstruction.
- (g) Observe the lips and nails for cyanosis, the lips for pursing, the fingers for clubbing, and the alae nasi for flaring. Any of these peripheral clues suggests pulmonary or cardiac difficulty.
1. Clubbing enlargement of the terminal phalanges of the fingers and/or toes is associated with emphysema, lung cancer, the cyanosis of genital heart disease, or cystic fibrosis.
  2. Flaring of the alae nasi during inspiration is a sign of air hunger.
  3. Look for any superficial venous patterns over the chest, which may be a sign of heart disorders or vascular obstruction.
  4. The underlying fat and relative prominence of the ribs give some clue to general nutrition.

(2) Palpation

- (a) Palpate the thoracic muscles and skeleton, feeling for pulsations, areas of tenderness, bulges, depressions, masses, and unusual movement. Expect bilateral symmetry and some elasticity of the rib cage, but the sternum and xiphoid should be relatively inflexible and the thoracic spine rigid.
- (b) Crepitus, a crackly or crinkly sensation, can be both palpated and heard –a gentle, bubbly feeling. It indicates air in the subcutaneous tissue from a rupture somewhere in the respiratory system or by infection with a gas-producing organism.
- (c) A pleural friction rub is a palpable, coarse, grating vibration (feels of leather rubbing on leather), usually on inspiration, suggests inflammation of the pleural surfaces.

OUTLINE SHEET SCSC 2.2-1

RESPIRATORY SYSTEM (CONT.)

(d) To evaluate thoracic expansion during respiration, stand behind the patient and place your thumbs along the spinal processes at the level of the tenth rib, with your palms lightly in contact with the posterior lateral surfaces. Watch your thumbs diverge during quiet and deep breathing. A loss of symmetry in the movement of the thumbs suggests a problem on one or both sides.

(e) Tactile Fremitus

1. Tactile fremitus, the palpable vibration of the chest wall that results from speech or other verbalizations. Fremitus is best felt posteriorly and laterally at the level of the bifurcation of the bronchi. The scapulae obscures fremitus.
2. Ask the patient to recite a few numbers or say a few words e.g. “99” is a favorite, while you systematically palpate the chest with the palmar surfaces of the fingers or with the ulnar aspects of the hand. Use a firm, light touch, establishing even contact. For comparison, palpate both sides simultaneously and symmetrically; or use one hand, alternating between the two sides. Move about the patient, palpating each area carefully, right side to left side.
3. Decreased or absent fremitus may be caused by excess air in the lungs or may indicate emphysema, pleural thickening or effusion, massive pulmonary edema, or bronchial obstruction.
4. Increased fremitus, often coarser or rougher in feel, occurs in the presence of fluids or a solid mass within the lungs and may be caused by lung consolidation, heavy but nonobstructive bronchial secretions, compressed lung, or tumor.

(f) Examining the trachea

1. Note the position of the trachea. Place an index finger in the suprasternal notch and move it gently, side to side, along the upper edges of each clavicle and in the spaces above to the inner borders of the sternocleidomastoid muscles. These spaces should be equal on both sides, and the trachea should be in the midline directly above the suprasternal notch. This can also be determined by palpating with both thumbs simultaneously.
2. Thyroid enlargement or pleural effusion may cause the trachea to deviate away from the affected side.

OUTLINE SHEET SCSC 2.2-1

RESPIRATORY SYSTEM (CONT.)

3. Pneumothorax can make the trachea go either way, depending on whether there is a tension pneumothorax. In this case pressure builds up on the side of the collapsed lung, and the deviation is away from the affected side. In contrast to a simple collapsed lung, the trachea deviates to the affected side.
4. Anterior mediastinal tumors may push it posteriorly; with inflammation of the mediastinum, the trachea may be pushed forward.

(3) Percussion

- (a) The techniques of percussion are the same regardless of the structure you are percussing.
  1. Direct percussion involves striking the finger or hand directly against the body.
  2. Most health care providers use indirect percussion and use the following technique:
    - a. The finger of one hand acts as the hammer and a finger of the other hand acts as the striking surface.
    - b. Place the nondominant hand on the surface of the body with the fingers slightly spread.
    - c. Place the distal phalanx of the middle finger firmly on the body surface with the other fingers slightly elevated off the surface.
    - d. Snap the wrist of your other hand downward, and with the tip of the middle finger, sharply tap the interphalangeal joint of the fingers that is on the body surface.
    - e. If you are not able to hear the percussion tone press harder against the patient's skin with your finger that lies on the body surface.
- (b) Percuss one side of the chest and then the other at each level in a ladder-like pattern. Look for the following:
  1. Tympanic is associated with a gastric air bubble.

OUTLINE SHEET SCSC 2.2-1

RESPIRATORY SYSTEM (CONT.)

- 2. Resonance is the expected sound which can be heard over all areas of the lungs.
- 3. Hyperresonance is associated with hyperinflation may indicate emphysema, pneumothorax, or asthma.
- 4. Dullness or flatness suggests pneumonia, atelectasis, pleural effusion, pneumothorax, or asthma.

(c) Degree of percussion tone is classified and ordered as listed in the table below.

Tone	Intensity	Pitch	Duration	Quality
Tympanic	Loud	High	Moderate	Drumlike
Hyperresonance	Very Loud	Low	Long	Boomlike
Resonance	Loud	Low	Long	Hollow
Dull	Soft to Moderate	Moderate to High	Moderate	Thudlike
Flat	Soft	High	Short	Very Dull

(d) Compare all areas bilaterally, using one side as a control for the other. The following sequence serves as one model:

- 1. Examine the back with the patient sitting with head bent forward and arms folded in front. This moves the scapulae laterally, exposing more of the lung.
- 2. Then ask the patient to raise the arms overhead while you percuss the lateral and anterior chest.
- 3. For all positions, percuss at 4 to 6 cm intervals over the intercostal spaces, moving systematically from superior to inferior and medial to lateral.

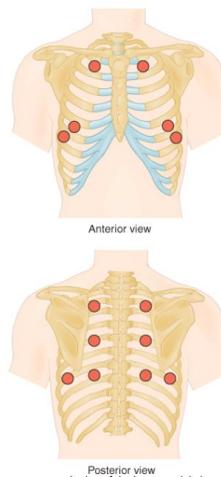
(4) Auscultation:

- (a) Involves listening over the chest wall as air enters and exits the lungs.
- (b) To perform auscultation of the lungs, a stethoscope is placed firmly on the patient's thorax anteriorly, laterally, and posteriorly.
- (c) The patient is asked to inspire fully through an open mouth, then to exhale quietly.

OUTLINE SHEET SCSC 2.2-1

RESPIRATORY SYSTEM (CONT.)

- (d) Inhalation and the beginning of exhalation normally produce a soft rustling sound.
- (e) The end of exhalation is normally silent.
- (f) This characteristic of a normal breath sound is termed vesicular.
- (g) When a louder, more hollow, and echoing sound occupies a larger portion of the ventilation cycle, the breath sounds are referred to as bronchial.
- (h) When the breath sounds are very quiet and barely audible, they are termed decreased.
- (i) These three terms—vesicular, bronchial, and decreased—allow the listener to describe the intensity of the breath sound.



- 1. Areas of auscultation for the heart (see figure above).
- 2. Abnormal lung sounds:
  - a. Adventitious (Added) Sounds - Due to abnormal airway wall motion or fluid in the lungs
  - b. Wheezes - High-Pitched, Squeaky. Indicative of obstruction.
  - c. Crackles (rales) - Indicate opening of a closed alveoli indicate presence of fluid in the small airways

OUTLINE SHEET SCSC 2.2-1

RESPIRATORY SYSTEM (CONT.)

- d. Rhonchi - Coarse, low-pitched, snoring, usually in larger airways indicates bronchial secretions
    - e. Pleural friction rub - dry, harsh, grating, and low-pitched. indicates pleurisy, inflammation of pleural surfaces
  - d. In summary, when the lungs are healthy, the bronchi clear, the pleural unaffected by disease, and the chest wall symmetrical and appropriately structured and mobile, the following characteristics will be found:
    - (1) On inspection: symmetry of movement on expansion, absence of retractions
    - (2) On palpation: midline trachea without a tug, symmetric, unaccentuated tactile fremitus
    - (3) On percussion: resonant and symmetric percussion notes
    - (4) On auscultation: absence of adventitious sounds
- 5. Signs and Symptoms of Common Respiratory System Disorders
  - a. Upper Respiratory Infection (URI)
    - (1) Description
      - (a) Acute, typically self-limited, upper respiratory infections (URIs) are one of the most common medical diagnoses, contributing to 30 million office visits annually and resulting in significant lost productivity through missed days from work/school.
      - (b) Inflammation of nasal passages resulting from infection with respiratory viruses
      - (c) Most cases are mild to moderate in severity, self-limited, and amenable to self-treat.
      - (d) Symptoms usually peak in 1 to 3 days and can last up to 2 weeks.
    - (2) Subjective Data
      - (a) Rhinitis
      - (b) Nasal congestion

OUTLINE SHEET SCSC 2.2-1

RESPIRATORY SYSTEM (CONT.)

- (c) and rhinorrhea (nasal discharge)
  - (d) Sore throat “dry” or “scratchy throat”
  - (e) Cough
  - (f) Malaise
  - (g) Headache
  - (h) Pressure discomfort in ears and face
  - (i) Fever is uncommon in adults, but low grade if present
- (3) Objective Data
- (a) The diagnosis of the common cold is clinical, based on reported symptoms and/or observed signs.
  - (b) Physical may reveal conjunctival injection, nasal mucosal edema (swelling) and or inflammation, nasal congestion, and pharyngeal erythema.
  - (c) Rhinorrhea (clear, yellow, or green)
  - (d) Postnasal drainage
  - (e) Adenopathy is typically absent or minimal
  - (f) Lung examination is typically clear to auscultation
  - (g) Cardiovascular examination (S1 and S2) is normal
- (4) Treatment Plan
- (a) No routine lab testing is typically needed, as diagnosis is based on clinical findings.
  - (b) Imaging not routinely indicated
  - (c) Treatment is symptom driven
    - 1. Saline nasal irrigation is safe for adults and children.

OUTLINE SHEET SCSC 2.2-1

RESPIRATORY SYSTEM (CONT.)

- 2. Analgesics or nonsteroidal anti-inflammatory drugs may be used to relieve headaches, ear pain, muscle and joint pains, malaise, and sneezing e.g. acetaminophen or ibuprofen.
  - 3. Antitussive therapy can provide symptom relief of cough e.g. dextromethorphan
  - 4. Antibiotics are not recommended.
- (5) Patient educated on diagnosis, treatment plan, smoking cessation, good hand hygiene, and cough etiquette. Patient verbally acknowledged understanding all.
- (a) Duty status, return to duty
  - (b) Follow up as needed or if symptoms worsen
- (6) Red Flag: Get a provider for any patient who has had a prolonged fever, difficulty breathing, or if there is a concern for any other complications.

b. Acute Bronchitis

(1) Description

- (a) Acute bronchitis is a common clinical condition characterized by cough, with or without sputum production, which lasts for at least five days. It is typically self-limited, resolving within one to three weeks. Symptoms result from inflammation of the lower respiratory tract and are most frequently due viral infection.
- (b) Acute bronchitis is a lower respiratory tract infection involving the large airways (bronchi) without evidence of pneumonia that occurs in the absence of chronic obstructive pulmonary disease.
- (c) Treatment is focused on patient education and supportive care. Antibiotics are not needed for the great majority of patients with acute bronchitis but are greatly overused for this condition.

(2) Subjective Data

- (a) Upper respiratory tract infection e.g. common cold; can precede the onset of acute bronchitis. During the first few days of illness, symptoms associated

OUTLINE SHEET SCSC 2.2-1

RESPIRATORY SYSTEM (CONT.)

with these two conditions such as headache, nasal congestion, and sore throat can overlap. The cough becomes the predominant complaint.

- (b) Cough is initially dry and nonproductive, then productive
  - (c) Dyspnea, wheeze, and fatigue may occur
  - (d) Possible contact with others who have respiratory infections
- (3) Objective Data
- (a) Many findings of an upper respiratory infection can be noted.
  - (b) Both wheezing and rhonchi may be auscultated on physical examination; rhonchi usually clear with coughing
  - (c) With prolonged coughing, chest wall or substernal pain can occur
- (4) Treatment Plan
- (a) Laboratory Tests are generally not necessary.
  - (b) Imaging Studies: Chest x-ray is usually reserved for patients with suspected pneumonia, influenza, or underlying chronic obstructive pulmonary disease (COPD) and no improvement with therapy.
  - (c) For most patients with acute bronchitis, symptoms are self-limited, resolving in about one to three weeks. Reassurance and symptom control are the cornerstone of care. Antibiotics are not recommended for routine use.
  - (d) Over the counter (OTC) medications to relieve cough e.g. dextromethorphan or guaifenesin.
  - (e) Analgesics like acetaminophen can help relieve symptoms such as headache, malaise, muscle pain, and joint pain.
  - (f) Patient educated on the expected course of illness and treatment plan. Patient verbalized understanding all.
  - (g) Duty status, return to full duty or with limitations due to symptoms.
  - (h) Follow up in one to three weeks if symptoms persist or sooner if symptoms worsen.

OUTLINE SHEET SCSC 2.2-1

RESPIRATORY SYSTEM (CONT.)

(5) Red Flag: Get a provider for any patient who has complications such as pneumonia or respiratory failure, comorbidities such as COPD, and a cough lasting >3 months.

c. Community-Acquired Pneumonia (CAP)

(1) Description

(a) An acute infection of the pulmonary parenchyma in a patient who has acquired the infection in the community, as distinguished from hospital-acquired (nosocomial) pneumonia. CAP is a common and potentially serious illness.

(2) Subjective Data

(a) Fever

(b) Dyspnea

(c) Cough and sputum production

(d) Pleuritic chest pain

(e) Gastrointestinal symptoms can be present such as nausea, vomiting and diarrhea.

(3) Objective Data

(a) Fever

(b) Tachypnea

(c) Lung examination reveals audible crackles or decreased breath sounds

(d) A dullness to percussion, tactile fremitus and egophony is noted

(e) The presence of an infiltrate on plain chest x-ray is considered the gold standard for diagnosing pneumonia when clinic features are supported

(4) Treatment Plan

(a) Order a chest x-ray.

OUTLINE SHEET SCSC 2.2-1

RESPIRATORY SYSTEM (CONT.)

- (b) Laboratory Tests: Complete blood count with differential; white blood cell count is elevated, usually with left shift.
- (c) Macrolides is recommended for empiric outpatient treatment of CAP as long as the patient has not received antibiotics within the past 3 months and does not reside in a community in which the prevalence of macrolide resistance is high e.g. azithromycin or clarithromycin or doxycycline for pregnant patients who cannot take azithromycin.
- (d) Patient education and reassurance
- (e) Indications for immediate presentation to medical provider and hospital admission are:
  1. Hypoxemia (oxygen saturation <90% while patient is breathing room air)
  2. Hemodynamic instability
  3. Inability to tolerate medications
- (5) Red Flag: Get a provider for any patient who has complications such as necrotizing pneumonia, respiratory failure, empyema, abscesses, cavitation, bronchopleural fistula, or sepsis.

d. Influenza

(1) Description

- (a) Influenza is an acute respiratory illness caused by influenza A or B viruses that occurs in outbreaks and epidemics worldwide, mainly during the winter season.
- (b) Although influenza is acutely debilitating, it is a self-limited infection in the general population (uncomplicated influenza); however, it is associated with increased morbidity and mortality in certain high-risk populations (complicated influenza).

(2) Pathophysiology:

- (a) Incubation is 1 to 4 days; infected persons are most contagious during peak symptoms.

OUTLINE SHEET SCSC 2.2-1

RESPIRATORY SYSTEM (CONT.)

- (b) Spread by aerosolized droplets or contact with respiratory secretions.
  - (c) Virus binds to the respiratory epithelium where replication occurs.
- (3) Subjective Data:
- (a) Sudden onset of the following:
    1. Fever (37.7-40.0 degree Celsius), especially if combined with presenting within 3 days of illness onset
    2. Anorexia
    3. Chills
    4. Sweats
    5. Malaise
    6. Myalgia
    7. Arthralgia
    8. Headache
    9. Sore throat/pharyngitis
    10. Nonproductive cough
    11. Rhinorrhea, and nasal congestion.
- (4) Objective Data:
- (a) Physical exam is not specific for influenza.
  - (b) Physical examination should exclude complications such as otitis media, pneumonia, sinusitis, and bronchitis
  - (c) Work up
    1. During influenza season, diagnosis is based solely on clinical findings.

OUTLINE SHEET SCSC 2.2-1

RESPIRATORY SYSTEM (CONT.)

2. If additional testing is needed the Reverse transcription polymerase reaction (RTPCR) from nasopharyngeal swab or aspirate is the gold standard for diagnostic confirmation.
3. Complete blood count (CBC) typically shows normal white blood cell count (WBC).
4. A chest x-ray is only needed if pneumonia is suspected

(5) Treatment Plan:

- (a) Symptomatic treatment is typically all that is required (saline nasal spray, analgesic gargle, antipyretics, analgesics).
- (b) Cool-mist or ultrasonic humidifier to increase moisture of inspired air
- (c) Droplet precautions
- (d) Tobacco cessation
- (e) Antiviral treatment is most effective if administered within first 48 hours in laboratory-confirmed (or highly suspected based on clinical findings) influenza cases.
- (f) Diet considerations, increase fluid intake.
- (g) Duty Status, sick in quarters for 24 to 48 hours.
- (h) Mild cases; usually no follow-up is required.
- (i) Moderate or severe cases: Follow up until symptoms and any secondary sequelae resolve.

(6) Red Flag: Get a provider for any patient who has complications such as bacterial pneumonia, otitis media, sinusitis, asthma, COPD, or congestive heart failure.

e. Asthma

(1) Description

- (a) Asthma is a heterogeneous disease, usually characterized by chronic airway inflammation.

OUTLINE SHEET SCSC 2.2-1

RESPIRATORY SYSTEM (CONT.)

- (b) It is defined by the history of respiratory symptoms such as wheeze, shortness of breath, chest tightness, and cough that vary over time and in intensity, together with variable expiratory airflow limitation.

(2) Subjective Data

- (a) Asthma is diagnosed before the age of seven years old in approximately 75% of cases. As a result, medical providers encounter adult patients with a prior diagnosis of asthma
- (b) Symptoms normally occur after exposure to triggers e.g. allergen, exercise, viral infection
- (c) Patients report all three of the classic symptoms, while other may report only one or two: wheeze (high-pitched whistling sound, usually upon exhalation), cough (often worse at night), shortness of breath or difficulty breathing.
- (d) Some patients describe chest tightness, a band-like constriction, or the sensation of a heavy weight on the chest. Sharp chest pain is rarely used to describe the sensation of asthma.
- (e) Symptoms come and go, with a time course of hours to days, resolving suddenly with removal of trigger or in response to anti-asthmatic medications. Some patients remain asymptomatic for long periods of time.

(3) Objective Data

- (a) Coughing with wheezing
- (b) Tachypnea
- (c) Prolonged expiratory phase of respiration

(4) Refer to doctor immediately, if physical findings that suggest severe airflow obstruction in asthma are noted:

- (a) Tachypnea
- (b) Tachycardia
- (c) Prolonged expiratory phase of respiration

OUTLINE SHEET SCSC 2.2-1

RESPIRATORY SYSTEM (CONT.)

- (d) Seated position with use of extended arms to support the upper chest "tripod position".
  - (e) Use of the accessory muscles of breathing e.g. sternocleidomastoid during inspiration.
- (5) Treatment Plan
- (a) Peak expiratory Flow displayed airflow limitation
  - (b) Order Pulmonary Function Test
  - (c) After onset of symptoms, take two to four puffs by mouth of short-acting beta agonist e.g. albuterol, levalbuterol, preferably with a holding chamber device. This can be repeated every 20 minutes for the first hour. If symptoms persist or worsen seek medical attention.
  - (d) A nebulizer treatment can also be used e.g. albuterol, repeated every 20 minutes for the first hour, if needed. If symptoms persist or worsen, seek immediate medical attention.
  - (e) Patient educated on diagnosis and treatment plan. The patient also accepted a pamphlet on diagnosis. The patient verbalized acknowledging all.
  - (f) Duty Status, dependent on status of patient
  - (g) Follow up if symptoms persist or worsen.
- (6) Red Flag: Get a provider for any patient who has complications such as atelectasis, pneumonia, air leak syndromes (pneumomediastinum, pneumothorax), medication-specific side effects/adverse effects/interactions, or respiratory failure.

6. Summary and Review

Utilize respiratory system anatomy to perform a physical assessment

Utilize respiratory system physiology to perform a physical assessment

Obtain history from patient with common respiratory system disorder

Perform a respiratory system examination

List signs and symptoms of common respiratory system disorders

OUTLINE SHEET SCSC 2.2-1

RESPIRATORY SYSTEM (CONT.)

List treatments for common respiratory system disorders

State Red Flag criteria

## JOB SHEET SCSC 2.2-3

## RESPIRATORY SYSTEM

## A. INTRODUCTION

Upon successful completion of this lesson the Trainee will be able to obtain a chest and lungs history and conduct a chest and lungs examination on a real or simulated patient (a person acting as a patient).

B. EQUIPMENT LIST: The primary instructor is responsible for checking that all of the below equipment is available, functional and in the lab before the lab is scheduled to begin:

1. Real or simulated patient (a person acting as a patient)
2. Pen, Black
3. Exam Table
4. Stethoscope
5. Electronic BP Machine
6. Blood Pressure Cuff, Manual
7. Gloves, Non-Sterile
8. SF 600 Forms

## C. REFERENCES

1. Seidel's Guide to Physical Examination, 8th Ed., Jane W. Ball, Joyce E. Dains, John A. Flynn, Barry S. Soloman, Rosalyn W. Stewart, Mosby, an imprint of Elsevier Inc., 2015
2. Bates' Guide to Physical Examination and History Taking, 12th Ed., Lynn S. Bickley and Peter G. Szilagyi, Wolters Kluwer, 2017, <https://STAT!Ref.com>

## D. SAFETY PRECAUTIONS

1. Instructors, Trainees and visitors must comply with all general safety procedures that are posted in the lab environment or provided in the lesson plan.
2. There are no skill specific safety hazards for this Performance Test.
3. Review TTO procedures in the Safety/Hazard Awareness Notice.
4. Trainees will not practice if an instructor is not present.
5. Trainees may not take equipment out of the lab.

## E. JOB STEPS

1. Trainee Instructions:
  - a. The purpose of this Performance Test is to evaluate the Trainee's ability to conduct a Respiratory System examination.
  - b. The Trainee must attempt to perform and describe or explain each step as they are performing it.

JOB SHEET SCSC 2.2-3

RESPIRATORY SYSTEM (CONT.)

- c. The Trainee has 20 minutes to complete this examination.
- d. The Trainee is not allowed to use the reference in the performance of this Performance Test.
- e. The Trainee will wear appropriate attire during the practice and actual Performance Test evaluation per Instructor's guidance.

**AT MEDICAL REPRESENTATIVE DIRECTION, OBTAIN PATIENT HISTORY PERTAINING TO THE RESPIRATORY SYSTEM BY COMPLETING THE FOLLOWING STEPS:**

- 1. \*Ask patient's chief complaint
- 2. \*Ask patient about onset of symptoms and pain. Specific MOI.
- 3. \*Ask about pain location, does it radiate or stay in place.
- 4. Ask about duration, does it come and go or is it constant.
- 5. Ask about the character of the pain, constant or comes and goes.
- 6. Ask what makes it worse.
- 7. Ask what makes it better.
- 8. Ask if there is a time of day that their symptoms are better or worse.
- 9. \*Ask about where their pain is on the pain scale of (1-10).
- 10. Ask about any other symptoms they notice.
- 11. Gather patients past medical history, SAMPLE and Past Surgical History, Medications, Tobacco Use and Allergies
- 12. Ask if there is a family history of any diseases.
- 13. Ask about their social history.
- 14. Review of systems, minimum of constitutional questions, ENT, Cardiac, Gastro.

JOB SHEET SCSC 2.2-3

RESPIRATORY SYSTEM (CONT.)

**AT MEDICAL REPRESENTATIVE DIRECTION, GATHER A GENERAL IMPRESSION BY COMPLETING THE FOLLOWING STEPS:**

1. \*Form General Impression
2. \*Obtain Vital Signs

**AT MEDICAL REPRESENTATIVE DIRECTION, COMPLETE A FOCUSED PHYSICAL EXAMINATION OF THE CHEST AND LUNGS BY INSPECTING THE THORAX BY COMPLETING THE FOLLOWING STEPS:**

1. Position patient
2. Remove clothing from the waist up
3. Note the shape and symmetry of the chest from the front, back, costal angle, angle of the ribs, and the intercostal spaces.
4. Inspect the clavicles for any abnormalities.
5. Inspect the diameter of the chest anteriorly and posteriorly.

**AT MEDICAL REPRESENTATIVE DIRECTION, COMPLETE A FOCUSED PHYSICAL EXAMINATION OF THE CHEST AND LUNGS BY OBSERVING RESPIRATIONS BY COMPLETING THE FOLLOWING STEPS:**

1. Observe respirations for the following:
2. \*Determine the respiratory rate.
3. \*Note the pattern or rhythm of respiration
4. \*Check for signs of Tachypnea
5. \*Check for signs of Bradypnea
6. Check for signs of Cheyne-Stokes
7. \*Check for signs of chest wall movement
8. \*Check for signs of unilateral or bilateral bulging

JOB SHEET SCSC 2.2-3

RESPIRATORY SYSTEM (CONT.)

**AT MEDICAL REPRESENTATIVE DIRECTION, COMPLETE A FOCUSED PHYSICAL EXAMINATION OF THE CHEST AND LUNGS BY OBSERVING THE LIPS, NAILS, FINGERS AND NOSTRILS BY COMPLETING THE FOLLOWING STEPS:**

1. Observe lips, nails, fingers and nostrils for the following signs:
2. \*Check lips and nails for signs of cyanosis
3. Check lips for signs of pursing
4. Check fingers for signs of clubbing
5. Check the alae nasi for signs of flaring

**AT MEDICAL REPRESENTATIVE DIRECTION, PALPATE A PATIENT'S CHEST BY PALPATING THE THORACIC MUSCLES AND SKELETON BY COMPLETING THE FOLLOWING STEPS:**

1. \*Check for signs of pulsations
2. Check for signs of tenderness
3. Check for signs of bulging
4. Check for signs of depressions
5. Check for signs of masses
6. \*Check for signs of unusual movement
7. Check for signs of crepitus
8. Check for signs of pleural friction rub
9. Evaluate thoracic expansion during respiration by checking the spinal processes

**AT MEDICAL REPRESENTATIVE DIRECTION, PALPATE A PATIENT'S CHEST BY PALPATING THE CHEST FOR TACTILE FREMITUS BY COMPLETING THE FOLLOWING STEPS:**

1. Ask the patient to recite a few numbers or say a few words. (e.g. 99)

JOB SHEET SCSC 2.2-3

RESPIRATORY SYSTEM (CONT.)

2. Palpate both sides simultaneously and symmetrically.
3. Note the position of the trachea

**AT MEDICAL REPRESENTATIVE DIRECTION, PERCUSS THE PATIENT'S CHEST IN A LADDER-LIKE PATTERN BY COMPLETING THE FOLLOWING STEPS:**

1. Check for tympanic percussion tones
2. Check for hyperresonance tones
3. Check for resonance tones
4. Check for dullness tones
5. Check for flatness tones
6. \*Compare all areas bilaterally, using one side as a control for the other.

**AT MEDICAL REPRESENTATIVE DIRECTION, AUSCULTATE THE PATIENT'S CHEST ANTERIORLY AND POSTERIORLY BY COMPLETING THE FOLLOWING STEPS:**

1. \*Listen for signs of adventitious sounds
2. \*Listen for signs of wheezing
3. \*Listen for signs of crackles
4. \*Listen or signs of rhonchi
5. \*Listen for signs of pleural friction rub

**AT MEDICAL REPRESENTATIVE DIRECTION, PRESENT A PATIENT BY COMPLETING THE FOLLOWING STEPS:**

1. \*Present findings of focused physical exam to provider
2. \*Document all history, findings interventions and procedures

OUTLINE SHEET SCSC 2.3-1

CARDIOVASCULAR SYSTEM

A. INTRODUCTION

B. ENABLING OBJECTIVES

- 1.23 Utilize cardiovascular system anatomy to perform a physical assessment
- 1.24 Utilize cardiovascular system physiology to perform physical assessment
- 1.25 Obtain history from a common cardiovascular disorders patient
- 1.26 Perform a heart and prominent blood vessel examination
- 1.27 List signs and symptoms of common heart disorders
- 1.16 State Red Flag criteria

C. SCSC 2.3-1 CARDIOVASCULAR SYSTEM TOPIC OUTLINE

1. Introduction

- a. The heart contributes to homeostasis, pumping blood through blood vessels to the tissues of the body to deliver oxygen and nutrients and remove wastes. For blood to reach body cells and exchange materials with them, it must be pumped continuously about 100,000 times every day by the heart through the body's blood vessels.

2. Anatomy and physiology of the cardiovascular system

a. Anatomy:

- (1) The heart is positioned behind the sternum and is encased inside a membrane called the pericardium, which allows for friction free movement of the heart.
  - (a) The heart lies in the mediastinum, an anatomical region that extends from the sternum to the verbal column, from the first rib to the diaphragm, and between the lungs.
  - (b) About two-thirds of the mass of the heart lies to the left of the body's midline.
  - (c) The apex of the heart is formed by the tip of the left ventricle (a lower chamber of the heart) and rests on the diaphragm. It is directed anteriorly, inferiorly and to the left. This is the location where the apical impulse may be felt.

OUTLINE SHEET SCSC 2.3-1

CARDIOVASCULAR SYSTEM (CONT.)

- (d) The base of the heart is opposite of the apex and is its posterior aspect. It is formed by the atria (upper chambers) of the heart, mostly the left atrium.
  - (e) The pericardium is made up of two layers the fibrous pericardium and the serous pericardium. Pericardial fluid is a thin film of lubricating serous fluid that reduces the friction between the layers of the serous pericardium as the heart moves.
- (2) The heart wall consists of three layers:
- (a) Epicardium, the thin outermost layer, covers the surface of the heart and contains the blood vessels and lymphatics that supply the myocardium.
  - (b) The myocardium, the thick muscular middle layer, is responsible for the pumping action of the heart. It makes up approximately 95% of the heart wall.
  - (c) The endocardium, the innermost layer, lines the chambers of the heart and covers the heart valves and the small muscles associated with the opening and closing of these valves.
- (3) Within the heart there are four chambers - two atria and two ventricles. The two superior receiving chambers are the atria, and the two inferior pumping chambers are the ventricles.
- (a) The right atrium forms the right border of the heart and receives blood from three veins: the superior vena cava, inferior vena cava, and coronary sinus.
    - 1. If you recall veins carry blood to the heart and the arteries carry blood from the heart.
    - 2. Blood passes from the right atrium into the right ventricle through a valve that is called the tricuspid valve because it consists of three leaflets or cusp.
  - (b) The right ventricle is about 4-5 mm in thickness and forms most of the anterior surface of the heart. It is separated from the left ventricle by the interventricular septum.
    - 1. Blood passes from the right ventricle to the left ventricle via the pulmonary semilunar valve (pulmonary valve) and into a large artery called the pulmonary trunk.

OUTLINE SHEET SCSC 2.3-1

CARDIOVASCULAR SYSTEM (CONT.)

- 2. The pulmonary trunk is divided into right and left arteries that carry blood to the lungs.
  
- (c) The left atrium is about the same thickness as the right atrium is and forms most of the base of the heart. It receives blood from the lungs through four pulmonary veins
  - 1. Blood passes from the left atrium into the left ventricle via the bicuspid (mitral) valve, it has two cusps and is also referred to as the left atrioventricular valve.
  
- (d) Left ventricle is the thickest chamber of the heart, averaging 10-15mm and forms the apex of the heart.
  - 1. Blood passes from the left ventricle through the aortic valve (aortic semilunar valve) into the ascending aorta.
  - 2. Some of the blood goes into the coronary arteries and the rest to the aortic arch and through the descending aorta.
  
- (4) The coronary arteries supply oxygenated blood to the heart muscle or myocardium.
  - (a) When the heart contracts the blood flow in these small arteries are slowed.
  - (b) When they relax the high pressure of the aorta propels the blood into the capillaries and coronary veins.
  
- (5) The heart's electrical conduction system is inherent and rhythmical and controls the pace of the heart.
  - (a) The source of this electrical activity is a network of self-excitabile, specialized cardiac muscle fibers called auto-rhythmic fibers.
  - (b) Cardiac excitation normally begins in the sinoatrial (SA) node, located in the right atrial wall just inferior and lateral to the opening of the superior vena cava.
  - (c) The SA node is considered the pacemaker of the heart.
  - (d) The impulse is carried to the AV node, located in the interatrial septum, just anterior to the opening of the coronary sinus.

OUTLINE SHEET SCSC 2.3-1

CARDIOVASCULAR SYSTEM (CONT.)

- (6) From the AV node, the action potential enters the atrioventricular
- (a) (AV) bundle (Bundle of His).
  - (b) After propagating through the AV bundle, the action potential enters both the right and left bundle branches. The bundle branches extend through the interventricular septum toward the apex of the heart.
  - (c) Finally, the large-diameter Purkinje fibers (pur-KIN-je) rapidly conduct the action potential beginning at the apex of the heart upward to the remainder of the ventricular myocardium. Then the ventricles contract, pushing the blood upward toward the semilunar valves.
- (7) In between beats, the heart is in a relaxed phase called diastole. The contraction is called systole.
- (8) A single cardiac cycle includes all the events associated with one heartbeat. Thus, a cardiac cycle consists of systole and diastole of the atria plus systole and diastole of the ventricles.
- (a) The blood pressure reflects these two phases of the cardiac cycle: the systolic pressure is the pressure in the arteries while the heart is contracting.
  - (b) The diastolic pressure is the pressure in the arteries while the heart rests.
- (9) During each heart cycle there are four heart sounds, but in a normal heart only the first and second heart sounds may be heard with a stethoscope.
- (a) The first sound or S 1 which can be described as a lubb sound, is louder and a bit longer than the second sound. S1 is caused by blood turbulence associated with closure of the AV valves soon after ventricular systole begins.
  - (b) The second sound or S 2 which is shorter than and not as loud as the first, can be described as a dupp sound. S2 is caused by blood turbulence associated with closure of the SL valves at the beginning of ventricular diastole.
  - (c) The third sound S3 (not normally heard) is due to blood turbulence during rapid ventricular filling.
  - (d) The fourth sound S4, (not normally heard) is due to blood turbulence during atrial systole.
- (10)       Autonomic regulation of heart rate.

OUTLINE SHEET SCSC 2.3-1

CARDIOVASCULAR SYSTEM (CONT.)

- (a) Nervous system regulation of the heart originates in the cardiovascular center in the medulla oblongata. This region of the Brainstem receives input from a variety of sensory receptors and from higher brain centers, such as the limbic system and cerebral cortex.
  - (b) The cardiovascular center then directs appropriate output by increasing or decreasing the frequency of nerve impulses in both the sympathetic and parasympathetic branches.
  - (c) Sympathetic neurons extend from the medulla oblongata into the spinal cord. From the thoracic region of the spinal cord, sympathetic cardiac accelerator nerves extend out to the SA node, AV node, and most portions of the myocardium.
  - (d) Parasympathetic nerve impulses reach the heart via the right and left vagus (X) nerves. Vagal axons terminate in the SA node, AV node, and atrial myocardium.
    - 1. They release acetylcholine, which decreases heart rate by slowing the rate of spontaneous depolarization in auto-rhythmic fibers.
    - 2. As only a few vagal fibers innervate ventricular muscle, changes in parasympathetic activity have little effect on contractility of the ventricles.
  - (e) Certain chemicals influence both the basic physiology of cardiac muscle and the heart rate. For example, hypoxia (lowered oxygen level), acidosis (low pH), and alkalosis (high pH) all depress cardiac activity.
    - 1. Hormones. Epinephrine and norepinephrine (from the adrenal medullae) enhance the heart's pumping effectiveness.
    - 2. Thyroid hormones also enhance cardiac contractility and increase heart rate.
3. Obtain a history from a common cardiovascular disorders patient.
- a. SUBJECTIVE (S) - "What the patient tells you." In this section, we will focus on obtaining the pertinent history from a patient.
    - (1) Chief Complaint (CC): chest pain, easily fatigued, orthopnea, etc.
    - (2) History of present illness (HPI) use the mnemonic OLD CARTS:

OUTLINE SHEET SCSC 2.3-1

CARDIOVASCULAR SYSTEM (CONT.)

- (a) Onset: Chronic or acute, insidious onset or gradual, attempt to obtain the time frame in days, hours, or weeks.
  - (b) Location: Radiating down arms? Radiating to neck, jaws, teeth, and/or scapula?
  - (c) Duration: Come and go? Cyclic? Related to event such as exercise?
  - (d) Characteristics: Aching, sharp, tingling, burning, pressure, stabbing, and/or crushing?
  - (e) Aggravating factors: Made worse by exercise, going up stairs or uphill, eating, and/or emotional experiences?
  - (f) Relieving factors: Made better by rest, sleep, eating, and/or position?
  - (g) Temporal factors: Is there a time of day in which it is worse or better?
  - (h) Severity: how does the patient rate pain on a scale of 1 to 10? Does it disrupt sleep or activity?
- (3) Symptoms Associated: shortness of breath, nausea, vomiting, numbness/tingling in upper extremities, shoulder pain, coughing, dizziness, syncope, palpitations, etc.
- (a) Triggers: food, physical activity, deep breathing, associated with rest, etc.
- (4) Other questions to ask:
- (a) Remedies tried already - Ex: ASA, antacids, prescription meds - effective or ineffective?
- (5) Past Medical and Surgical History (PMHx & PSurgHx):
- (a) Chronic medical conditions - heart disease, heart attacks, hypercholesterolemia, hypertension, hiatal hernia, gastric ulcers, and pertinent psychological history.
  - (b) Hospitalizations, previous work-ups for chest pain if any, review previous sick call visits.
  - (c) Past Surgeries

OUTLINE SHEET SCSC 2.3-1

CARDIOVASCULAR SYSTEM (CONT.)

- (d) Medications: Heart medications, OTCs, supplements, caffeine-based supplements, illicit drugs (cocaine can cause severe chest pain).
- (e) Allergies to food and medications: Note what happens to patient when taking such food or meds (Ex: penicillin allergy (hives) and shortness of breath).
- (6) Family history: check which side of the family has heart disease, hypertension, hypercholesterolemia, sudden deaths, heart attacks (asked what age and who).
- (7) Social history: tobacco, alcohol, dietary habits, physical activity, work or family related stress.
- (8) Review of Systems: Make sure to ask questions in relation to gastrointestinal, pulmonary and musculoskeletal systems. Chest pain can also be caused by anxiety, so review the patient's psychiatric history and ask about current stressors.
  - (a) Respiratory: cough, sputum (color, quantity), hemoptysis, wheezing, asthma, bronchitis, pneumonia, TB, last PPD, pleurisy, shortness of breath
  - (b) Cardiac: (review these symptoms to check for pertinent negatives) hypertension, rheumatic fever, heart murmurs, paroxysmal nocturnal dyspnea (PND), orthopnea, edema, chest pain/palpitations, last EKG, shortness of breath, arrhythmias, palpitations.
  - (c) Gastrointestinal: trouble swallowing, heartburn, appetite, nausea, vomiting, vomiting blood, indigestion, frequency of BM's, last BM, change in habit, rectal bleeding or tarry stools, constipation, diarrhea, abdominal pain, food intolerance, excessive belching or farting, hemorrhoids, jaundice, liver or gall bladder trouble, hepatitis, pancreatitis, esophageal lesions, etc....
  - (d) Musculoskeletal: joint pain/stiffness, arthritis, backache, thoracic muscle pain, weight lifting activities, history of costochondritis, past injuries, trauma.
  - (e) Psychiatric: mood, affect, feelings of impending doom, stress, nervousness, tension, depression, hospitalization, mania
- 4. Perform a heart and blood vessel examination
  - a. You must perform a thorough blood vessel examination along with the heart examination.

OUTLINE SHEET SCSC 2.3-1

CARDIOVASCULAR SYSTEM (CONT.)

- b. When examining the heart, always proceed in an orderly fashion. You must follow these steps when examining the heart: inspect, palpate and auscultate.
  - (1) Vital Signs: Note BP (both arms), T, RR, HR; O2 saturation if available, pain level.
  - (2) General Appearance: Note the patient's general appearance to include physical build. Is patient pale, sweating, cyanotic, anxious, awake, alert or in acute distress? Note ability to complete sentences, mental status and respiratory rate/effort. Patient's build and overall appearance of health.
  - (3) Inspect the chest wall for any obvious abnormality such as bruising, erythema, uncoordinated movement and shape of chest wall.
  - (4) Inspect the apical impulse can sometimes be seen at approx. the midclavicular line the in the fifth intercostal space and sometimes the fourth intercostal space.
  - (5) Inspect the nails for:
    - (a) Color, texture and nail changes
    - (b) Cyanosis
    - (c) Capillary refill
  - (6) Inspect the skin for:
    - (a) Pallor
    - (b) Presence and absence of hair
    - (c) Mottling
    - (d) Cyanosis
    - (e) Muscular atrophy
    - (f) Edema or swelling
    - (g) Venous distention
  - (7) Inspect extremities for:

OUTLINE SHEET SCSC 2.3-1

CARDIOVASCULAR SYSTEM (CONT.)

- (a) Thrombosis
  - (b) Pitting edema
  - (c) Varicose veins
- (8) Position the patient at a 45 degree angle on the examination table and inspect for jugular venous pulsations or distension.
- (9) Palpate the apical impulse at the apex.
- (a) Point of maximal pulsation (PMI): Palpate over the apical or left ventricular area for the PMI; usually found at the 5th intercostal space just medial to left mid-clavicular line. If laterally displaced, this could suggest an enlarged heart.
    - 1. Assess the pulsation of the carotid artery with the pulsation of the apical impulse simultaneously, they should be synchronous
    - 2. Palpate the extremities for warmth, pulse quality and pitting edema.
    - 3. Palpate apical impulse for chest wall abnormalities, thrills, or murmurs.
    - 4. Palpate left sternal border for chest wall abnormalities, thrills, or murmurs.
    - 5. Palpate base for chest wall abnormalities, thrills, or murmurs.
    - 6. Palpate right sternal border for chest wall abnormalities, thrills, or murmurs.
    - 7. Palpate epigastrium or axillae for chest wall abnormalities, thrills, or murmurs.
    - 8. Identify the point of maximal impulse (PMI) and estimate its diameter.
    - 9. Document findings
- (10) Feel the pulses bilaterally and compare: carotid, radial, femoral, dorsalis pedis and posterior tibialis. Compare them bilaterally for rate, rhythm, contour and amplitude.
- (a) Palpate arteries.

OUTLINE SHEET SCSC 2.3-1

CARDIOVASCULAR SYSTEM (CONT.)

1. Palpate carotid (1 at a time) arteries for: rate, rhythm, pulse contour, amplitude, symmetry, or any obstructions to flow
  2. Palpate radial (1 at a time) arteries for: rate, rhythm, pulse contour, amplitude, symmetry, or any obstructions to flow
  3. Palpate femoral (1 at a time) arteries for: rate, rhythm, pulse contour, amplitude, symmetry, or any obstructions to flow
  4. Palpate dorsalis pedis (1 at a time) arteries for: rate, rhythm, pulse contour, amplitude, symmetry, or any obstructions to flow
  5. Palpate posterior tibialis (1 at a time) arteries for: rate, rhythm, pulse contour, amplitude, symmetry, or any obstructions to flow
  6. Document findings
- (11) Auscultation: the heart is listened to in 5 listening posts using both the diaphragm and the bell while assumed in various positions: (1) sitting and leaning forward, (2) lying supine, (3) lying in left lateral decubitus position.
- (a) Areas of auscultation for the heart:
1. Aortic valve area: second right intercostal space, right sternal boarder.
  2. First pulmonic valve area: second left intercostal space, left sternal boarder.
  3. Second pulmonic valve area: third left intercostal space, left sternal border
  4. Tricuspid valve area: fourth left intercostal space, left sternal boarder
  5. Mitral valve area/apex of the heart: fifth intercostal space, mid-clavicular line.
- (b) Have patient breath normally and auscultate for a sufficient amount of time in each listening post, ask the patient to hold their breath on expiration listening for and expiration and note the following:
1. Rate: fast, slow? (normal = 60-100 bpm; bradycardia = less than 60 bpm; tachycardia = greater than 100 bpm)

OUTLINE SHEET SCSC 2.3-1

CARDIOVASCULAR SYSTEM (CONT.)

2. Rhythm: regular? If irregular, is it irregularly irregular or regularly irregular?
  
3. Heart sounds (S1, S2)
  - a. During each cardiac cycle, there are four heart sounds, but in a normal heart only the first and second heart sounds are loud enough to be heard through a stethoscope.
  
  - b. S1 best heard at mitral valve areas
  
  - c. S2 best heard at aortic and pulmonic areas
  
  - d. S3 or S4 - Murmur / Gallopiv
  
  - e. Auscultate the following list of peripheral arteries for, rate, rhythm, pulse contour, amplitude, symmetry, bruits, or obstructions to flow:
    - (1) Temporal
  
    - (2) Carotid
  
    - (3) Renal
  
    - (4) Abdominal aorta
  
    - (5) Femoral
  
  - f. Abnormal heart sounds:
    - (1) Murmurs: auditory vibrations resulting from turbulent blood flow through narrowed valves (stenosis), backwards flow of blood through an incompetent valve (regurgitation) or redirection of blood flow through abnormal heart wall opening (shunt). It has a "whooshing" quality sound.
  
    - (2) Pericardial friction rubs: a scratchy, scraping sound that gets louder when patient exhales and leans forward. To hear, listen over the 3rd intercostal space at the left sternal border.
  
    - (3) Document above locations for: S1, S2, rate, rhythm, splitting sounds, murmurs, or any extra sounds like S3, S4, gallops, or rubs.

OUTLINE SHEET SCSC 2.3-1

CARDIOVASCULAR SYSTEM (CONT.)

(c) Heart Rate and Rhythm

1. Atrial Fibrillation

- a. Dysrhythmic contraction of the atria gives way to rapid series of irregular spasms of the muscle wall; no discernible regularity in rhythm or pattern
- b. The conduction system is malfunctioning and is in an anarchic state. Any contraction of the atria that is best described as “irregularly” irregular.

2. Ventricular Fibrillation

- a. Complete loss of regular heart rhythm with expected conduction pattern absent if weakened and rapid, ventricular contraction is irregular.
- b. The ventricle has lost the rhythm of its expected response, and all evidence of vigorous contraction is gone. It calls for immediate action and may immediately precede sudden death.

3. Ventricular Tachycardia

- a. Rapid, relatively regular heartbeat (often nearly 200/min) without loss in apparent strength.
- b. The electrical source of the beat is in an unusual focus somewhere in the ventricles. This usually arises in serious heart disease and is a grave prognostic sign.

5. List signs and symptoms of common heart disorders

- a. This section lists common heart diseases. Never ignore the complaint of chest pain. All patients presenting with this should be referred immediately to your MO, IDC, PA, or NP.

(1) The following are stages of Hypertension:

(a) High blood pressure.

1. Normal <120/<80 mm Hg

OUTLINE SHEET SCSC 2.3-1

CARDIOVASCULAR SYSTEM (CONT.)

2. Prehypertension 120-139/80-89 mm Hg
  3. Stage 1 hypertension 140-159/90-99 mm Hg
  4. Stage 2 hypertension >160/>100 mm Hg
- (b) When someone presents with high blood pressure, serial blood pressure checks should be done. During these serial checks, both bilateral blood pressures and radial pulses are recorded in the AM and PM
- (c) The assessment of hypertension can only be made if the blood pressure is consistently elevated.
- (d) Patients could be completely asymptomatic and only find out that they have hypertension when they have vital signs checked for other medical problems.
- (e) The following are hypertension signs and symptoms: dizziness, headaches, palpitations, light headedness, ringing in the ears (tinnitus), chest pain, dyspnea, blurred vision and epistaxis.
- (f) Plan:
1. Patients with manual blood pressures of greater than 160 systolic and/or 100 diastolic should be reported immediately to your supervisor.
  2. Borderline hypertension can be treated with increased physical exercise, better nutrition (low fat, low salt diet), smoking cessation, stress reduction and weight loss.
  3. Anti-hypertensive medications can only be prescribed by medical providers
- (2) The following are signs and symptoms of Varicose Veins:
- (a) Enlarged, twisted, knotted, superficial veins commonly found in the lower legs.
  - (b) Due to incompetent venous valves.
  - (c) Aggravated by pregnancy, obesity and prolonged standing.
  - (d) May present with dull aching pain and cramping.

OUTLINE SHEET SCSC 2.3-1

CARDIOVASCULAR SYSTEM (CONT.)

- (e) Examination reveal dilated veins beneath the skin in the thigh and leg, commonly along the posterior surfaces.
  - (f) Swelling may occur.
  - (g) Generally benign.
  - (h) Plan:
    1. Rest, elevation, elastic support stockings
    2. Surgical treatment if extensive or for cosmetic purposes.
- (3) The following are signs and symptoms of Thrombophlebitis:
- (a) Partial or complete occlusion of a vein by a thrombus (blood clot) with a secondary inflammatory reaction on the wall of the vein.
  - (b) Patients will complain of pain at the site of inflamed vein.
  - (c) Examination may reveal: induration, swelling, tenderness and redness over a vein.
  - (d) Deep venous thrombosis (DVT): the urgent nature of this condition, commonly involving the deep veins of the calves.
  - (e) The following are risk factors for DVT: oral contraceptives, pregnancy, immobilization, surgery.
  - (f) Examination is similar to that of a minor case of thrombophlebitis, but could also involve the following:
    1. Calf pain associated with forcible dorsiflexion of the foot.
    2. Increased calf and thigh circumference.
    3. Fever.
    4. Difficulty ambulating due to pain.
  - (g) DVTs become life threatening when the thrombus (immobilized blood clot) detaches and becomes an embolus (floating blood clot) and gets lodged in the

OUTLINE SHEET SCSC 2.3-1

CARDIOVASCULAR SYSTEM (CONT.)

lungs (pulmonary embolus). This leads to lung tissue death because blood could not circulate properly.

(h) Plan:

1. DVT typically requires admission for anticoagulation medication.
2. Superficial thrombophlebitis is treated with analgesics, NSAIDS, rest, warm compress and elevation of affected limb.

(4) The following are signs and symptoms of Bacterial Endocarditis:

- (a) Bacterial infection of the endothelial layer of the heart and valves.
- (b) Patient complaints could be fever, fatigue, or may have a sudden onset of congestive heart failure (e.g., shortness of breath, ankle edema)
- (c) The duration of illness typically is a few days to a few weeks
- (d) Initial signs and symptoms of Bacterial Endocarditis may be:
  1. Murmur
  2. Signs of neurologic dysfunction
  3. Janeway lesion (small erythematous or hemorrhagic macules appearing on the palms and soles)
  4. Osler nodes (painful, red, raised lesions that appear on the tips of fingers or toes and are caused by septic emboli)
- (e) Imaging
  1. Chest radiograph may show evidence for the underlying cardiac abnormality and, in right-sided endocarditis, pulmonary infiltrates.
  2. The electrocardiogram is no diagnostic
  3. Echocardiography is useful in identifying vegetation's and other characteristic features suspicious for endocarditis.

(f) Plan

OUTLINE SHEET SCSC 2.3-1

CARDIOVASCULAR SYSTEM (CONT.)

1. Cardiology
  2. Antibiotics
- (g) Blood cultures establish the diagnosis
- (h) Modified Duke Criteria: The following are three major criteria's for the diagnosis of endocarditis:
1. Two positive blood cultures for a microorganism
  2. Evidence of endocardial involvement documented by echocardiography.
  3. Development of a new regurgitant murmur.
- (5) The following are signs and symptoms of Pericarditis:
- (a) Inflammation of the pericardium
  - (b) Often the result of a viral infection such as echovirus or coxsackie virus
  - (c) Patients may have complaints of sharp and stabbing chest pain (caused by the heart rubbing against the pericardium).
  - (d) Pain worse with coughing, swallowing, deep breathing or lying flat, or movement
  - (e) Pain may be most severe when supine, relieved by sitting up and leaning forward
  - (f) Pain in the back, neck or left shoulder
  - (g) Difficulty breathing when lying down
  - (h) Dry cough
  - (i) Anxiety or fatigue
- (6) Examinations reveals scratchy, grating, tri-phasic friction rub on auscultation, comprises ventricular systole, early diastolic ventricular filling, and late diastolic atrial systole. Friction rub easily heard just left of the sternum in third and fourth intercostal spaces

OUTLINE SHEET SCSC 2.3-1

CARDIOVASCULAR SYSTEM (CONT.)

- (7) Plan: Nonsteroidal anti-inflammatory drugs are generally effective.
- (8) The following are signs and symptoms of Arrhythmias:
  - (a) Abnormalities of rhythm and conduction are common.
  - (b) The following are common arrhythmias:
    - 1. Sinus bradycardia
    - 2. Supraventricular tachyarrhythmia
    - 3. Ventricular arrhythmias
    - 4. Conduction disturbances
  - (c) The following are abnormalities of cardiac rhythm and conduction (can be symptomatic or asymptomatic) signs and symptoms.
    - 1. Syncope
    - 2. Near syncope
    - 3. Dizziness
    - 4. Fatigue
    - 5. Palpations
  - (d) They can be lethal or dangerous to the extent that they reduce cardiac output, so that perfusion of the brain and myocardium is impaired.
  - (e) Plan: Treatment of arrhythmias varies and can include modalities such as antiarrhythmic drugs and more invasive techniques, such as catheter ablation.
  - (f) A number of procedures are used to evaluate patients with symptoms who are believed to be at risk for life-threatening arrhythmias, including in-hospital and ambulatory ECG mentoring, exercise testing, catheter-based electrophysiological studies, and tests of autonomic nervous system function (tilt-table testing).

## OUTLINE SHEET SCSC 2.3-1

## CARDIOVASCULAR SYSTEM (CONT.)

## 6. Summary and Review

Utilize cardiovascular system anatomy to perform a physical assessment

Utilize cardiovascular system physiology to perform physical assessment

Obtain history from patient with common cardiovascular disorders

Perform a heart and prominent blood vessel examination

List signs and symptoms of common heart disorders

State Red Flag criteria

JOB SHEET SCSC 2.3-3

CARDIOVASCULAR SYSTEM

A. INTRODUCTION

Upon successful completion of this lesson the Trainee will be able to obtain a cardiovascular history and conduct a cardiovascular examination on a real or simulated patient (a person acting as a patient).

B. EQUIPMENT LIST: The primary instructor is responsible for checking that all of the below equipment is available, functional and in the lab before the lab is scheduled to begin:

1. Real or simulated patient (a person acting as a patient)
2. Exam Room
3. Stethoscope
4. Sphygmomanometer
5. BP Cuff Manual
6. Non sterile gloves
7. Black Pen
8. SF 600

C. REFERENCES

1. Seidel’s Guide to Physical Examination, 8th Ed., Jane W. Ball, Joyce E. Dains, John A. Flynn, Barry S. Soloman, Rosalyn W. Stewart, Mosby, an imprint of Elsevier Inc., 2015
2. Bates’ Guide to Physical Examination and History Taking, 12th Ed., Lynn S. Bickley and Peter G. Szilagy, Wolters Kluwer, 2017, <https://STAT!Ref.com>

D. SAFETY PRECAUTIONS

1. Instructors, Trainees and visitors must comply with all general safety procedures that are posted in the lab environment or provided in the lesson plan.
2. There are no skill specific safety hazards for this Performance Test.
3. Review TTO procedures in the Safety/Hazard Awareness Notice.
4. Trainees will not practice if an instructor is not present.
5. Trainees may not take equipment out of the lab.

E. JOB STEPS

Trainee Instructions:

1. The purpose of this performance test is to evaluate the Trainee’s ability to perform a heart and blood vessel examination.

JOB SHEET SCSC 2.3-3

CARDIOVASCULAR SYSTEM (CONT.)

2. The Trainee must attempt to perform and describe or explain each step as they are performing it.
3. The Trainee has 20 minutes to complete this examination.
4. The Trainee is not allowed to use the references in the performance of this Performance Test.
5. The Trainee will wear appropriate attire during the practice and actual Performance Test evaluation per Instructor's guidance.

**AT MEDICAL REPRESENTATIVE DIRECTION, OBTAIN PATIENT HISTORY PERTAINING TO CARDIOVASCULAR SYSTEM BY COMPLETING THE FOLLOWING STEPS:**

1. Obtains Patient's information
2. \*Obtain Vital signs (BP,T, P, R, SpO2)
3. \*Note patient's general appearance
4. \*Obtain History of Present Illness (HPI) OLDCARTS
5. \*Obtain Symptoms Associated
6. Obtain Past Medical & Surgical History
7. Obtain Family History
8. Obtain Social History
9. Conduct Review of Systems

**AT MEDICAL REPRESENTATIVE DIRECTION, INSPECT PATIENTS HEART BY COMPLETING THE FOLLOWING STEPS:**

1. Check the chest wall
2. Inspect Precordium – apical impulse
3. \*Inspect Skin – cyanosis, venous distension
4. \*Inspect Nails – cyanosis, capillary refill time

JOB SHEET SCSC 2.3-3

CARDIOVASCULAR SYSTEM (CONT.)

5. Position the patient at a 45 degree angle on the examination table and inspect for jugular venous pulsations or distension

**AT MEDICAL REPRESENTATIVE DIRECTION, INSPECT PATIENTS BLOOD VESSELS BY COMPLETING THE FOLLOWING STEPS:**

1. \*Inspect Skin – pallor, cyanosis, mottling
2. Inspect Hair loss
3. Inspect Skin or muscular atrophy
4. Inspect Changes in skin texture
5. Inspect Edema or swelling
6. \*Inspect for Jugular venous pulsations or distention
7. \*Inspect extremities for
  - a. \*Thrombosis
  - b. \*Pitting edema
  - c. \*Varicose veins

**AT MEDICAL REPRESENTATIVE DIRECTION, PALPATE THE PATIENTS CHEST BY COMPLETING THE FOLLOWING STEPS:**

1. Palpate apical impulse for chest wall Abnormalities, thrills, or murmurs.
2. Palpate Left sternal border for chest wall Abnormalities, thrills, or murmurs.
3. Palpate Base for chest wall Abnormalities, thrills, or murmurs.
4. Palpate Right sternal border for chest wall Abnormalities, thrills, or murmurs.
5. Palpate Epigastrium or axillae for chest wall Abnormalities, thrills, or murmurs.
6. Identify the point of maximal impulse (PMI) and estimate its diameter.
7. \*Document findings

JOB SHEET SCSC 2.3-3

CARDIOVASCULAR SYSTEM (CONT.)

**AT MEDICAL REPRESENTATIVE DIRECTION, PALPATE THE PATIENTS BLOOD VESSELS BY COMPLETING THE FOLLOWING STEPS:**

1. \*Palpate Carotid (1 at a time) arteries for: rate, rhythm, pulse contour, amplitude, symmetry, or any obstructions to flow
2. \*Palpate Radial (1 at a time) arteries for: rate, rhythm, pulse contour, amplitude, symmetry, or any obstructions to flow
3. Palpate Femoral (1 at a time) arteries for: rate, rhythm, pulse contour, amplitude, symmetry, or any obstructions to flow
4. Palpate Dorsalis Pedis (1 at a time) arteries for: rate, rhythm, pulse contour, amplitude, symmetry, or any obstructions to flow
5. Palpate Posterior tibialis (1 at a time) arteries for: rate, rhythm, pulse contour, amplitude, symmetry, or any obstructions to flow
6. \*Document findings

**AT MEDICAL REPRESENTATIVE DIRECTION, AUSCULTATE PATIENTS HEART BY COMPLETING THE FOLLOWING STEPS:**

1. Auscultate Aortic valve area
2. Auscultate Pulmonic valve area
3. Auscultate Second pulmonic area
4. Auscultate Tricuspid valve
5. Auscultate Mitral (or apical) area
6. \*Document above locations for: S1, S2, Rate, rhythm, splitting sounds, murmurs, or any extra sounds like S3, S4, gallops, or rubs.

**AT MEDICAL REPRESENTATIVE DIRECTION, AUSCULTATE PATIENTS BLOOD VESSELS BY COMPLETING THE FOLLOWING STEPS:**

1. Auscultate Temporal
2. Auscultate Carotid

## JOB SHEET SCSC 2.3-3

## CARDIOVASCULAR SYSTEM (CONT.)

3. Auscultate Renal
4. Auscultate Abdominal aorta
5. Auscultate Femoral
6. \*Document above arteries for: rate, rhythm, pulse contour, amplitude, symmetry, bruits, or obstructions to flow

**AT MEDICAL REPRESENTATIVE DIRECTION, PRESENT A PATIENT BY COMPLETING THE FOLLOWING STEPS:**

1. \*Present findings of focused physical exam to provider
2. \*Document all history, findings interventions and procedures

OUTLINE SHEET SCSC 2.4-1

GASTROINTESTINAL SYSTEM

A. INTRODUCTION

B. ENABLING OBJECTIVES

- 1.28 Utilize gastrointestinal system anatomy to perform a physical assessment
- 1.29 Utilize gastrointestinal system physiology to perform a physical assessment
- 1.30 Obtain history from patient with common gastrointestinal disorders
- 1.31 Perform an abdominal examination
- 1.32 List signs and symptoms of common abdominal disorders
- 1.33 List treatments for common gastrointestinal disorders
- 1.16 State Red Flag criteria

C. SCSC 2.4-1 GASTROINTESTINAL SYSTEM TOPIC OUTLINE

- 1. Introduction
  - a. The gastrointestinal tract functions to provide the body with water, electrolytes, and nutrients. Food is moved through the system through peristalsis while digestive enzymes are secreted by various organs for food breakdown and digestion.
- 2. Identify the anatomy and physiology of the gastrointestinal system
  - a. Anatomy & Physiology
    - (1) The gastrointestinal system consists of:
      - (a) Esophagus: A collapsible tube approximately 10 inches long.
      - (b) Stomach: Secretes hydrochloric acid and digestive enzymes for the breakdown of fats and proteins. (little absorption takes place)
      - (c) Small Intestine: Approximately 21 feet long connecting to the larger intestine.
      - (d) Large Intestine: Approximately 4 to 5 feet long, with a diameter of 2 ½ inches.
      - (e) Rectum: Extends from the colon to the muscles of the pelvic floor.

OUTLINE SHEET SCSC 2.4-1

GASTROINTESTINAL SYSTEM (CONT.)

(2) Accessory organs for the digestive:

- (a) The liver, Gallbladder, and Pancreas are vital functioning accessory organs of the digestive system. Responsible for the break down, processing, and storing of carbohydrates, fats, and proteins essential to the functions of the digestive system.

(3) The surface anatomy of the abdomen divides the area into four quadrants:

(a) Right upper quadrant (RUQ)

- 1. Liver
- 2. Head of the Pancreas
- 3. Gall bladder
- 4. Portions of the ascending and transverse colon

(b) Left upper quadrant (LUQ)

- 1. Left lobe of the Liver
- 2. Spleen
- 3. Stomach
- 4. Body of the Pancreas
- 5. Portions of the transverse and descending colon

(c) Right lower quadrant (RLQ)

- 1. Appendix
- 2. Portion of ascending colon
- 3. Bladder (if distended)
- 4. Uterus (if enlarged)

(d) Left lower quadrant (LLQ).

OUTLINE SHEET SCSC 2.4-1

GASTROINTESTINAL SYSTEM (CONT.)

1. Sigmoid colon
  2. Portion of descending colon
  3. Bladder (if distended)
  4. Uterus (if enlarged)
- (e) Three other terms commonly used for epigastric lower land marks: umbilical, and suprapubic regions.
3. Obtain history from patient with common gastrointestinal disorders
- a. Subjective (S) – “What the patient tells you.” In this section, we will focus on the complaint of “abdominal pain”, a complaint you will definitely encounter in military sick call.
    - (1) Chief Complaint (CC) – “abdominal pain”.
    - (2) History of present illness (HPI)
      - (a) Use the mnemonic “OLDCARTS” to explore the complaint of pain.
        1. Onset
        2. Location
        3. Duration
        4. Character
        5. Aggravating/ Associated factors
        6. Relieving Factors
        7. Temporal Factors
        8. Severity of Symptoms
      - (b) Past Medical & Surgical History (PMHx & PSurgHx):

OUTLINE SHEET SCSC 2.4-1

GASTROINTESTINAL SYSTEM (CONT.)

1. Chronic medical conditions – irritable bowel syndrome (IBS), inflammatory bowel disease (IBD), Crohn’s, ulcerative colitis, diverticulitis, diverticulosis, gastric ulcers, constipation, diarrhea, GERD.
  2. Hospitalizations/review previous sick call visits – 10 previous visits for diarrhea due to laxative abuse, shortness of breath, hospitalized for GI bleed at age 10
  3. Surgeries: Ex: appendectomy
  4. Medications. Laxatives, supplements, illicit drugs
  5. Allergies to food and medications. Note what happens to patient when taking such food or meds. Ex: penicillin allergy – hives and shortness of breath.
- (c) Family history – IBS, IBD, colon/gastric cancers
- (d) Social history – tobacco, alcohol, dietary habits, travels (especially to exotic locations)
- (3) Review of Systems (ROS). It’s important to know how the other parts of the body are doing in relation to the chief complaint. Remember, organs other than those located in the abdomen can cause abdominal pain. Make sure to ask questions in relation to cardiovascular, pulmonary and musculoskeletal systems. Abdominal pain can also be caused by anxiety and be referred from the genitourinary systems, so review the patient’s psychiatric and genitourinary systems.
- (a) Respiratory – cough, sputum (color, quantity), hemoptysis, wheezing, asthma, bronchitis, pneumonia, TB, last PPD, pleurisy
- (b) Gastrointestinal – (review these symptoms to check for pertinent negatives) trouble swallowing, heartburn, appetite, nausea, vomiting, vomiting blood, indigestion, frequency of BM’s, last BM, change in habit, rectal bleeding or tarry stools, constipation, diarrhea, abdominal pain, food intolerance, excessive belching or farting, hemorrhoids, jaundice, liver or gall bladder trouble, hepatitis, pancreatitis, esophageal lesions, etc....
- (c) Cardiac –heart trouble, HTN, rheumatic fever, heart murmurs, dyspnea/orthopnea, edema, chest pain/palpitations, last EKG

OUTLINE SHEET SCSC 2.4-1

GASTROINTESTINAL SYSTEM (CONT.)

- (d) Urinary – frequency of urination, polyuria, nocturia, dysuria, hematuria, urgency, hesitancy, incontinence, urinary infections and STD’s, kidney stones (renal calculi)
- (e) Genitourinary & reproductive – discharge from or sores on genitals, STD Hx and treatment, last HIV test, hernias, testicular/vaginal pain or masses, frequency of intercourse, libido, sexual difficulties, vaginal irritation, vaginal bleeding.
- (f) Musculoskeletal – joint pain/stiffness, arthritis, backache, thoracic muscle pain, weight lifting activities, history of costochondritis, past injuries, trauma.
- (g) Psychiatric – mood, affect, feelings of impending doom, stress, nervousness, tension, depression, hospitalization, mania

4. Perform a thorough abdominal examination

- a. Physical Examination. Along with the abdominal examination, one also performs a thorough upper body examination, complete with HEENT, lung and heart.

(1) Your examination should proceed in the following order:

- (a) Inspect
- (b) Auscultate
- (c) Percuss
- (d) Palpate

(2) Do a thorough examination of the patient:

- (a) General Impression - Note patient's general appearance. Is he pale, sweating, anxious, awake, alert or in acute distress? Is he in a fetal position clutching his abdomen? Is he sitting up straight and smiling? Note ability to complete sentence, mental status and respiratory rate.
- (b) VS - note BP, T, RR, HR, LMP
- (c) HEENT - perform thorough examination; see HEENT exam section under Eye and ENT chapters.
- (d) Neck - perform thorough exam; see neck exam section under ENT chapter;

OUTLINE SHEET SCSC 2.4-1

GASTROINTESTINAL SYSTEM (CONT.)

- (e) Lungs - perform thorough exam; see lung exam section under Respiratory chapter.
  - (f) Heart - perform thorough exam; see heart exam section under cardiovascular chapter.
  - (g) Abdomen - perform examination in detail, discussed below
  - (h) Back - check for costovertebral angle tenderness to rule-out kidney disease
  - (i) GU - check for inguinal hernia, testicular mass/torsion, etc.... see GU exam section under Genitourinary & STD chapter.
  - (j) Rectal Exam - check if bleeding is a complaint
  - (k) Extremities - note cyanosis, check for distal and dorsalis pedis pulses, capillary refill and peripheral edema.
- (3) The abdominal exam in detail.
- (a) Inspection/Observation.
    - 1. Contour - Is abdomen flat, scaphoid (markedly hollow or concave), round, bloated? Note symmetry versus local bulging. Check for exaggerated, visible peristalsis or pulsation.
    - 2. Skin:
      - a. Striae (stretch marks): red, white, or purple.
      - b. Scars: location/appearance – describe or diagram their location.
      - c. Veins: dilated veins around the umbilicus usually indicative of venous obstruction and hepatic disease
      - d. Color: areas of bruising (Cullen’s sign), discoloration or rashes.
    - 3. Umbilicus: contour, location, inflammation, hernia.
  - (b) Auscultation
    - 1. Bowel sounds

OUTLINE SHEET SCSC 2.4-1

GASTROINTESTINAL SYSTEM (CONT.)

- a. Note frequency and character – absent or infrequent sounds (hypoactive) suggest peritonitis, ileus, late bowel obstruction; frequent, loud, high pitched noise (hyperactive) is indicative of early bowel obstruction or hypermotility of diarrhea. Borborygmus is loud rumbling through the large intestine.
- b. Sounds consist of clicks and gurgles generated by peristalsis (progressive, wavelike, involuntary movement)
- c. Bowel sounds are widely transmitted throughout the abdomen. Listen in all 4 quadrants.
- d. Bowel sounds cannot be said to be absent unless they are not heard after listening for at least 2-3 minutes.

(c) Palpation

1. Light palpation

- a. Gentle horizontal dipping motion with fingertips.
- b. Have the patient supine with knees slightly flexed.
- c. Identify muscular resistance and abdominal wall tenderness.

2. Deep palpation

- a. Place one hand on top of the other. Press with outer hand and feel with inner hand.
- b. Palpate tender areas last.

3. Things to check for during palpation:

- a. Guarding/muscular rigidity
  - (1) Voluntary guarding by tightness of muscle against palpation.
  - (2) Involuntary resistance, progressive abdominal rigidity. Patient is unable to relax muscles. Body's protective function against pain.
- b. Intra-abdominal mass vs. abdominal wall mass

OUTLINE SHEET SCSC 2.4-1

GASTROINTESTINAL SYSTEM (CONT.)

- (1) Have the patient tighten abdominal muscles wall.
  - (2) Mass in abdominal wall remains palpable whereas intra-abdominal mass will be obscured.
4. Rebound tenderness - pain elicited by pressing your fingers in firmly and slowly, and then quickly withdrawing them. Watch and listen to the patient for signs of pain. Ask patient (1) to compare which hurt more, the pressing or the letting go; and (2) to show you exactly where it hurts. Pain induced or increased by quick withdrawal constitutes rebound tenderness.
- a. Rovsing's sign (referred tenderness): tenderness/pain in RLQ during LLQ palpation.
    - b. Psoas sign: An increase in pain from passive extension of the right hip joint that stretches the iliopsoas muscle.
      - (1) Place right hand on patient's right knee.
      - (2) Have the patient raise his thigh against resistance.
      - (3) The test flexes and stretches the psoas over which the peritoneum lies.
      - (4) If the peritoneum is inflamed, the patient will experience increased abdominal pain.
      - (5) Suggestive of appendicitis
  - c. Obturator sign
    - (1) Flex patient's right thigh at hip with right knee bent.
    - (2) Internally rotate the leg at the hip by placing the right heel on top of the left knee.
    - (3) This maneuver stretches the internal obturator muscle, over which peritoneum lies.
    - (4) Pain elicited suggests a positive obturator sign.
    - (5) Suggestive of appendicitis.

OUTLINE SHEET SCSC 2.4-1

GASTROINTESTINAL SYSTEM (CONT.)

d. Murphy's sign: When the inflamed gallbladder is palpated by pressing the fingers under the rib cage, deep inspiration causes pain because the gallbladder is forced downward to touch the fingers.

(1) Place hands on top of each other over the RUQ just under the costal margin.

(2) Press deeply as you ask the patient to take a deep breath.

(3) Inability to complete the deep breath due to elicited pain is a positive test.

(4) Indicative of gallbladder disease

5. Testing for Costovertebral Angle (CVA) tenderness:

a. Kidney not palpable in normal adults. But pain associated with the kidneys can be assessed by checking for costovertebral angle (CVA) tenderness.

b. CVA tenderness

(1) With patient seated upright, place palm of left hand over each costovertebral angle.

(2) Strike back of left hand with ulnar surface of right fist.

(3) Tenderness elicited suggests kidney disease – infection or stones.

6. Markle Sign (Heel Jar)

5. List signs, symptoms and treatments of common abdominal disorders

a. Common gastrointestinal disorders.

(1) Appendicitis: Typically presents with constant, crampy epigastric or periumbilical pain which intensifies and migrates/localizes to the RLQ of the abdomen.

(a) Pain is severe, made worse by moving. Associated symptoms include fever, chills, anorexia, nausea, vomiting.

OUTLINE SHEET SCSC 2.4-1

GASTROINTESTINAL SYSTEM (CONT.)

- (b) On examination, the pain worsens when the table is bumped. There is abdominal tenderness in the right lower quadrant and McBurney's Point (tenderness at the mid-point between the umbilicus and right iliac crest). There is associated rebound tenderness and involuntary guarding. Positive Rovsing, heel jar, psoas and obturator test signs may be present. Elevation of WBC count can also happen.

1. Plan

- a. Nothing by mouth, except for occasional sips of water or ice
- b. Refer to medical provider immediately for further work-up
- c. Hospitalization for surgical intervention

(2) Acute cholecystitis.

- (a) Inflammation of the gallbladder and biliary tree resulting from an obstruction of the biliary by a gallstone.
- (b) Patient may have history of fatty food intolerance, flatulence, right upper quadrant discomfort and postprandial fullness.
- (c) Patient presents with sudden onset, colicky pain which may be waxing and waning. Pain becomes more severe and localizes to the RUQ and radiate to the back at the right lower scapular area. Nothing makes the pain better or worse.
- (d) Associated symptoms include clay colored stool, nausea, vomiting, and anorexia. Physical examination may reveal low grade fever, jaundice and moderate to severe distress. Abdomen exam may reveal involuntary guarding to the right sided abdominal muscles but, initially, no rebound tenderness. There is a positive Murphy's sign. A high fever, rigors, elevated WBC count and signs of peritonitis suggests perforation and immediate surgical treatment is indicated.

(e) Plan:

- 1. Internal medicine
- 2. Surgical referral/intervention

(3) Peptic Ulcer Disease.

OUTLINE SHEET SCSC 2.4-1

GASTROINTESTINAL SYSTEM (CONT.)

- (a) Result in ulceration of the lining of the stomach or duodenum due to hyperacidity.
- (b) Patients present with epigastric burning, gnawing or aching usually occurring 1-3 hours after meals. May radiate to back/shoulders. Patients are often awakened by pain. Food immediately offers relief until the disease progresses (when food may increase discomfort).
- (c) The patient may also present heartburn, substernal pain, and bilateral shoulder pain due to diaphragmatic irritation by air or fluid that spilled from the stomach. During examination, patient lies very still and may initially have unremarkable vital signs. There is involuntary guarding and rebound tenderness with hypoactive or absent bowel sounds. The patient's condition may appear to improve after several hours with decreasing pain and abdominal rigidity
- (d) Plan:
  - 1. Refer to medical provider.
  - 2. Peptic ulcer disease/GERD
    - a. lab work-up to check for associated bacterial cause (Helicobacter pylori)
    - b. antacids
    - c. dietary modification
    - d. smoking/alcohol cessation
  - 3. Perforated bowel/viscous - immediate surgical referral
- (4) Acute Gastroenteritis.
  - (a) The most common cause of nausea, vomiting and diarrhea. Pain usually located across the lower abdomen and cramping in nature, but can be severe.
  - (b) It is frequently noted prior to bowel movement. Fever may or may not be present. Abdomen is diffusely tender but there should be no rebound or other signs of peritonitis. Bowel sounds are hyperactive. Staphylococcal enterotoxin is one of the most common causes of food poisoning.

OUTLINE SHEET SCSC 2.4-1

GASTROINTESTINAL SYSTEM (CONT.)

(c) Severe nausea and vomiting generally start abruptly 2 - 8 hours after eating contaminated food. There may also be abdominal cramping, diarrhea, headache and low-grade fever. The attack is brief, resolving in 3 - 6 hours.

(d) Plan:

1. Hydration, if tilt positive, using IV fluid replacement (NS or LR).
2. Anti-nausea medications, if nauseated and vomiting.
3. Clear liquid diet for 24 hours (high in salt, but low in sugar), followed by soft-bland diet such as the BRAT diet.
4. SIQ x 24 hours, if needed
5. Increased/forced oral hydration when capable.
6. Refer to medical officer, if severe

(5) Hernia

(a) A protrusion or projection of an organ or a part of an organ through the wall of the cavity that normally contains it. The following are different types of hernia:

1. Abdominal - hernia through the abdominal wall.
2. Umbilical - bulging defect at umbilicus. Common in infants generally closing by 3 y/o.
3. Incisional - defect in abdomen muscles due to poor repair of a surgical incision through the abdominal wall.
4. Diastasis recti - not a true hernia, a separation of the two rectus abdominis muscles. No clinical significance.
5. Epigastric - small, midline protrusion through a defect in the linea alba located between the xiphoid process and umbilicus.

(b) Other diseases that can cause abdominal pain are genitourinary illnesses (kidney stones, urinary infections, and STDs). These are discussed in the Genitourinary & STDs lesson topics.

OUTLINE SHEET SCSC 2.4-1

GASTROINTESTINAL SYSTEM (CONT.)

(c) Plan:

1. Inspect for incarceration of hernia
2. Refer to Medical Officer.

(6) Hemorrhoids

(a) Result from increased venous pressure in the veins of the rectum, Can be characterized as either Internal or External, and based on their location.

(b) Hemorrhoids are most often caused by the following:

1. Straining to stool
2. Prolonged sitting
3. Pregnancy
4. Obesity

(c) The following are signs and symptoms of Hemorrhoids:

1. Bright red blood per rectum
2. Mucoïd discharge from rectum
3. Rectal irritation
4. Soiling of undergarments

(d) Plan: Increase fiber intake, decrease strain during defecation, increase water intake, Anusol, Sitz bath, or Surgical Excision.

(7) Constipation

(a) Two or fewer bowel movements per week or excessive straining with defecation

(b) Can be caused from poor diet intake of fiber, inadequate fluid intake, medication or systemic diseases ( Thyroid, Hypercalcemia, Hypokalemia)

OUTLINE SHEET SCSC 2.4-1

GASTROINTESTINAL SYSTEM (CONT.)

(c) Evaluation should consist of a good dietary history and physical exam, electrolyte testing, CBC test

(d) Plan.

1. Provide proper diet education, to include fiber supplements.

2. Stool softeners or osmotic laxatives can be given.

(8) Gastroesophageal Reflux Disease (GERD)

(a) Is the reflux of stomach acid into the esophagus

(b) Evaluation will show signs and symptoms of heartburn and regurgitation of sour or bitter stomach acid

(c) Plan:

1. Requires lifestyle change

2. Medication therapy (antacids, proton pump inhibitors).

3. Avoid foods that relax the esophageal sphincter (fatty foods, peppermint, chocolate, alcohol)

(9) Anal Fissure

(a) Linear or rocket-shaped ulcers that are usually less than 5mm in length.

(b) Signs and Symptoms

1. Tearing pain

2. Hematochezia

3. Confirmed by visual inspection

(c) Plan

1. Medical management is directed by promoting effortless, painless bowel movements.

2. Fiber supplements

OUTLINE SHEET SCSC 2.4-1

GASTROINTESTINAL SYSTEM (CONT.)

3. Topical anesthetics

(10) Bowel Obstruction

- (a) Bowel obstruction occurs in either sex, at any age, and from a variety of causes.
- (b) Bowel obstructions are classified as mechanical or nonmechanical
  - 1. Mechanical obstruction results from a disorder outside the intestines or blockage inside the lumen of the intestines.
  - 2. Nonmechanical obstruction results when muscle activity of the intestine decreases and movement of contents slows.

(c) Signs and Symptoms

- 1. Cramps
- 2. Intermittent and wavelike abdominal pain
- 3. Abdominal distention
- 4. Either hyperactive or absent bowel sounds
- 5. Emesis usually has an odor from proliferation of bacteria

(d) Plan

- 1. IV Fluids
- 2. Electrolytes
- 3. Antibiotics
- 4. Surgery

(11) Diarrhea

- (a) Can range in severity from an acute self-limited episode to a severe injury.
- (b) Signs and Symptoms

OUTLINE SHEET SCSC 2.4-1

GASTROINTESTINAL SYSTEM (CONT.)

1. Fever
2. Bloating
3. Nausea
4. Vomiting
5. Bloody stool
6. Abdominal pain
7. Passage of 6 or more unformed stools in 24 hours

(c) Plan

1. Diet
2. Rehydration
3. Anti-diarrheal agents
4. Antibiotic therapy

(12) Pancreatitis

(a) An abrupt onset of deep epigastric pain, often with radiation to the back, often related to a biliary tract disease or heavy alcohol intake.

(b) Signs and Symptoms

1. Abdominal pain, that radiates
2. Nausea
3. Vomiting
4. Weakness
5. Sweating
6. Anxiety

OUTLINE SHEET SCSC 2.4-1

GASTROINTESTINAL SYSTEM (CONT.)

(c) Plan

1. Mild cases can resolve spontaneously within a few days
2. IV fluid resuscitation
3. Pain Reliever Medication
4. In severe cases hospitalization is required

(13) Diverticulitis

(a) An inflammation or infection in one or more small pouches in the digestive tract.

(b) Signs and Symptoms

1. Localized inflammation
2. Aching abdominal pain (LLQ)
3. Constipation
4. Nausea
5. Vomiting
6. Low-grade fever
7. Leukocytosis

(c) Plan

1. Pharmacological therapy
2. Clear liquid diet
3. Surgery

6. Red Flag criteria

OUTLINE SHEET SCSC 2.4-1

GASTROINTESTINAL SYSTEM (CONT.)

a. Upon examination certain findings should alert you the patient should be red flagged. The following are Gastrointestinal System Red Flag finding:

(1) Significant mechanism of injury (MOI) is indicative of severe blunt force trauma, direct impact, deceleration injuries, rotary forces, or shear forces. An urgent referral may need to be made.

(2) Diffuse abdominal pain

(3) Extreme tenderness

(4) Severe guarding

(5) Rigidity

(6) Distention

(7) Diminished Bowel Sounds

(8) Rebound Tenderness

(9) Positive F.A.S.T. exams

7. Summary and Review

1.31 Utilize gastrointestinal system anatomy to perform a physical assessment

1.32 Utilize gastrointestinal system physiology to perform a physical assessment

1.33 Obtain history from patient with common gastrointestinal disorders

1.34 Perform an abdominal examination

1.35 List signs and symptoms of common abdominal disorders

1.36 List treatments for common gastrointestinal disorders

1.16 State Red Flag criteria

JOB SHEET SCSC 2.4-3

GASTROINTESTINAL SYSTEM

A. INTRODUCTION

Upon successful completion of this job sheet the Trainee will be able to obtain an abdomen, anus, rectum, and prostate history and conduct an abdomen, anus, rectum, and prostate examination on a real or simulated patient (a person acting as a patient).

B. EQUIPMENT LIST: The primary instructor is responsible for checking that all of the below equipment is available, functional and in the lab before the lab is scheduled to begin:

1. Real or simulated patient (a person acting as a patient)
2. Lubricant
3. Centimeter ruler
4. Fecal occult blood testing materials
5. Penlight
6. Stethoscope
7. Tape Measure
8. Exam Room Equipment

C. REFERENCES

1. Seidel’s Guide to Physical Examination, 8th Ed., Jane W. Ball, Joyce E. Dains, John A. Flynn, Barry S. Soloman, Rosalyn W. Stewart, Mosby, an imprint of Elsevier Inc., 2015
2. Bates’ Guide to Physical Examination and History Taking, 12th Ed., Lynn S. Bickley and Peter G. Szilagyi, Wolters Kluwer, 2017, <https://STAT!Ref.com>

D. SAFETY PRECAUTIONS

1. Instructors, Trainees and visitors must comply with all general safety procedures that are posted in the lab environment or provided in the lesson plan.
2. There are no skill specific safety hazards for this Performance Test.
3. Review TTO procedures in the Safety/Hazard Awareness Notice.
4. Trainees will not practice if an instructor is not present
5. Trainees may not take equipment out of the lab
6. Trainees will follow universal precautions and wear proper PPE.

E. JOB STEPS

Trainee Instructions:

1. The purpose of this Job Sheet is to evaluate the Trainee’s knowledge of the practical application of conducting an abdomen, anus, rectum, and prostate examination.

JOB SHEET SCSC 2.4-3

GASTROINTESTINAL SYSTEM (CONT.)

2. The Trainee must perform a complete physical examination of the Abdomen, Anus, Rectum, and Prostate and explain each step as it is performed.
3. The Trainee has 20 minutes to complete this examination.
4. The Trainee is not allowed to use the reference in the performance of this Job Sheet.
5. The Trainee will wear appropriate attire during the practice and actual Job Sheet evaluation.

**AT MEDICAL REPRESENTATIVE DIRECTION, OBTAIN PATIENT HISTORY PERTAINING TO GASTROINTESTINAL SYSTEM BY COMPLETING THE FOLLOWING STEPS:**

1. \*Ask patient's chief complaint
2. \*Ask patient about onset of symptoms and pain. Specific MOI.
3. \*Ask about pain location, does it radiate or stay in place.
4. Ask about duration, does it come and go or is it constant.
5. Ask about the character of the pain, what it feels like sharp, dull, ache etc.
6. Ask what makes it worse.
7. Ask what makes it better.
8. Ask if there is a time of day that their symptoms are better or worse.
9. \*Ask about where their pain is on the pain scale of (1-10).
10. Ask about any other symptoms they notice.
11. Ask about affect to activities of daily living
12. Gather patients past medical history, SAMPLE
13. Gather Surgical History
14. Gather Family History
15. Gather Social History

JOB SHEET SCSC 2.4-3

GASTROINTESTINAL SYSTEM (CONT.)

16. Review of systems, minimum of constitutional questions

**AT MEDICAL REPRESENTATIVE DIRECTION, GATHER A GENERAL IMPRESSION BY COMPLETING THE FOLLOWING STEPS:**

1. \*Form general impression
2. \*Obtain vital signs

**AT MEDICAL REPRESENTATIVE DIRECTION, INSPECT PATIENT'S ABDOMEN BY COMPLETING THE FOLLOWING STEPS:**

1. Inspect skin for
  - a. Bruising and lesions
  - b. Venous patterns
  - c. Symmetry/Contour
  - d. Surface motion
2. \*Inspect abdomen for masses
3. Inspect abdomen for herniation
4. Inspect abdomen for pulsations

**\*AT MEDICAL REPRESENTATIVE DIRECTION, AUSCULTATE PATIENT'S ABDOMEN FOR BOWEL SOUNDS.**

**AT MEDICAL REPRESENTATIVE DIRECTION, PERCUSS PATIENT'S ABDOMEN BY COMPLETING THE FOLLOWING STEPS:**

1. Check tone in all four quadrants
2. Percuss liver border to estimate span at mid-clavicular line
3. Percuss splenic dullness in left midaxillary line
4. Percuss to check for gastric air bubbles

JOB SHEET SCSC 2.4-3

GASTROINTESTINAL SYSTEM (CONT.)

**AT MEDICAL REPRESENTATIVE DIRECTION, PALPATE PATIENT’S ABDOMEN BY COMPLETING THE FOLLOWING STEPS:**

1. \*Palpate all abdominal quadrants for:
  - a. \*Muscular resistance
  - b. \*Tenderness
  - c. \*Masses
2. \*Palpate all abdominal quadrants for:
  - a. \*Bulges and masses
  - b. \*Liver border, right costal margin
  - c. \*Gallbladder below liver margin
  - d. \*Spleen in left costal margin
  - e. \*Aortic pulsation in midline

**AT MEDICAL REPRESENTATIVE DIRECTION, PERFORM A FOCUSED EXAM BY COMPLETING THE FOLLOWING STEPS:**

1. \*Perform the Rebound Tenderness Test (at McBurney’s point)
2. \*Perform the Heel Tap/Heel Jar test
3. Perform Obturator test
4. Assess for Rovsing sign
5. Assess for Psoas sign
6. \*Assess for Murphy’s sign
7. \*With patient sitting, percuss left and right costovertebral angles (CVA) for kidney tenderness

**AT MEDICAL REPRESENTATIVE DIRECTION, INSPECT PATIENT’S RECTUM BY COMPLETING THE FOLLOWING STEPS:**

## JOB SHEET SCSC 2.4-3

## GASTROINTESTINAL SYSTEM (CONT.)

1. Inspect rectum for fissures
2. Inspect rectum for hemorrhoids
3. Inspect rectum for lesions

**AT MEDICAL REPRESENTATIVE DIRECTION, PRESENT FINDINGS BY COMPLETING THE FOLLOWING STEPS:**

1. \*Present findings of focused physical exam to provider
2. \*Document all history, findings interventions and procedures

**AT MEDICAL REPRESENTATIVE DIRECTION, PROVIDE PATIENT EDUCATION AND TREATMENT FINDINGS BY COMPLETING THE FOLLOWING STEPS:**

1. \*Distribute medication per provider's orders and with 5 rights.
2. Provides reassurance and answer patient questions.
3. Provide patient education and home therapy handouts.
4. \*Document and provide duty status determination paperwork.

OUTLINE SHEET SCSC 2.5-1

GENITOURINARY SYSTEM

A. INTRODUCTION

B. ENABLING OBJECTIVES

- 1.34 Utilize genitourinary system anatomy to perform a physical assessment
- 1.35 Utilize genitourinary system physiology to perform a physical assessment
- 1.36 Obtain history from patient with common genitourinary disorders and sexually transmitted infections (STIs)
- 1.37 Describe a genitourinary system examination
- 1.38 List signs and symptoms of common genitourinary disorders and STIs
- 1.39 List treatments for common genitourinary disorders and STIs
- 1.16 State Red Flag criteria

C. SCSC 2.5-1 GENITOURINARY SYSTEM TOPIC OUTLINE

1. Introduction

- a. The urinary system consists of the kidneys, ureters, bladder, and urethra. The two kidneys are located on either side of the vertebral column just above the waistline. The kidneys filter waste products along with excess fluid and electrolytes. Urine is formed within the nephrons of each kidney. Unabsorbed water and electrolytes form the "urine", which passes through the tubule to the pelvis of the kidney into the ureters and finally stored in the urinary bladder. The urethra serves as the conduit that eliminates urine from the body.

2. Identify the anatomy and physiology of the genitourinary system

- a. The male genital system consists of the penis, testicles, epididymis, scrotum, prostate gland, vas deferens, and the seminal vesicles.
  - (1) The scrotum or the scrotal sac holds both the testicles. The testicles produce sperm. During ejaculation, sperms swim in semen, a composition of fluids released by the seminal vesicles and prostate gland. Sperms travel from the testicles via the epididymis, vas deferens and then through the urethra via the prostate gland.

OUTLINE SHEET SCSC 2.5-1

GENITOURINARY SYSTEM (CONT.)

- (2) The epididymis is a soft comma shaped structure located on the posterolateral aspect of each testicle. The prostate gland resembles a large chestnut and surrounds the urethra just under the bladder. It produces the majority of the ejaculatory fluid that carries the sperm.
- b. The female external genital system consists of the mons pubis, labia majora, labia minora, clitoris, vestibular glands, vaginal vestibule, vaginal orifice, and urethral opening.
  - (1) Lying inside and usually hidden by the labia majora are the labia minora. The labia minora meet at the anterior of the vulva. The labia minora enclose the area designated as the vestibule, which contain six openings: the urethra, the vagina, two ducts of Bartholin glands, and two ducts of Skene glands.
- c. The female internal genital system consists of the vagina, cervix, uterus, two fallopian tubes, and two ovaries.
  - (1) The vagina carries menstrual flow from the uterus, serves as the terminal portion of the birth canal, and is the receptive organ for the penis during sexual intercourse.
  - (2) The uterus is a pear shaped muscular organ that sits in the pelvic cavity between the bladder and the rectum. The uterus opens into the vagina via the cervix.
  - (3) The fallopian tubes insert into the upper portion of the uterus extending laterally to the ovaries and transport the ova from the ovary to the uterus. The ovaries release an ovum monthly and secrete estrogen and progesterone, hormones that have several functions, including controlling the menstrual cycle and supporting pregnancy.
- 3. Obtain history from patient with common genitourinary disorders and STIs
  - a. Subjective (S) - "What the patient tells you." In this section, we will focus on the complaint of "scrotal pain", a complaint you will definitely encounter in military sick call.
    - (1) Chief Complaint (CC) - "scrotal pain"
    - (2) History of present illness (HPI): Use the mnemonic "OLDCARTS" to explore the complaint of pain.
      - 1. Onset: Ask the patient when the problem or symptom first started and the order of events e.g. "When did these symptoms begin? Were you feeling

OUTLINE SHEET SCSC 2.5-1

GENITOURINARY SYSTEM (CONT.)

well before the symptoms started? What were you doing when they first started? Also ask about the manner of the onset e.g. “Did the symptoms come on gradually or suddenly?”

2. Location: Ask about the pain’s location and if it radiates or stay in the same place e.g. “Where is your pain located? Does your pain radiate or remain in the same location?”
3. Duration: Ask about the length of the symptom e.g. “How long did your pain or symptoms last? Does it come and go or is it constant?”
4. Character: Ask about the nature of the pain e.g. “What does your pain or symptoms feel like?”
5. Aggravating Factors: Ask what makes it worse, e.g. exercises, walking and straining. Are there any other associated symptoms e.g. “What makes your pain or symptoms worse? “Do you experience any other problems with your symptoms?”
6. Relieving Factors: Ask what makes the symptoms better, e.g. improved with lifting the testicles, lying down, wearing tight underwear and the effect on the symptom e.g. “Have you done anything to make your symptoms better and what kind of affect did it have on your symptoms?”  
Remedies tried already - Ex: analgesics, heat pad, ice pack, and other medications - effective or ineffective?
7. Temporal Factors: Ask the patient to describe the symptoms e.g. “Can you describe the typical symptoms”
8. Severity: Ask about the severity of their symptoms e.g. “How bad does it hurt on a scale from zero to ten, zero is no pain and 10 is the worst pain you have ever felt?” and “Does it interfere with your activities at home or at work?”

(3) Past Medical & Surgical History (PMHx & PSurgHx):

- (a) Chronic medical conditions - hernias, testicular torsion, testicular mass, testicular cancer, kidney stones, diabetes, pelvic inflammatory disease, endometriosis
- (b) Hospitalizations/review previous sick call visits - previous visits for testicular torsion, previous STDs, fungal infections

OUTLINE SHEET SCSC 2.5-1

GENITOURINARY SYSTEM (CONT.)

- (c) Surgeries: ex: orchiectomy, hernia repair, hysterectomy, tubal ligation
- (d) Medications: OTCs, supplements, illicit drugs, antibiotics, contraceptives
- (e) Allergies to food and medications. Note what happens to patient when taking such food or meds. Ex: Rocephin allergy - hives and shortness of breath
- (f) Male genitourinary & reproductive
  - 1. Review the patient's normal urinary elimination pattern, including frequency of voiding; history of nocturia; character and volume of urine; daily fluid intake; symptoms of burning, urgency, and frequency; difficulty starting stream; and hematuria.
  - 2. Ask if the patient has noted penile pain or swelling, genital lesions, or urethral discharge.
  - 3. Determine if the patient has noticed heaviness or painless enlargement of the testes or irregular lumps. If the patient reports an enlargement in the inguinal area, assess if it is intermittent or constant, associated with straining or lifting, and painful, and whether coughing, lifting, or straining at stool causes pain.
  - 4. Ask if the patient has experienced weak or interrupted urine flow, inability to urinate, difficulty starting or stopping urine flow, polyuria, nocturia, hematuria, or dysuria.
  - 5. Ask if the patient has continuing pain in lower back, pelvis, or upper thighs
- (g) Female genitourinary & reproductive
  - 1. Determine if the patient has signs and symptoms of vaginal discharge, painful or swollen perianal tissues, or genital lesions.
  - 2. Determine if the patient has symptoms or a history of genitourinary problems, including burning during urination (dysuria), frequency, urgency, nocturia, hematuria, or incontinence.
  - 3. Ask if the patient has had signs of vaginal bleeding outside of normal menstrual period or after menopause.
  - 4. Determine if the patient has received the HPV vaccine.

OUTLINE SHEET SCSC 2.5-1

GENITOURINARY SYSTEM (CONT.)

5. Determine if the patient has history of HPV (condyloma acuminatum, herpes simplex, or cervical dysplasia), has multiple sex partners, or has had multiple pregnancies.
  6. Assess the patient for history of ovarian dysfunction, breast or endometrial cancer, irradiation of pelvic organs, or endometriosis; family history of ovarian, breast, or colon cancer; history of infertility or nulliparity; use of estrogen (alone) hormone replacement therapy or long-term use of an oral contraception.
  7. Determine if the patient is postmenopausal (natural or surgical): had early menarche or late menopause; has a history of hypertension, diabetes, gallbladder disease, or polycystic ovary disease; or has a history of estrogen-related exposure (estrogen replacement therapy, tamoxifen use).
- (4) Family history - cancers of reproductive organs, kidney diseases, diabetes, hernias
- (5) Social history - tobacco, alcohol, dietary habits, travel outside the continental US, genital self-exam practices, contraceptive history, genital cleansing routines, sexual practices
- (6) Review of Systems. It's important to know how the other parts of the body are doing in relation to the chief complaint. Remember, other organs in the abdomen can cause pain and refer them to the testicles. Make sure to ask questions in relation to gastrointestinal problems and musculoskeletal systems.
- (a) Gastrointestinal - (review these symptoms to check for pertinent negatives) trouble swallowing, heartburn, appetite, nausea, vomiting, vomiting blood, indigestion, frequency of BM's, last BM, change in habit, rectal bleeding or tarry stools, constipation, diarrhea, abdominal pain, food intolerance, excessive belching or passing gas, hemorrhoids, jaundice, liver or gall bladder trouble, hepatitis, pancreatitis, esophageal lesions, etc....
  - (b) Renal - (review the following to find pertinent negatives) frequency of urination, polyuria, nocturia, dysuria, hematuria, urgency, hesitancy, incontinence, urinary infections and STD's, stones (renal calculi), enuresis
  - (c) Male genitourinary & reproductive - (review the following to find pertinent negatives) discharge from or sores on penis, hernias, testicular pain or masses, frequency of intercourse, libido, sexual difficulties

OUTLINE SHEET SCSC 2.5-1

GENITOURINARY SYSTEM (CONT.)

- (d) Female genitourinary & reproductive - (review the following to find pertinent negatives / information) abnormal bleeding patterns (e.g. prolonged menses, amenorrhea, bleeding between periods), vaginal discharge, genital pain, premenstrual symptoms, frequency of intercourse, sexual difficulties
- (e) Musculoskeletal - joint pain/stiffness, back pain, lower extremity pain, arthritis, backache, thoracic muscle pain, weight lifting activities, history of femoral neck injuries.

4. Explain a genitourinary and STI examination

a. During a genitourinary exam a standby is required. Due to the sensitive and invasive nature of the female genital exam, Sick Call Screener will generally not be expected to perform this exam, however, examination of the abdomen and percussion of the kidneys may still be performed as discussed below.

b. In addition to the groin, examine other parts of the body.

(1) Gen - Note patient's general appearance. Any signs of distress, what is the patient's level of discomfort? Is the patient clutching their groin/abdomen and unable to move? Does the patient allow you to examine them?

(2) Vital signs - note BP, T, RR, HR, LMP

(3) Abdominal - perform examination in detail

(4) Back - check for costovertebral angle tenderness to rule-out kidney disease

c. Male genitourinary examination in detail.

(1) Inspection

(a) Note obvious abnormalities with the penis and scrotum - open lesions, ulcers, discoloration, and swelling.

(b) If uncircumcised, ask patient to retract prepuce to check for chancres and other lesions. Cheesy material may accumulate under the foreskin. This is called smegma and is normal.

(c) Focus on the glans (head) of the penis - check for inflammation (balanitis), nodules, and scars. Check the base of the penis for lesions.

(d) Pubic hair - check for nits, lice (crabs) and scabies, excoriation

OUTLINE SHEET SCSC 2.5-1

GENITOURINARY SYSTEM (CONT.)

(e) Urethral meatus - check for discharge.

(2) Palpation

(a) Palpate the shaft of the penis for induration, tenderness

(b) Testes, epididymis, spermatic cord - Use thumb and two fingers to palpate these structures. Carefully note size, consistency, tenderness, nodules, mass and how they lie in axis. If nodules/mass are felt, note location, consistency (firm, soft), mobility and level of tenderness. A painless nodule is worrisome for cancer.

(c) Transillumination. Any swelling within the scrotum must be evaluated using transillumination. Darken the room, shine a beam of strong flashlight from behind the scrotum through the mass. Fluid will transilluminate (hydrocele), but blood and solid mass will not.

(d) Inguinal hernia. Using in turn your right hand for the patient's right side and the left hand for the patient's left side, invaginate loose scrotal skin with your index fingers. Start at a point low enough to be sure that your finger will have enough mobility to reach as far as the internal inguinal ring, if possible. Follow spermatic cord upward above the inguinal ligament, and find the triangular slit-like opening of the external inguinal ring. This is just above and lateral to the pubic tubercle. If the ring is somewhat enlarged, it may admit your index finger. If possible, gently follow the inguinal canal laterally in its oblique course. With your finger located either at the external ring or within the canal, ask the patient to strain down or cough. Note any palpable herniating mass as it touches your finger. If present, refer to medical officer for re-evaluation. If there is a large scrotal mass, auscultate the mass to listen for bowel sounds.

(e) Femoral hernia. Palpate by placing your fingers on the superior aspect of the anterior thighs in the region of the femoral canal. Ask the patient to strain down or cough. Note any swelling or tenderness.

d. Female genitourinary examination in detail.

(1) Observe genitalia for lice, rashes, excoriations, or lesions.

(2) Inspect the surface characteristics of the perineum and then retract the labia majora.

OUTLINE SHEET SCSC 2.5-1

GENITOURINARY SYSTEM (CONT.)

- (3) Observe for inflammation, edema, lesions, or lacerations.
  - (4) Note if there is vaginal discharge. Discharge may indicate need for a culture.
  - e. Percussion of the kidneys. After doing careful inspection of the back and flank, percuss the kidneys. This becomes an important part of the examination when a patient complains of "flank pain". Have the patient sit, then place the palm of your hand over the costovertebral angle (CVA) and strike your hand gently with the ulnar surface of the fist of your other hand. Direct percussion with the fist over the CVA is also acceptable. The test should not cause any tenderness. If there is tenderness it can indicate kidney inflammation, infection or stones.
5. List signs and symptoms of common genitourinary disorders and STIs
- a. Common Male Genitourinary Diseases
    - (1) Hematuria. Bright red, rusty brown, or cola color present at the beginning, end, or throughout voiding urine. Associated symptoms are flank or costovertebral pain, passage of wormlike clots, pain on voiding. Alternate possibilities can be from ingestion of foods containing red vegetable dyes (may cause red urinary pigment); ingestion of laxatives containing phenolphthalein.
      - (a) Plan:
        - 1. Aspirin
        - 2. NSAIDs
        - 3. Anticoagulants
        - 4. Diuretics
        - 5. Antibiotics
    - (2) Epididymitis is swelling (inflammation) of the epididymis. To do a physical exam ask about symptoms and check scrotum and testicle for swelling, pain, and redness. Examination of discharge from the penis. Test urine for infections, such as STDs. The health care provider may test for other STDs, including HIV.
      - (a) This condition usually begins suddenly with chills, fever, and pain behind the scrotum and in the testicle. Other symptoms include:
        - 1. Swelling of the scrotum, testicle, or both

OUTLINE SHEET SCSC 2.5-1

GENITOURINARY SYSTEM (CONT.)

2. Pain when ejaculating or urinating
3. Pain in the back or belly
4. Nausea
5. Itching and discharge from the penis
6. Frequent need to pass urine
7. Redness and tenderness of the scrotum

(b) Plan:

1. Oral antibiotic medicine
2. If the bacterial infection has spread to the blood, IV antibiotics may be needed
3. Bed rest
4. Elevation of the scrotum
5. Surgery may be needed to treat:
  - a. Bacterial epididymitis that causes pus to build up in the scrotum (abscess).
  - b. Chronic epididymitis that has not responded to other treatments.

(3) Epididymo-orchitis. Inflammation of the epididymis and testicle, resulting from trauma or infection. Patients complain of acute onset of pain and unilateral swelling on the affected side and marked tenderness on palpation of the testicle and spermatic cord. The pain may or may not be relieved with elevation of testis. Pain usually relieved when lying down. Associated symptoms include fever, chills and urethral discharge. Testis lie in the normal position and urinalysis may be normal or show increased WBC. Ask explicit questions about unprotected sex. This can be a complication of a sexually transmitted disease.

(a) Plan:

1. Scrotal support, ice packs

## OUTLINE SHEET SCSC 2.5-1

## GENITOURINARY SYSTEM (CONT.)

2. Bed rest until symptoms subside

3. NSAIDs, antibiotics

(4) Hydrocele. An abnormal accumulation of fluid within the tunica vaginalis of the testis. May result from injury or inflammation or complicate testicular neoplasm. Presents as non-tender, soft cystic mass within the scrotum and it will transilluminate.

(a) Plan:

1. Refer to medical officer. Re-evaluate for absence of tumor. May need to be evaluated with an ultrasound.

2. Follow lesion, assess rate of fluid accumulation. If rapid, may need referral to Urology.

3. Scrotal support

4. Reassure patient. No treatment needed unless they become painful.

(5) Spermatocele. Benign tumor of the epididymis and is a cystic mass of sperm. Lies just above and posterior to (but separate from) the testis. Usually small, firm, painless. May mimic solid tumor. Will transilluminate.

(a) Plan:

1. Confirm diagnosis with medical provider

2. Ensure the mass is not within the testis

3. Reassure patient. No treatment needed unless painful.

(6) Testicular cancer. An abnormal growth in testis, commonly appearing in men age 18-45. The most common symptom is painless mass, lump, bump or firmness that will not transilluminate. Patients may relate sensation of heaviness in the scrotum or a new-onset of scrotal pain. A hydrocele may be present as well as a variety of other possible symptoms: weight loss, fatigue, anorexia, gynecomastia, cough, and dyspnea.

(a) Plan:

OUTLINE SHEET SCSC 2.5-1

GENITOURINARY SYSTEM (CONT.)

1. Refer to medical provider
2. If it is indeed testicular mass, orchiectomy needs to be performed by Urology.

(7) Prostatitis: An acute or chronic inflammation of the prostate as a result of infection. Symptoms range from rectal pain, vague perineal pain or lower back pain. May present with frequency, dysuria, pyuria and hematuria. May be associated with epididymitis and urethral discharge. Can be caused by same bacteria that cause Gonorrhea or Chlamydia. In older men, this is more commonly caused by E. coli. Exam reveals an enlarged, tender, boggy prostate.

(a) Plan:

1. Refer to medical provider for re-evaluation
2. Urinary culture to find causative bacteria
3. Antibiotics

(8) An Inguinal Hernia is the protrusion of the small bowel through the abdominal wall into the inguinal canal or scrotum. Patient present with vague groin pain, swelling, may have the sensation of something tearing in the lower abdomen while lifting or doing heavy exercising. Swelling worsens with standing and reduces while lying down. On examination, there is palpable mass in the inguinal canal or scrotum (see physical examination section in this chapter). May or may not reduce with the patient in the supine position and while applying gentle pressure.

(a) Plan:

1. Refer to medical officer for evaluation
2. If reducible, routine referral to surgery for surgical repair. Avoid heavy lifting
3. If non-reducible and extremely painful, patient is at risk for bowel infarction. Immediate referral for surgical repair.

b. Common Female Genitourinary Diseases

(1) Breast Masses:

OUTLINE SHEET SCSC 2.5-1

GENITOURINARY SYSTEM (CONT.)

- (a) Fibroadenoma is a type of breast tumor that is not cancerous (is benign). These tumors are made up of breast tissue and the tissue that holds breast tissue together (connective tissue). A fibroadenoma usually occurs as a single lump, but sometimes there may be more than one lump. Fibroadenomas vary in size. They can occur in one breast or in both breasts. Some fibroadenomas are too small to feel, but a larger one may feel like a firm, smooth lump that moves beneath your fingers.

1. Signs or Symptoms:

- a. A fibroadenoma may not cause any symptoms. These tumors usually do not cause pain unless they grow to a large size.
- b. A fibroadenoma may feel like a lump in your breast that is:
  - (1) Firm
  - (2) Round
  - (3) Smooth
  - (4) Slightly moveable

2. Differential:

- a. Age: 20 to 49
- b. Occurrence: Usually bilateral
- c. Number: Multiple or single
- d. Shape: Round
- e. Consistency: Soft to firm, tense
- f. Mobility: Mobile
- g. Retraction signs: Absent
- h. Tenderness: Usually tender
- i. Borders: Poorly delineated; Well delineated

OUTLINE SHEET SCSC 2.5-1

GENITOURINARY SYSTEM (CONT.)

j. Variation with menses: Yes

3. Plan:

a. Having breast exams regularly to check for changes in your fibroadenoma.

b. Having the fibroadenoma removed. A fibroadenoma may be removed if it is:

(1) Large

(2) Continuing to grow

(3) Causing symptoms

(4) Changing the appearance of your breast

(5) A juvenile fibroadenoma. These tend to grow large over time

(b) Fibrocystic breast changes are changes in breast tissue that can cause breasts to become swollen, lumpy, or painful. This can happen due to buildup of scar-like tissue (fibrous tissue) or the forming of fluid-filled lumps (cysts) in the breast. This is a common condition, and it is not cancerous (is benign). The exact cause is not known, but it seems to occur when women go through hormonal changes during their menstrual cycle. Fibrocystic breast changes can affect one or both breasts

1. Signs or Symptoms:

a. condition may affect one or both breasts

b. Tenderness, mild discomfort, or pain

c. Swelling

d. Rope-like tissue that can be felt when touching the breast

e. Lumps in one or both breasts

f. Changes in breast size. Breasts may get larger before the menstrual period and smaller after the menstrual period.

OUTLINE SHEET SCSC 2.5-1

GENITOURINARY SYSTEM (CONT.)

g. Green or dark brown discharge from the nipple

2. Differential:

a. Age: 15 to 55

b. Occurrence: Usually bilateral

c. Number: Single; may be multiple

d. Shape: Round or discoid

e. Consistency: Firm, rubbery

f. Mobility: Mobile

g. Retraction signs: Absent

h. Tenderness: Usually non tender

i. Borders: Poorly delineated; Well delineated

j. Variation with menses: No

3. Plan:

a. Often, treatment is not needed for this condition. In some cases, treatment may include:

b. Taking over-the-counter pain relievers to help lessen pain or discomfort

c. Limiting or avoiding caffeine. Foods and beverages that contain caffeine include chocolate, soda, coffee, and tea

d. Reducing sugar and fat in your diet

e. Removal fluid from a cyst that is causing pain (fine needle aspiration)

f. Surgery may be needed to remove a cyst that is large or tender or does not go away

OUTLINE SHEET SCSC 2.5-1

GENITOURINARY SYSTEM (CONT.)

(c) Breast cancer is an abnormal growth of tissue (tumor) in the breast that is cancerous (malignant). Unlike noncancerous (benign) tumors, malignant tumors can spread to other parts of the body. The most common type of female breast cancer begins in the milk ducts (ductal carcinoma). Breast cancer is one of the most common types of cancer in women.

1. Signs or Symptoms:

- a. A painless lump in your breast
- b. Changes in the size or shape of your breast
- c. Breast skin changes, such as puckering or dimpling
- d. Nipple abnormalities, such as scaling, crustiness, redness, or pulling in (retraction)
- e. Nipple discharge that is bloody or clear

2. Differential:

- a. Age: 30 to 80
- b. Occurrence: Usually unilateral
- c. Number: Single
- d. Shape: Irregular or stellate
- e. Consistency: Hard, stone like
- f. Mobility: Fixed
- g. Retraction signs: Often present
- h. Tenderness: Usually non tender
- i. Borders: Poorly delineated; irregular
- j. Variation with menses: No

3. Plan

OUTLINE SHEET SCSC 2.5-1

GENITOURINARY SYSTEM (CONT.)

- a. Surgery to remove just the tumor (lumpectomy) or the entire breast (mastectomy). Lymph nodes may also be removed.
- b. Radiation therapy, which uses high-energy rays to kill cancer cells.
- c. Chemotherapy, which is the use of drugs to kill cancer cells.
- d. Hormone therapy, which involves taking medicine to adjust the hormone levels in your body. You may take medicine to decrease your estrogen levels. This can help stop cancer cells from growing.

(2) Galactorrhea is an abnormal milky discharge from the breast. The discharge may come from one or both nipples. The fluid is often white, yellow, or green. It is different from the normal milk produced in nursing mothers. Galactorrhea usually occurs in women, but it can sometimes affect men. Various things can cause galactorrhea. It is often caused by irritation of the breast, which can result from injury, stimulation during sexual activity, or clothes rubbing against the nipple. It may also be related to medicines or changes in hormone levels. In many cases, galactorrhea will go away without treatment. However, galactorrhea can also be a sign of something more serious, such as diseases of the kidney or thyroid or problems with the pituitary gland. Your health care provider may do various tests to help determine the cause. Sometimes the cause is unknown. It is important to monitor your condition to make sure that it goes away.

(a) Plan:

- 1. Take medicines only as directed by health care provider
- 2. Do not squeeze breasts or nipples
- 3. Avoid breast stimulation during sexual activity
- 4. Perform a breast self-exam once a month. Doing this more often can irritate breasts.
- 5. Avoid clothes that rub on nipples
- 6. Use breast pads to absorb the discharge
- 7. Wear a breast binder or a support bra to help prevent clothes from rubbing on nipples

OUTLINE SHEET SCSC 2.5-1

GENITOURINARY SYSTEM (CONT.)

8. Keep all follow-up visits as directed by health care provider. This is important
- (3) Inflammation of Bartholin Gland: Inflamed Bartholin glands are commonly, but not always, caused by gonococcal infection. It may be acute or chronic. Patient will complain of pain or discomfort to the external genitals. Acute inflammation produces a hot, red, tender, fluctuant swelling that may drain pus. Chronic inflammation results in a non-tender cyst on the labium. Usually unilateral.
- (a) Plan:
1. Refer to medical provider for evaluation
  2. May require incision and drainage (I&D)
  3. Antibiotics
- (4) Vaginal Infections: Vaginal infections often produce a vaginal discharge and may be accompanied by urinary and other symptoms; however, symptoms may be entirely absent. Vaginal infections can be sexually transmitted, although candidal infections can result from antibiotics, oral contraceptives, or systemic disease. A thorough history must be obtained, to include sexual and social history. Plan is based on diagnostic tests and specific exam findings.
- (a) Plan:
1. Refer to medical provider for evaluation
  2. All vaginal infections will require some form of medication for treatment.
- (5) Endometritis is irritation, soreness, or inflammation that affects the lining of the uterus (endometrium). Infection is usually the cause of endometritis. It is important to get treatment to prevent complications. Common complications may include more severe infections and not being able to have children (infertility). This condition may be diagnosed based on a physical exam including a pelvic exam, blood tests and removal of a sample of fluid from the cervix for testing (cervical culture).
- (a) Plan:
1. Perform blood tests
  2. Sample collection of fluid from the cervix for testing (cervical culture)

OUTLINE SHEET SCSC 2.5-1

GENITOURINARY SYSTEM (CONT.)

3. Refer to medical provider for evaluation

4. Antibiotics

(6) Tubal (Ectopic) Pregnancy: An ectopic pregnancy is when the fertilized egg attaches (implants) outside the uterus. Most ectopic pregnancies occur in one of the tubes where eggs travel from the ovary to the uterus (fallopian tubes), but the implanting can occur in other locations. In rare cases, ectopic pregnancies occur on the ovary, intestine, pelvis, abdomen, or cervix. In an ectopic pregnancy, the fertilized egg does not have the ability to develop into a normal, healthy baby.

(a) Plan:

1. Medicine

a. An injection of a medicine (methotrexate) may be given to cause the pregnancy tissue to be absorbed. This medicine may save your fallopian tube. It may be given if:

(1) The diagnosis is made early, with no signs of active bleeding

(2) The fallopian tube has not ruptured

(3) You are considered to be a good candidate for the medicine

b. Usually, pregnancy hormone blood levels are checked after methotrexate treatment. This is to be sure that the medicine is effective. It may take 4–6 weeks for the pregnancy to be absorbed. Most pregnancies will be absorbed by 3 weeks.

2. Surgery

a. A laparoscope may be used to remove the pregnancy tissue.

b. If severe internal bleeding occurs, a larger cut (incision) may be made in the lower abdomen (laparotomy) to remove the fetus and placenta. This is done to stop the bleeding.

c. Part or all of the fallopian tube may be removed (salpingectomy) along with the fetus and placenta. The fallopian tube may also be repaired during the surgery.

OUTLINE SHEET SCSC 2.5-1

GENITOURINARY SYSTEM (CONT.)

- d. In very rare circumstances, removal of the uterus (hysterectomy) may be required.
        - e. After surgery, pregnancy hormone testing may be done to be sure that there is no pregnancy tissue left.
      - 3. Whether your treatment is medicine or surgery, you may receive a Rho (D) immune globulin shot to prevent problems with any future pregnancy. This shot may be given if:
        - a. You are Rh-negative and the baby's father is Rh-positive.
        - b. You are Rh-negative and you do not know the Rh type of the baby's father.
- (7) Pregnancy Loss: There are many reasons, both predictable and unpredictable, for the loss of a pregnancy. Regardless of the cause, the family experiences varying degrees of grief that health care personnel must address. Pregnancy loss is often overlooked. Because others may feel uncomfortable discussing the miscarriage, stillbirth, or death of a newborn, the family experiencing the loss may have to deal with the grief alone or may feel isolated from society when experiencing such grief.
- (a) Plan:
- 1. Instruct the patient and support person about the interventions being initiated if stillbirth is unexpected.
  - 2. Use realistic terms such as "miscarriage" or "death" to describe the loss of a fetus or newborn to the family.
  - 3. Instruct the patient and family on the symptoms of parental grief.
    - a. Acute distress: Symptoms of shock, crying, and depression
    - b. Intense grief: Feelings of loneliness, guilt, resentment, anger, fear, anxiety, sadness, and depression, as well as possible physical symptoms
    - c. Reorganization: Potential start of a reduction in stress, of searching for meaning in the loss, of reentering normal life activities more easily, and of making future plans, to include another pregnancy

OUTLINE SHEET SCSC 2.5-1

GENITOURINARY SYSTEM (CONT.)

4. Instruct the patient and family about bereavement team (if available), follow-up contacts, and support groups available to assist with the grieving process following discharge.
5. Encourage questions and answer them as they arise.

(b) Documentation:

1. Maternal assessment findings
2. Nursing interventions and patient's response to them
3. Adverse responses
4. Status of newborn at delivery and details of any resuscitation interventions
5. Time of delivery
6. Time of placenta delivery
7. Recovery care provided to patient
8. Patient and family education
9. Support provided to patient and family
10. Disposition of patient and family
11. Patient's and family members' signs and symptoms of grief and level of coping
12. Care provided to newborn and details of mementos and keepsakes obtained
13. State-mandated reporting forms
14. Unexpected outcomes and related nursing interventions

(8) Pelvic Inflammatory Disease: Often caused by gonococcal and chlamydial infection, pelvic inflammatory disease (PID) may be acute or chronic. Patients may present with extreme lower abdominal pain and vaginal discharge. Inquiry about the use of IUDs and STD/sexual history. Acute PID produces very tender,

OUTLINE SHEET SCSC 2.5-1

GENITOURINARY SYSTEM (CONT.)

bilateral adnexal areas; the patient guards and usually cannot tolerate bimanual examinations.

(a) Plan:

1. Perform HCG
2. Refer to medical provider for evaluation
3. Severe forms of PID require hospitalization
4. Antibiotics

(9) An ovarian cyst is a fluid-filled sac that forms on an ovary. Follicle undergoes carrying rates of maturation and cysts can occur as the result of hypothalamic-pituitary dysfunction or because of native anatomic defects in the reproductive system. Can occur unilaterally or bilaterally. Most are functional in nature and resolve with minimal treatment. Usually asymptomatic. Patient may report lower abdominal pain, sudden onset abdominal pain may suggest cyst rupture. These cysts are commonly found during a routine pelvic exam.

(a) Plan:

1. Medicines to help relieve pain
2. A procedure to drain the cyst (aspiration)
3. Hormone treatment or birth control pills are methods that sometimes are used to help dissolve a cyst.
4. Regularly monitor for 2–3 months to see if it changes.

c. Common Gender Neutral Genitourinary Infections

(1) Cystitis/Urinary tract infection (UTI). An acute bacterial infection of the bladder. The agent is typically E. coli and usually ascends from the urethra. It is more common in females due to the short urethra. Patients present with dysuria, frequency, urgency or urination and hematuria. There may be suprapubic and lower back tenderness and fever is unusual. Urinalysis will be abnormal with hematuria, pyuria and positive leukocyte esterase and/or nitrite. Pyelonephritis results if the infections climbs further up to the kidneys. The patient will complain of fevers, flank or costovertebral angle (CVA) tenderness and the urinalysis shows high numbers of WBCs.

OUTLINE SHEET SCSC 2.5-1

GENITOURINARY SYSTEM (CONT.)

(a) Plan:

1. Refer patient to medical provider
2. Antibiotics
3. Increase oral intake
4. Pyelonephritis may require hospitalization
5. If men present with these problems, they will require further urologic work-up for structural abnormalities of the GU tract. Men, due to their longer urethra, should not have UTIs.
6. Females should be educated on proper wiping techniques (front to back) and encouraged to void before and after intercourse.

(2) Kidney stones (nephrolithiasis). Patients present with excruciating, intermittent flank pain that often radiates to the back and groin. Associated with fevers, chills, dysuria, frequency, and hematuria. Nausea, vomiting and abdominal distention may happen. This is due to an intestinal ileus (lack of motility) caused by local inflammation. Nothing makes the pain better or worse. On exam, patient has low grade fever, moderately hypertensive and tachycardic due to episodes of pain. Patients generally say their pain is "10 out of 10". Urinalysis shows gross or microscopic hematuria, pyuria and even stones.

(a) Plan

1. Refer to medical provider for further evaluation and management
2. Pain management
3. Strain urine and catch stone for pathologic identification
4. Refer to urology for full evaluation

(3) Sexually Transmitted Infections

(a) All patients presenting with signs and symptoms of STDs should receive a full STD work-up and counseling/education. These include:

1. STD tests

OUTLINE SHEET SCSC 2.5-1

GENITOURINARY SYSTEM (CONT.)

- a. DNA probe for Gonorrhea and Chlamydia
  - b. Urinalysis
  - c. RPR
  - d. HIV
  - e. Hepatitis Panel
2. Counseling by Preventive Medicine Technician on STD prevention and barrier protection
  3. Hepatitis B series
  4. Report to Navy Environmental & Preventive Medicine Unit
- (b) Non-gonococcal Urethritis (NGU) & Gonorrhea: NGU is an infection of the urethra by an organism other than Gonorrhea, commonly due to E. coli and Chlamydia. Symptoms include mild to severe dysuria, slight mucopurulent to copious purulent discharge, a red urethral meatus and hematuria. Chlamydia may present with clear penile drainage. Gonorrhea is caused by the gram-negative diplococcus Neisseria Gonorrhea. Symptoms are basically the same as NGU, but worse.
1. Plan:
    - a. STD work-up as outlined above
    - b. Antibiotics
    - c. Refrain from sexual contact until treatment is complete
- (c) Chlamydia is transmitted through sexual contact with the penis, vagina, mouth, or anus of an infected partner. Ejaculation does not have to occur for chlamydia to be transmitted or acquired. Chlamydia can also be spread perinatally from an untreated mother to her baby during childbirth, resulting in ophthalmia neonatorum (conjunctivitis) or pneumonia in some exposed infants. In published prospective studies, chlamydial conjunctivitis has been identified in 18-44% and chlamydial pneumonia in 3-16% of infants born to women with untreated chlamydial cervical infection at the time of delivery. While rectal or genital chlamydial infection has been shown to persist one

OUTLINE SHEET SCSC 2.5-1

GENITOURINARY SYSTEM (CONT.)

year or longer in infants infected at birth, the possibility of sexual abuse should be considered in prepubertal children beyond the neonatal period with vaginal, urethral, or rectal chlamydial infection.

1. People who have had chlamydia and have been treated may get infected again if they have sexual contact with a person infected with chlamydia.

2. Diagnosis:

a. Women: urine test or swab specimens from the endocervix or vagina

b. Men: Urine test or urethral swab

c. Rectal swab specimen for infections in persons that engage in repetitive anal intercourse

3. Plan:

a. Azithromycin OR Doxycycline

b. Treating infected patients prevents transmission to sex partners

c. Treating pregnant women usually prevents transmission to the infant during birth

d. Alternative Regiments - Erythromycin Base, Erythromycin ethylsuccinate, Ofloxacin, Levofloxacin

(d) Syphilis - a sexually transmitted infection (STI) caused by the bacterium *Treponema pallidum*. Syphilis can cause long-term complications if not adequately treated.

1. Signs and symptoms:

a. Syphilis has been called “The Great Pretender”, as its symptoms can look like many other diseases. However, syphilis typically follows a progression of stages that can last for weeks, months, or even years.

b. Primary syphilis has an appearance of a chancre. - Firm, painless, and infectious rounded ulcer. Occurs at syphilis bacteria entry portal

c. Secondary syphilis is characterized by skin lesions mimicking other dermatological disorders

OUTLINE SHEET SCSC 2.5-1

GENITOURINARY SYSTEM (CONT.)

- d. Tertiary syphilis follows a latent period of two or more years
- 2. Transmission - Syphilis is transmitted from person to person by direct contact with a syphilitic sore, known as a chancre. Chancres occur mainly on the external genitals, vagina, anus, or in the rectum. Chancres also can occur on the lips and in the mouth. Transmission of syphilis occurs during vaginal, anal, or oral sex. Pregnant women with the disease can transmit it to their unborn child.
- 3. Diagnosis:
  - a. Blood test – Rapid Plasma Reagent (RPR)
  - b. Microscopic exam – Dark field microscopic exam of skin scraping from chancre
- 4. Plan:
  - a. Benzathine Penicillin G 2.4 million units
  - b. Without treatment, patient is infectious in primary and secondary stages and anytime skin lesions are present
  - c. Doxycycline, Tetracycline and Erythromycin (for patients allergic to penicillin)
- 5. Follow-up:
  - a. Exam by Provider
  - b. Blood test
- 6. Treatment of contacts
- (e) Genital Herpes infection: is a sexually transmitted infection (STI) caused by the herpes simplex viruses type 1 (HSV-1) or type 2 (HSV-2). Genital herpes infection is common in the United States. Center for Disease Control and Prevention estimates that, annually, 776,000 people in the United States get new herpes infections. Nationwide, 15.5 % of persons aged 14 to 49 years have HSV-2 infection. The overall prevalence of genital herpes is likely higher than 15.5% because an increasing number of genital herpes infections are caused by HSV-1. HSV-1 is typically acquired in childhood passed from

OUTLINE SHEET SCSC 2.5-1

GENITOURINARY SYSTEM (CONT.)

mother; as the prevalence of HSV-1 infection has declined in recent decades, people may have become more susceptible to genital herpes from HSV-1.

1. Transmission

- a. Infections are transmitted through contact with lesions, mucosal surfaces, genital secretions, or oral secretions.
- b. HSV-1 and HSV-2 can also be shed from skin that looks normal. Generally, a person can only get HSV-2 infection during sexual contact with someone who has a genital HSV-2 infection.
- c. Transmission most commonly occurs from an infected partner who does not have visible sores and who may not know that he or she is infected.
- d. In persons with asymptomatic HSV-2 infections, genital HSV shedding occurs on 10% of days, and on most of those days the person has no signs or symptoms.

2. Signs and symptoms:

- a. Most individuals infected with HSV-1 or HSV-2 are asymptomatic or have very mild symptoms that go unnoticed or are mistaken for another skin condition. As a result, 87.4% of infected individuals remain unaware of their infection.
- b. When symptoms do occur, they typically appear as one or more vesicles on or around the genitals, rectum or mouth.
- c. The average incubation period after exposure is 4 days (range, 2 to 12). The vesicles break and leave painful ulcers that may take two to four weeks to heal. Experiencing these symptoms is referred to as having an "outbreak" or episode.
- d. Clinical manifestations of genital herpes differ between the first and recurrent outbreaks of HSV. The first outbreak of herpes is often associated with a longer duration of herpetic lesions, increased viral shedding (making HSV transmission more likely) and systemic symptoms including fever, body aches, swollen lymph nodes, or headache.

OUTLINE SHEET SCSC 2.5-1

GENITOURINARY SYSTEM (CONT.)

e. Recurrent outbreaks of genital herpes are common, in particular during the first year of infection. Approximately half of patients who recognize recurrences have prodromal symptoms, such as mild tingling or shooting pains in the legs, hips or buttocks, which occur hours to days before the eruption of herpetic lesions. Symptoms of recurrent outbreaks are typically shorter in duration and less severe than the first outbreak of genital herpes.

f. Although the infection can stay in the body indefinitely, the number of outbreaks tends to decrease over time. Recurrences and subclinical shedding are much less frequent for genital HSV-1 infection than for genital HSV-2 infection.

3. Diagnosis - Smear from lesions or by a viral culture

4. Plan:

a. There is no cure. Lesions will recur throughout life

b. Symptoms may be relieved by warm baths

c. First episode may also be treated with Acyclovir for symptomatic relief

d. Several promising medications are currently being tested

(f) Venereal Warts (Condylomata Acuminata). Caused by the human papilloma virus (HPV) characterized with hypervascularized verrucous lesions. Patients often complain of firm, non-tender papules or plaques with cauliflower-like appearance. Cosmetics is a big concern for patients and it is what drives them to seek medical help. There could be black, pin-point areas within the lesion. These represent thrombosed capillaries after the lesion has been picked-on many times. Warts could be located anywhere in the body, but are more commonly found in the hands and arms. The genital and rectal areas are also affected. In the face, the warts tend to have flat appearance (planar warts). When present in the soles of feet, they are indented and are called plantar warts.

1. Plan:

a. Refer to medical provider to confirm diagnosis

b. Use cryotherapy for warts in extremities

OUTLINE SHEET SCSC 2.5-1

GENITOURINARY SYSTEM (CONT.)

c. Podophyllin is used for genital warts

6. Identify Red Flag criteria

- a. Ovarian torsion is when an ovary becomes twisted and cuts off its own blood supply. In many cases, both the ovary and the fallopian tube on the affected side become twisted (adnexal torsion). This causes the ovary to swell. If left untreated, the ovary may become infected, which can be painful. Ovarian torsion can happen at any age and is a medical emergency that must be treated quickly, generally with surgery.

(1) Signs or Symptoms

- (a) The main symptom of this condition is pain in the lower abdomen, usually on one side of the body. The pain may be severe and may come and go suddenly.
- (b) Abdominal pain that spreads to the sides, lower back, or thighs
- (c) Nausea and vomiting
- (d) Fever

(2) Plan:

- (a) This condition is treated with surgery to untwist the ovary (laparoscopic ovarian torsion surgery)
- (b) If treated early, ovarian function can usually be restored. If the ovary cannot be untwisted, the ovary will have to be surgically removed (oophorectomy)

- b. A ruptured ectopic pregnancy is one in which tearing or bursting of a fallopian tube causes internal bleeding. Often, there is intense lower abdominal pain, and vaginal bleeding sometimes occurs. Having an ectopic pregnancy can be life-threatening. If this dangerous condition is not treated, it can lead to blood loss, shock, or even death.

(1) Get help right away if:

- (a) Develop worsening pain that is not relieved by medicine
- (b) Fever or chills
- (c) Vaginal bleeding

OUTLINE SHEET SCSC 2.5-1

GENITOURINARY SYSTEM (CONT.)

- (d) Redness and swelling at the incision site
  - (e) Nausea and vomiting
  - (f) Feeling dizzy or weak
  - (g) Feeling light-headed or if they faint
- c. Testicular torsion is a twisting of the spermatic cord, artery, and vein that go to the testicle. This twisting cuts off the blood supply to everything in the sac that contains the testes, blood vessels, and part of the spermatic cord (scrotum). Testicular torsion is most commonly seen in newborn and adolescent males, it can also occur before birth.
- (1) Cause
    - (a) Torsion can be caused by a hit on the scrotum or by certain movements during exercise. In some males, testicular torsion is more common because the connection of their testicle to a specific tissue in their scrotum developed in the wrong place, allowing the testicle to rotate and the cord to get twisted
  - (2) Signs or Symptoms
    - (a) The main symptom of testicular torsion is pain in your testicle
    - (b) The scrotum may be swollen, red, hard, and very tender
    - (c) There will be excess fluid in the tissue (edema)
    - (d) The testicle may be higher than normal in the scrotum
    - (e) Skin of the scrotum may be stuck to the testicle
    - (f) Nausea, vomiting, and a fever may be present
  - (3) Plan:
    - (a) Manual untwisting of the testicle may be done when the testicle is still mobile and the maneuver is not too painful
    - (b) Surgery usually is necessary and should be done as soon as possible after torsion occurs

OUTLINE SHEET SCSC 2.5-1

GENITOURINARY SYSTEM (CONT.)

- (c) During surgery, the testicle is untwisted and evaluated and possibly removed
- d. Hernias that are not reducible and lose their blood supply (are strangulated). This type of hernia requires emergency surgery.

(1) Signs or Symptoms

- (a) A bulge in the groin that is very painful and tender to the touch.
- (b) A bulge that turns red or purple
- (c) Fever, nausea, and vomiting
- (d) The inability to have a bowel movement or to pass gas

7. Summary and Review

Utilize genitourinary system anatomy to perform a physical assessment

Utilize genitourinary system physiology to perform a physical assessment

Obtain history from patient with common genitourinary disorders and STIs

Recognize a genitourinary and STI examination

List signs and symptoms of common genitourinary disorders and STIs

List treatments for common genitourinary disorders and STIs

Identify Red Flag criteria

INFORMATION SHEET SCSC 2.5-3

GENITOURINARY SYSTEM EXAMINATION

B. INTRODUCTION

This information describes the steps to perform a genitourinary system examination on a simulated patient with the assistance of a provider.

D. REFERENCES

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3. Close, J.F. (2018). Gastrointestinal clinical assessment and diagnostic procedures. In L.D. Urden, K.M. Stacy, M.E. Lough (Eds.), Critical care nursing: Diagnosis and management (8th Ed., pp. 669-679). St. Louis: Elsevier.

E. INFORMATION/EQUIPMENT LIST: The primary instructor is responsible for checking that all of the below equipment is available, functional and in the lab before the lab is scheduled to begin:

1. Cotton-Tipped Applicators
2. Non-Sterile Gloves
3. Vaginal Speculum
4. Cervical Speculum
5. Breast Simulator
6. Male Pelvic Simulator
7. Female Pelvic Simulator
8. Lamp
9. Private Exam Room
10. Standby

F. TRAINEE INSTRUCTIONS

1. This information sheet is for informational purposes only.
2. Trainees will follow all local instructions and standard operating procedures posted by their command.
3. It will **NOT** be utilized as a grading checklist and will not be performed by any Trainee enrolled within SCSC.

INFORMATION SHEET SCSC 2.5-3

GENITOURINARY SYSTEM EXAMINATION (CONT.)

G. JOB STEPS

**AT MEDICAL REPRESENTATIVE DIRECTION, OBTAIN PATIENT HISTORY PERTAINING TO THE GENITOURINARY SYSTEM BY COMPLETING THE FOLLOWING STEPS:**

1. Ask patient's chief complaint
2. Ask patient about onset of symptoms and pain. Specific MOI.
3. Ask about pain location, does it radiate or stay in place.
4. Ask about duration, does it come and go or is it constant.
5. Ask about the quality of the pain, what it feels like sharp, dull, ache etc.
6. Ask what makes it worse.
7. Ask what makes it better.
8. Ask if there is a time of day that their symptoms are better or worse.
9. Ask about where their pain is on the pain scale of (1-10).
10. Ask about any other symptoms they notice.
11. Ask about affect to activities of daily living
12. Gather patients past medical history, SAMPLE
13. Gather Surgical History
14. Gather Family History
15. Gather Social History
16. Review of systems, minimum of constitutional questions

**AT MEDICAL REPRESENTATIVE DIRECTION, OBTAIN A GENERAL IMPRESSION PERTAINING TO THE GENITOURINARY SYSTEM BY COMPLETING THE FOLLOWING STEPS:**

1. Form General Impression

INFORMATION SHEET SCSC 2.5-3

GENITOURINARY SYSTEM EXAMINATION (CONT.)

2. Obtain Vital Signs

**AT MEDICAL REPRESENTATIVE DIRECTION, PERFORM A BREAST EXAM BY COMPLETING THE FOLLOWING STEPS:**

1. Palpate lymph nodes (bilaterally) in the following areas:
  - a. Supraclavicular
  - b. Axillary apex (central)
  - c. Axillary anterior
  - d. Axillary posterior
  - e. Axillary lateral walls
2. Inspect the breasts & note:
  - a. Symmetry
  - b. Skin color and texture
  - c. Contour abnormalities
  - d. Retractions or dimpling
  - e. Venous patterns
  - f. Skin Lesions
  - g. Supernumerary nipples.
3. Inspect areola and nipples & compare:
  - a. Symmetry
  - b. Color
  - c. Size and shape
  - d. Smoothness

INFORMATION SHEET SCSC 2.5-3

GENITOURINARY SYSTEM EXAMINATION (CONT.)

- e. Nipple inversion/eversion/retraction.
4. Inspect the breast in the following positions:
    - a. Arms over head
    - b. Hands on hips (or hands pushed together in front of chest)
    - c. Leaning forward (esp. for large/pendulous)
  5. Place the patient in the supine position with exam side arm overhead and a pillow or folded sheet under same shoulder.
  6. Palpate the entire breast in a systematic fashion (vertical rows, circular, or wedge). Note the following:
    - a. Consistency
    - b. Tenderness
    - c. Any nodules.
  7. Repeat on opposite breast
  8. Palpate each nipple, noting any discharge.

**AT MEDICAL REPRESENTATIVE DIRECTION, PERFORM AN EXTERNAL FEMALE GENITALIA EXAM BY COMPLETING THE FOLLOWING STEPS:**

1. Don exam gloves
2. Place PT in the lithotomy position
3. Inspect the pubic hair characteristics and distribution
4. Inspect and palpate the labia for:
  - a. Symmetry
  - b. Color

INFORMATION SHEET SCSC 2.5-3

GENITOURINARY SYSTEM EXAMINATION (CONT.)

- c. Discharge
  - d. Inflammation or irritation.
5. Inspect the urethral meatus and vaginal introitus for:
- a. Discharge
  - b. Lesions
  - c. Polyps or fistulas.
6. Milk the Skene glands (culture any d/c)
7. Palpate the Bartholin glands
8. Inspect and palpate the perineum for:
- a. Skin lesions or nodules
  - b. Inflammation or excoriations
  - c. Fissures or fistulas
  - d. Tenderness
9. Inspect the perineal area and anus for:
- a. Skin lesions or nodules
  - b. Inflammation or excoriations
  - c. Fissures or fistulas
  - d. Tenderness
10. Inspect and palpate for bulging and urinary incontinence as the PT bears down.

**AT MEDICAL REPRESENTATIVE DIRECTION, PERFORM AN INTERNAL/SPECULUM FEMALE GENITALIA EXAM BY COMPLETING THE FOLLOWING STEPS:**

- 1. Insert proper size speculum.

INFORMATION SHEET SCSC 2.5-3

GENITOURINARY SYSTEM EXAMINATION (CONT.)

2. Inspect the cervix for:
  - a. Color
  - b. Position
  - c. Size
  - d. Surface characteristics
  - e. Any d/c or bleeding
  - f. Size/shape of the OS
3. Obtain specimens for Pap smear/cytology:
  - a. Ectocervix spatula and endocervical brush or Cervix-brush for a combined specimen.
  - b. All other specimens relevant i.e.) NS, KOH, STD
4. Inspect the vaginal mucosa as you withdraw the speculum for:
  - a. Color
  - b. Skin lesions or nodules
  - c. Secretions or discharge

**AT MEDICAL REPRESENTATIVE DIRECTION, PERFORM A BIMANNUAL EXAM BY COMPLETING THE FOLLOWING STEPS:**

1. Insert the index and middle fingers of one hand into the vagina and the other hand on the abdominal midline.
2. Palpate the vaginal walls for lesions or tenderness
3. Palpate the cervix for:
  - a. Position
  - b. Mobility

INFORMATION SHEET SCSC 2.5-3

GENITOURINARY SYSTEM EXAMINATION (CONT.)

- c. Tenderness
- 4. Palpate the uterus for:
  - a. Location
  - b. Position
  - c. Size/Shape/Contour
  - d. Mobility
  - e. Tenderness
- 5. Palpate the adenxa for:
  - a. Ovarian size and shape
  - b. Tenderness
  - c. Masses

**AT MEDICAL REPRESENTATIVE DIRECTION, PERFORM A RECTOVAGINAL EXAM BY COMPLETING THE FOLLOWING STEPS:**

- 1. Change exam gloves and lubricate index and middle finger
- 2. Insert the index finger into the vagina and the middle finger into the anus.
- 3. Assess sphincter tone and palpate rectal wall for:
  - a. Masses or nodules
  - b. Tenderness.
- 4. Palpate rectovaginal septum for:
  - a. Lesions
  - b. Nodules
- 5. Palpate posterior aspect of uterus

INFORMATION SHEET SCSC 2.5-3

GENITOURINARY SYSTEM EXAMINATION (CONT.)

6. Note characteristics of feces when gloved finger is removed. Perform guaiac test.

**AT MEDICAL REPRESENTATIVE DIRECTION, PERFORM A MALE GENITALIA EXAM BY COMPLETING THE FOLLOWING STEPS:**

1. Don exam gloves
2. Inspect pubic hair characteristics and distribution
3. Retract foreskin if patient is uncircumcised.
4. Inspect glans noting:
  - a. Color
  - b. Smegma
  - c. Lesions or nodules
  - d. External Meatus
  - e. Urethral Discharge
5. Palpate the shaft of penis noting:
  - a. Tenderness
  - b. Induration
  - c. Strip the urethra for discharge
6. Inspect the scrotum and ventral surface of the penis for:
  - a. Color
  - b. Lesions or nodules
  - c. Unusual Thickening
  - d. Hernia
7. Palpate each testicles, epididymis, and vas deferens for:

## INFORMATION SHEET SCSC 2.5-3

## GENITOURINARY SYSTEM EXAMINATION (CONT.)

- a. Symmetry/Asymmetry
  - b. Consistency
  - c. Tenderness
  - d. Lesions, masses or nodules
8. Transilluminate any scrotal masses noted
  9. Inspect and palpate femoral areas for bulges while pt. strains down.
  10. Palpate inguinal canals for an indirect or direct hernias
  11. Palpate for inguinal lymph nodes
  12. Elicit the cremasteric reflex

**AT MEDICAL REPRESENTATIVE DIRECTION, PRESENT FINDINGS BY COMPLETING THE FOLLOWING STEPS:**

1. Present findings of focused physical exam to provider
2. Document all history, findings interventions and procedures

ASSIGNMENT SHEET SCSC 2.5-4

GENITOURINARY SYSTEM

A. INTRODUCTION:

This assignment is to be completed after the material has been covered in class.

B. ENABLING OBJECTIVES:

1.34 Describe genitourinary system anatomy

1.35 Describe genitourinary system physiology

1.36 Describe gathering history from a patient with common genitourinary disorders and sexually transmitted infections (STIs)

1.37 Describe the basic components of a genitourinary system examination

1.38 State signs and symptoms of common genitourinary disorders and STIs

1.39 State treatments for common genitourinary disorders and STIs

1.16 State Red Flag criteria

C. STUDY ASSIGNMENT:

1. Read Genitourinary, Outline Sheet SCSC 2.5-1

D. STUDY QUESTIONS:

1. What potentially life-threatening condition occurs, when a fertilized egg attaches in a location outside of the uterus?
  
2. What process is characterized as swelling of the scrotum, painful urination, frequent need to urinate and gradual onset of testicular pain?
  
3. What organ(s) is responsible for filtering waste products and located on either side of the vertebral column above the waist line?

## ASSIGNMENT SHEET SCSC 2.5-4

## GENITOURINARY SYSTEM (CONT.)

4. What process is characterized as an abnormal accumulation of fluid within the tunica vaginalis of the testis?
  
5. What genitourinary conditions requires immediate referral for males and females?
  
6. What genitourinary disorder presents with a small, firm, painless mass just above the testis.
  
7. Which test is used to test a patient with flank pain?
  
8. What pertinent findings may present during a renal systems review?
  
9. A patient with complaint of an abnormal milky discharge from the breast may be experiencing?
  
10. What medications may be a treatment for Chlamydia?

OUTLINE SHEET SCSC 2.6-1

NEUROLOGICAL SYSTEM

A. INTRODUCTION

B. ENABLING OBJECTIVES

- 1.40 Utilize the knowledge of neurological system anatomy while assessing a patient with a neurological complaint
- 1.41 Utilize the knowledge of neurological system physiology while assessing a patient with a neurological complaint
- 1.42 Obtain history from patient with common neurologic disorders
- 1.43 Perform a neurologic examination
- 1.44 State signs and symptoms of common neurologic disorders
- 1.45 State treatments for common neurologic disorders
- 1.16 State Red Flag criteria

C. SCSC 2.6-1 NEUROLOGICAL SYSTEM TOPIC OUTLINE

- 1. Introduction
  - a. The nervous system, with its central and peripheral divisions, maintains and controls all body functions by its voluntary and autonomic responses. The evaluation of motor, sensory, autonomic, cognitive, and behavioral elements makes neurologic assessment one of the most complex portions of the physical examination.
  - b. This lesson guide focuses on the assessment of the nervous system within the Hospital Corpsman’s scope of care.
- 2. Identify the anatomical landmarks of the neurologic system anatomy.
  - a. The brain has four major units:
    - (1) Cerebrum. Center for interpreting sensory input, and control of voluntary muscular activity. It generates consciousness and is the center of memory, reasoning, intelligence and emotions. The two hemispheres are divided into lobes.
      - (a) Frontal lobe. Control center for voluntary skeletal movements and eye movements.

OUTLINE SHEET SCSC 2.6-1

NEUROLOGICAL SYSTEM (CONT.)

- (b) Parietal lobe. Responsible for processing sensory data such as temperature, pressure, pain, texture, and two-point discrimination.
  - (c) Occipital lobe. Primary vision center and interpretation of that data.
  - (d) Temporal lobe. Responsible for perception and interpretation of sound. Also integrated is sense of taste, smell, and balance. Speech is processed in the Wernicke area.
  - (e) Cerebral cortex. The gray outer layer that houses higher mental functions and general movements, perceptions behavior.
  - (f) Commissural fibers (corpus callosum). Permits the connection between the two hemispheres.
- (2) The Cerebellum. Concerned with coordination of voluntary muscular movement within the cerebrum. It processes sensory information received from eyes, ears, and sensory receptors and musculoskeletal. Houses the vestibular system that controls muscle tone, balance, and posture and movements.
- (a) Second in size to the cerebrum located in the inferior and posterior aspect of the cranial cavity. Accounts for nearly half of the neurons in the brain.
  - (b) Resembles the shape of a butterfly with layers:
    1. Cerebellar cortex. Superficial layer known as grey matter.
    2. Arbor vitae. Deep tracks to the grey matter resembling tree branches, known as white matter.
    3. Cerebellar nuclei. Deeper than the white matter where axons rise to carry impulses from cerebellum to other brain centers.
- (3) The Brainstem. Connects the brain to the spinal cord which branch off the cranial nerves. The structure includes:
- (a) Medulla oblongata: Is the site where the corticospinal tracts cross to the contralateral side.
  - (b) Pons: Relays information cerebral cortex to the contralateral cerebellar hemisphere.

OUTLINE SHEET SCSC 2.6-1

NEUROLOGICAL SYSTEM (CONT.)

- (c) Midbrain: Located above the first vertebrae, serves as the corticospinal tract pathway and reflex center for the eye and head movements. Also controls vital areas such as heart rate, blood pressure and respiration.
- (4) Diencephalon. Superior to the midbrain which controls various sensations such as pain and temperature. Relays information between the basal ganglia and cerebellum. It activates or arouses the brain to consciousness.
  - (a) Thalamus. Is the principal relay station for sensory impulses and plays a role in maintenance of consciousness.
  - (b) Hypothalamus. Inferior to the thalamus composed of a dozen or so nuclei in four regions. Provides control of the autonomic nervous system, production of hormones, regulation of emotional behavioral patterns, regulation of eating and drinking, control of body temperature, regulation of circadian rhythms and states of consciousness.
  - (c) Epithalamus. A small region found superior and posterior to the thalamus.
    - 1. Pineal Gland. Pea size gland which produces melatonin.
    - 2. Habenular Nuclei. Processes emotional responses to odor such as a loved ones cologne.
  - (d) Cranial Nerves. Peripheral nerves rising from the brain down the spinal cord. Each nerve has a motor function; only four nerves have a parasympathetic function.
- (5) Meninges. The fibrous and vascular coverings of the brain & spinal cord. This 'PAD' (Pia mater, Arachnoid, & Dura mater) are the layers that protects and hug the brain:
  - (a) The arachnoid is the middle layer and is separated from the pia mater by the subarachnoid space, which is filled with cerebrospinal fluid.
  - (b) Cerebrospinal fluid acts to cushion the soft cranial and spinal cord tissue within their hard bony protective cases.
  - (c) The dura mater is the tough fibrous sheath; it covers the arachnoid and lies against the skull.
- (6) Spinal Nerves (Dermatomes).

OUTLINE SHEET SCSC 2.6-1

NEUROLOGICAL SYSTEM (CONT.)

- (a) There are 21 pairs of spinal nerves that ascend from the spinal cord and exit at each intervertebral foramen. The fibers carry impulses from the spinal cord to the muscles and glands to which they are associated.
  - (b) Knowledge of the dermatomal innervation of the body is essential to localize neurologic lesions. One suggested pattern includes both shoulders(C4), the inner and outer aspects of the forearms (C6 and T1), the thumbs and little fingers (C6 and C8), the fronts of both thighs (L2), the medial and lateral aspects of both calves (L4 and L5), the little toes (S1), and the medial aspects of each buttocks (S3). When testing vibration and position sensation, first test the fingers and toes. If you detect abnormal findings, correlate them with motor and reflex activity.
3. Obtain history from patient with common neurologic disorders
- a. Subjective. When obtaining a detailed patient history your findings can help in the development of diagnoses and evaluation. Questions regarding medication use, family history and trauma such as possibilities of brain injury are important.
  - b. Chief Complaint (CC) - headaches, weakness - Have you had a headache like this before? If it's a new type of headache, refer to medical officer.
  - c. History of present illness (HPI)
    - (1) Seizures or convulsions – ask specifically if patient was had experienced a seizure and if so describe in detail; aura, frequency, medications.
    - (2) Pain – quality and location, neck, sciatica, headache.
    - (3) Gait coordination – question balance, stiffness, and muscle loss.
    - (4) Weakness or paresthesia – tingling or numbness, trouble speaking, severe headaches.
    - (5) Tremors – intentional movements or anxiety.
    - (6) Duration of symptoms - 3 days, 2 weeks, 4 months?
    - (7) Psychiatric history - nervousness, tension, depression, anxiety, and personality disorders, psychiatric hospitalization, mania, photophobia.

OUTLINE SHEET SCSC 2.6-1

NEUROLOGICAL SYSTEM (CONT.)

- (8) Associated symptoms - fever, chills, nausea, vomiting, URI symptoms, fainting, blackouts, paralysis, numbness, tingling, memory, headaches, vertigo, and neck stiffness; hearing problems such as tinnitus, ear pain, hearing deficits.
- (9) Anything that makes the symptoms better or worse (alleviating or aggravating problems)
- (10) Frequency of symptoms - constant, intermittent, etc....
- (11) Remedies tried already - analgesics, self-physical therapy and whether they were effective or ineffective.
- (12) Antecedent events - exposure to someone who is ill, specific trauma (diving, flying, blunt ear trauma) Severity of symptoms - particularly pain (rate on a scale of 1 - 10). Quality of pain - burning, aching, etc....
- d. Past Medical & Surgical History (PMHx & PSurgHx):
  - (1) Chronic conditions or past hospitalizations - seizures, syncopal episodes, focal weakness, radiculopathy, migraines & treatment
  - (2) Trauma – concussion or brain injury, spinal cord injury, past deployment history
  - (3) Medications - chronic, new, illegal, supplements, OTCs.
- e. Family history - migraines, seizures, cancer, stroke, hypertension.
- f. Social history - tobacco, alcohol, supplemental, travel, mental illness such as depression, SI/HI, stress
- g. Review of systems.
  - (1) Head - headaches, head injury
  - (2) Eyes - visual deficits, photophobia, corrective lenses, pain, redness, tearing, diplopia
  - (3) Ears - hearing, tinnitus, vertigo, earache, infection, discharge, barotrauma
  - (4) Nose & Sinuses - frequent colds, nasal stuffiness, hay fever, environmental allergies

OUTLINE SHEET SCSC 2.6-1

NEUROLOGICAL SYSTEM (CONT.)

- (5) Mouth & Throat - dental carries, gum disease, taste problems, pharyngitis, tonsillectomy, sore throat, hoarseness, voice change, trouble swallowing
  - (6) Neck - pain, mass, limitation in range of motion
  - (7) Add extremities for any radiculopathies such as numbness, tingling, loss of sensation, paralysis or paresthesia.
4. Perform a neurologic examination. Any positive finding is a Red Flag criteria and requires that the finding be discussed with your supervisor.
- a. General impression and observation.
    - (1) Upon your general approach, what is the patient's level of distress? Observe balance coordination and gait.
  - b. Mental Status
    - (1) Orientation - The patient should be orientated to person (name and age), place (location - city and state), time (date, day, month and year), and situation (why are they being seen).
  - c. Cranial Nerves (CN)
    - (1) Perform a CN check - These nerves emerge from within the head rather than from the vertebral column. Each of the twelve nerves are both numbered and named. Tests for intact brain function are concerned primarily with the 2nd through 7th cranial nerve.
    - (2) Testing the function of the cranial nerves is easily accomplished if done in an orderly, systematic fashion. Start with number one and work your way "down" to number twelve.
      - (a) CN I (Olfactory) - Sense of smell
        - 1. Test the sense of smell by presenting the patient with familiar and non-irritating odors. First be sure that each nasal passage is patent. The patient should then close both eyes. Occlude one nostril and test ability to smell in the other with a familiar substance such as cloves, coffee, soap, or vanilla.

OUTLINE SHEET SCSC 2.6-1

NEUROLOGICAL SYSTEM (CONT.)

2. Ask if the patient smells anything and, if so, what? Test the other side. A person should normally perceive odor on each side, and can often identify it.
3. This nerve is normally not tested in a routine neurological exam.

(b) CN II (Optic) – Vision

- a. Obtain a visual acuity.
- b. Inspect the size and shape of the pupils, and compare one side with the other.
- c. Your provider can perform a fundoscopic examination if deemed necessary.

(c) CN III (Oculomotor) - Pupillary constriction, opening the eye, and most of the extraocular movements

1. CN IV (Trochlear) - Downward, inward movement of the eye
2. CN VI (Abducens) - Lateral deviation of the eye
  - a. All three CN III, IV and VI function in unison and can be tested together by examining the extraocular movements in the six cardinal directions of gaze.
  - b. Check convergence of the eyes or any nystagmus. Also look for ptosis (drooping of the upper eyelids).
  - c. Inspect pupils size for equality and their response to light and accommodation (PEARL-A).

(d) CN V (Trigeminal) - Facial sensations and jaw clenching

1. The motor component of this nerve is tested by palpating the temporal and masseter muscles while asking the patient to clench teeth. Note the strength of muscle contraction.
2. After explaining what you are going to do, test the forehead, cheeks, and jaw on each side for sharp and dull sensations to evaluate the sensory component of this nerve.
  - a. The patient's eyes should be closed for this exam.

OUTLINE SHEET SCSC 2.6-1

NEUROLOGICAL SYSTEM (CONT.)

- b. Using a cotton swab that has been halved, ask the patient to report whether it is "sharp" or "dull" and compare both sides. Then test for light touch by using a fine wisp of cotton. Ask the patient to respond whenever you are touching the skin.

(e) CN VII (Facial) – Movement of facial expression muscles

1. Inspect the face, both at rest and during conversation.
2. Note any weakness or asymmetry and observe any tics or other abnormal movements. Ask the patient to:
  - a. Raise both eyebrows.
  - b. Frown.
  - c. Close both eyes tightly so that you cannot open them. Test the muscular strength by trying to open them.
  - d. Show both upper and lower teeth.
  - e. Smile.
  - f. Puff out both cheeks.

(f) CN VIII (Vestibulocochlear) or (Acoustic) - Hearing and balance

1. Gross hearing is assessed by holding your hands close to each ear and simultaneously rubbing your thumb and index finger together lightly. It should sound equally loud in each ear.
2. If the exam is abnormal, Weber and Rene tests should be performed by your provider.

(g) CN IX (Glossopharyngeal) – Phonation

1. CN X (Vagus) - Gag reflex
  - a. CN IX and X are tested together by listen to the patient's voice. Is it hoarse or does it have a nasal quality?

OUTLINE SHEET SCSC 2.6-1

NEUROLOGICAL SYSTEM (CONT.)

- b. Ask the patient to say "ah" or yawn as you depress the tongue with a tongue blade and watch the movements of the soft palate and the pharynx. The soft palate normally rises symmetrically and the uvula remains in the midline.
- c. Then warn the patient that you are going to test the gag reflex by stimulating the back of the throat with a tongue blade.

(h) CN XI (Spinal accessory) - Muscles of the neck and upper back

- 1. Standing behind the patient, look for atrophy or fasciculation (fine, flickering, irregular movements in small groups of muscle fibers) in the trapezius muscles, and compare one side with the other.
- 2. Ask the patient to shrug both shoulders against your resistance. Note the strength and contraction of the trapezius. Then ask the patient to turn head to each side against resistance.
- 3. Observe the contraction of the opposite sternocleidomastoid and note the force of the movement against your hand.

(i) CN XII (Hypoglossal) – Tongue

- a. Listen to the articulation of the patient's words.
- b. Ask the patient to stick out their tongue and look for asymmetry, atrophy, or deviation from the midline.
- c. Ask the patient to move the tongue from side to side, and note the symmetry of the movement.

(j) Cerebellar function – coordination

- 1. Fine motor skills check - As you assess the motor system, focus on the patient's body position during movement and at rest. Watch for involuntary movements such as tremors, tics, or fasciculation. If present, note their location, rate, rhythm, and amplitude.
  - a. 0 = no muscle contraction detected
  - b. 1 = visible muscle twitch but no movement of the joint
  - c. 2 = weak contraction insufficient to overcome gravity

OUTLINE SHEET SCSC 2.6-1

NEUROLOGICAL SYSTEM (CONT.)

- d. 3 = weak contraction able to overcome gravity but no additional resistance
  - e. 4 = weak contraction able to overcome some resistance but not full resistance
  - f. 5 = normal; able to overcome full resistance
2. To assess coordination, observe the patient's performance with the following maneuvers:
- a. Rapid alternating movements (RAMs). With the patient seated, ask to place palms on thigh. Then ask to lift their hand up, turn it over, and touch their thigh with the dorsum of their hand. This series of motion should be repeated as quickly as possible. Repeat with the other hand. You can also test by having the patient touch each fingers with the thumb of the same hand as rapidly as possible. Observe the speed, rhythm, and smoothness of the movements.
  - b. Point to Point Movement. These maneuvers test for sense of position and the functions of both the cerebellum and labyrinthine systems. Hold your finger in one place an arm length away from the patient. With an arm and index finger outstretched, ask the patient to raise their arm overhead and lower it again and touch your finger. After several repeats, ask to close both eyes and try several more times. Repeat with the other arm. Past-pointing, clumsy movements or intention tremor may indicate cerebellar disease.
  - c. Finger to Nose (FTN) – with the patient seated, ask to place index finger on nose. Hold index finger about 18 inches in front of face. Ask to go back and forth as quickly as possible between your finger and their nose while you move your finger from one spot to another. Repeat with the other hand. Past-point, clumsy movements or intention tremor may indicate cerebellar disease.
3. Gait and other related body movements.
- a. Heel-to-Toe-Walk - ask the patient to walk placing one foot directly in line with and in front of the other. Then ask the patient to walk on toes and heels. These last two maneuvers test the strength of plantar flexion and dorsiflexion of the ankles as well as balance and position sense.

OUTLINE SHEET SCSC 2.6-1

NEUROLOGICAL SYSTEM (CONT.)

b. Hop in place on each foot - ask the patient to hop in place on each foot. This indicates intact lower extremity motor system, cerebellar functions, and position sense.

4. Standing in specified ways.

a. The Romberg Test - This is primarily a test for position sense. Ask the patient to first stand with feet together and eyes open and then close both eyes for 20 to 30 seconds without support. Note the patient's ability to maintain an upright posture. Normally only minimal swaying should occur, in which a “negative Romberg” is recorded.

b. If your patient has normal Romberg testing, assess for pronator drift. This response requires muscular strength, coordination, and a good sense of position. Ask the patient to stand for 20 to 30 seconds with both arms straight forward, palms up and eyes closed. Normally a person can maintain this position. If he can, tap the arms briskly downward. They should return smoothly to the horizontal position. However, if the patient cannot, the arms drift down and the palms will pronate and this indicates a “positive pronator drift”.

(k) Sensory Testing

1. Sensory Function Test – Evaluate both primary and cortical discrimination sensation by having the patient identify various stimuli in the hands, lower arms, abdomen, feet and lower legs. Face is tested while evaluating CNV. Each sensory procedure is tested with the patients eyes closed.

2. Primary Sensory Functions

a. Superficial Touch - Light touch determination is tested with a fine wisp of cotton. Touch the skin lightly, avoiding pressure. Ask the patient to respond to whenever a touch is felt and to compare one area with another.

b. Superficial Pain - To test the patient's ability to discriminate between sharp and dull sensations, use a cotton swab that has been broken in half and touch the patient alternately with each side. Ask the patient to report whether it is “sharp” or “dull” and compare the symmetrical areas of the body.

OUTLINE SHEET SCSC 2.6-1

NEUROLOGICAL SYSTEM (CONT.)

- c. Vibration - To test vibratory sensations, use a low-pitch tuning fork. Tap it on the heel of your hand and place it firmly over the distal interphalangeal joint of the patient's finger, then over the interphalangeal joint of the big toe. Ask what the patient feels. If you are uncertain whether it is pressure or vibration, ask the patient to tell you when the vibration stops and touch the fork to stop it. If vibrations sense is impaired, proceed to a more proximal bony prominence (wrist, elbow, medial malleolus, patella, anterior superior iliac spine, spinous processes, and clavicles).
- d. Position of Joints - To test position sense, grasp the patient's big toe, holding it by its sides between your thumb and index finger, and then pull it away from the other toes to avoid friction. Show the patient what you mean by "up" or "down" as you move the toe clearly upward or downward. Then with the patient's eyes closed, ask for an "up" or "down" response as you move the toe in a small arc. Repeat several times on each side. If position sense is impaired, move proximally to the ankle joint. In a similar fashion, test position in the fingers, moving proximally if indicated.
- e. Loss of sensory modalities may indicate peripheral neuropathy. Symmetric sensory loss indicates a polyneuropathy.

3. Cortical Sensory Functions

- a. Stereognosis – Hand the patient a familiar object (key, coin, etc.) to identify by touch and manipulation. The inability to recognize objects by touch, suggest a parietal lobe lesion.
- b. Two Point Discrimination – use two sterile needles or ends of paper clips and alternate touching patient skin with one point or both points at various locations over the body. Ask the patient how many points are felt.
- c. Graphesthesia – With a blunt pen and an applicator stick, draw a letter, number or shape on the palm of the patients hand. Ask the patient to identify the figure.
- d. Cortical or discriminatory sensory functions test cognitive ability to interpret sensations. Failure to these test may indicate a lesion in the sensory cortex or the posterior columns of the spinal cord.

OUTLINE SHEET SCSC 2.6-1

NEUROLOGICAL SYSTEM (CONT.)

4. Superficial Reflexes

a. Reflexes are recorded using the Reflex Grading System:

(1) 4+ Very brisk, hyperactive; often with clonus (rhythmic oscillations between flexion and extension)

(2) 3+ Brisker than average, not necessarily indicative of disease

(3) 2+ Average

(4) 1+ Somewhat diminished; not necessarily indicative of disease

(5) 0+ No response

b. Plantar Reflex – Using the end of the reflex hammer to stroke the lateral side of the foot from the heel to the ball and then across the ball of the foot to the heel side. Expect plantar flexion of all toes. If there is dorsiflexion of the big toe with or without fanning of the rest, is considered The Babinski. This response may indicate pyramidal tract disease. However, if patient is a child younger than two, this reflex is considered normal.

c. Cremasteric Reflex – Performed on male patients. Stroke the inner thigh (proximal to distal) to elicit the cremasteric reflex. Expect the testicle and scrotum to rise on the stroked side.

(1) Deep tendon reflexes (DTRs)

1. The presence or absence of tendon reflexes is a very useful, objective information gleaned from the neurological exam. Note the speed, force, and amplitude of the reflex response, comparing one side to the other.

2. The following reflexes should be routinely tested. The spinal nerves involved in the reflex are noted in parenthesis.

a. Biceps Reflex (C5, C6) - The patient's arm should be partially flexed at the elbow with the palm down. Place your thumb or finger firmly on the biceps tendon. Strike with the reflex hammer so that the blow is aimed directly through your digit towards the biceps tendon. Observe for flexion at the elbow, and watch for and feel the contraction of the biceps muscle.

OUTLINE SHEET SCSC 2.6-1

NEUROLOGICAL SYSTEM (CONT.)

- b. Triceps Reflex (C6, C7) - Flex the patient's arm at the elbow, with palm toward the body, and pull slightly across the chest. Strike the triceps tendon above the elbow. Use a direct blow from directly behind it. Watch for contraction of the triceps muscle and extension at the elbow.
  - c. Supinator or Brachioradialis Reflex (C5, C6) - The patient's hand should rest on the abdomen or the lap, with the forearm partly pronated. Strike the radius about 1 to 2 inches above the wrist. Watch for flexion and supination of the forearm.
  - d. Knee Reflex (L2, L3, L4) - With the patient sitting, the knee flexed, and the lower leg hanging freely, briskly strike the patella tendon just below the patella. Note contraction of the quadriceps with extension at the knee.
  - e. Ankle Reflex (S1) - With the patient sitting, the knee flexed, and lower leg hanging freely, support the big toe with slight force from the plantar aspect. Use the large side of the reflex hammer to briskly strike the Achilles tendon. You should feel the ankle respond with plantar flexion.
  - f. Plantar Reflex (L5, S1) - With the pointed end of the reflex hammer, stroke the lateral aspect of the sole of the foot from the heel, curving medially across the ball. Normally the toes will move into flexion.
  - g. Clonus - Use this test when other reflexes are found to be hyperactive. Support the patient's knee in a partially flexed position and briskly dorsiflex the foot with your other hand, while maintain the foot in flexion. There should be no rhythmic oscillating movements between dorsiflexion and plantar flexion. A sustained clonus is associated with upper motor neuron disease.
- (2) Special testing - these depend on specific body parts affected. For example, someone who appears to have meningitis would have a Brudzinski's and Kernig's done.
3. Testing for signs of Meningeal Irritation.
- a. With the patient in the supine position, place your hand behind the patient's head and flex neck forward until the chin touches the chest if possible. Normally the neck is supple and the patient can easily do

OUTLINE SHEET SCSC 2.6-1

NEUROLOGICAL SYSTEM (CONT.)

this. However, pain in the neck and resistance to flexion can arise from meningeal inflammation, arthritis, or injury.

- 4. Brudzinski's Sign - As you flex the head forward, watch the hips and knees in reaction to this movement. Normally, they will remain relaxed and motionless, but flexion of the hips and knees suggests meningeal inflammation. This is a positive Brudzinski's Sign.
- 5. Kernig's Sign - Flex the patient's leg at both the hip and the knee. Then straighten the knee. This may produce some discomfort behind the knee in many people, but this maneuver should not produce pain. Bilateral pain and increased resistance to extending the knee suggest meningeal irritation and indicates a positive test.

5. List signs and symptoms of common neurologic disorders

a. Specific Neurological Conditions

- (1) Altered Mental Status: One of the most complex examinations. Mental status is determined as the general expression of a person's emotional responses, mood, cognitive functioning and personality.
  - (a) Physical factors such as concussions or trauma can cause in change of mental status. Other conditions may also affect such as, depression, anxiety, dementia or intellectual disabilities.
  - (b) Those patients manifesting an altered mental status may have abnormal appearance and behavior, altered state of consciousness, abstract reasoning, and difficulty in memory gathering. Changes in voice quality, articulation and sense of coherence may also be noted.
  - (c) Evaluate patient for signs of depression, anxiety, hallucinations or any other mental disturbances.
  - (d) Plan:
    - 1. Treat according to MOI
    - 2. Keep patient safe from harming self or others
    - 3. Notify your provider immediately.

OUTLINE SHEET SCSC 2.6-1

NEUROLOGICAL SYSTEM (CONT.)

- (2) Bell's Palsy: A temporary paralysis or weakness of one side of the face. An inflammation of the facial nerve (CN VII) that may be caused by a viral infection.
- (a) Other causes can be central nervous system lesions such as multiple sclerosis, stroke or tumor. Most commonly in patients of diabetes mellitus.
  - (b) Patients will feel rapid facial numbness and muscle weakness (within 2 to 3 days). Facial creases, nasolabial folds are none existent and the eyelid will not close on affected side. Also, saliva may pool on affected side yet, facial sensation is intact.
  - (c) Plan:
    - 1. Notify your provider immediately.
- (3) Cauda Equina Syndrome: A disorder caused by a lesion, tumor, infection or trauma of the bundle of nerve roots before they exit the spinal canal. The lesions may cause compression on the proximal nerve roots causing a lumbar disc herniation.
- (a) Patients may present with muscle weakness, bowel/bladder incontinence, weakened sensation and saddle numbness.
  - (b) Plan:
    - 1. Notify your provider immediately.
- (4) Peripheral Neuropathy: The impaired blood flow, vasoconstriction, and chronic ischemic changes within the peripheral neuronal fibers lead to the sensory and autonomic nerve function deficits.
- (a) Symptoms are numbness tingling, burning, and cramping, most commonly in the hands and feet. Night pain in one or both feet or feelings of walking on cotton.
  - (b) Plan:
    - 1. Glycemic control
    - 2. Avoid alcohol
    - 3. Pain control

OUTLINE SHEET SCSC 2.6-1

NEUROLOGICAL SYSTEM (CONT.)

4. Notify your provider.
- (5) Radiculopathy (Lumbosacral): Most commonly caused by compression to the lower lumbar disc due to trauma, lesions, and improper lifting techniques.
- (a) Other causes can be infection or inflammatory disease.
  - (b) Patients may feel recurrent back pain followed by pain down one or both legs. Pain symptoms may be triggered by cough, sneeze or bowel movement. Other symptoms experienced based on location of lesion:
    1. L1-L3 – Altered sensation in the inguinal region, anterior thigh, and medial aspect of knee.
    2. L4 - Altered sensation over the knee and medial leg, may have weakness in the quadriceps and tibialis anterior.
    3. L5 - Altered sensation over the lateral leg, dorsomedial foot, and great toe.
    4. S1 - Altered sensation over the little toe, lateral foot, and sole of foot.
    5. S2-S5 - Altered sensation involving the perianal region, buttocks, posterior thigh, and calf.
  - (c) Positive findings in performing the straight leg raise, cross straight leg raise or femoral stretch test can be key indicators of radiculopathy. Because Radiculopathy can be anywhere between the L1 to S5 recommended taking an MRI, CT scan or x-rays.
  - (d) Plan:
    1. NSAIDs
    2. Muscle relaxers
    3. Oral corticosteroids
    4. Rest and ice therapy
    5. Notify your provider and they may tell the patient to follow up if no improvement or new symptoms appear, or they may decide to put them in for diagnostic studies.

OUTLINE SHEET SCSC 2.6-1

NEUROLOGICAL SYSTEM (CONT.)

- (6) Tension Headaches: The most common type of headache and usually results from involuntary spasms or contractions of the muscles of the head, neck and shoulders.
- (a) It may be associated with depression, anxiety or fatigue.
  - (b) These headaches are usually dull, persistent, and may circle the head and feel like a tight band. It may also involve the back of the head and neck area only. No nausea, vomiting, blurring vision or no neurological deficits are noted.
  - (c) Your exam will be normal.
  - (d) Plan:
    1. NSAIDs.
    2. Increase fluid intake.
    3. Rest, relaxation techniques or stress reduction class.
    4. Follow up if no improvement or new symptoms appear.
    5. Notify your provider for any positive neurological findings.
- (7) Migraine Headaches are vascular in nature and usually the result of intracranial artery constriction followed by dilation and distention of the arteries resulting in throbbing pain.
- (a) Many times the initial constriction of the arteries is accompanied by an "aura" (which can be a visual, sensorial, or motor disturbance).
  - (b) The pain is intense, throbbing, and often is one sided. The patient may be very sensitive to light or sound stimuli and nausea with or without vomiting.
  - (c) Your examination is normal.
  - (d) Plan:
    1. Refer patient to your provider.
    2. Your provider will manage the medication treatment of patients suffering from migraines.



OUTLINE SHEET SCSC 2.6-1

NEUROLOGICAL SYSTEM (CONT.)

- (10) Meningitis is an inflammation of the membrane covering of the brain and spinal cord.
  - (a) It may be due to bacteria or viruses and usually occur in the winter and spring seasons or in areas where overcrowding is common.
  - (b) It may be preceded by a URI. Symptoms include an acute frontal headache, stiff neck, fever, and possible altered mental status.
  - (c) During your examination, the Brudzinski's and Kernig's signs are positive and there may be a Petechiae or purpuric rash present.
  - (d) Plan:
    - 1. Refer patient to your provider.
  
- (11) Traumatic Brain Injury (TBI) An injury that disrupts normal functioning of the brain. Patients experiencing blunt trauma for suspicions of TBI or concussion.
  - (a) Symptoms include, loss of consciousness, loss of memory immediately before or after accident, headache or light sensitivity, neck pain, change in breathing patterns, nausea vomiting, blurred or double vision.
  - (b) The Military Acute Concussion Evaluation (MACE) is a screening tool for assessing concussion in the deployed setting. However, Glasgow Coma Scale (GCS) of 13-15 can be assessed and identified in TBI patients.
  - (c) If patient is visually lacking balance and coordination, losses of sensation, seizures, or any changes in personality or behavior, the patient must be immediately evaluated by a physician.
  - (d) Plan:
    - 1. Refer to provider immediately if patient is visually lacking balance and coordination, losses of sensation, seizures, or any changes in personality or behavior.
    - 2. Refer this patient to your provider.

6. Summary and Review

Utilize neurological system anatomy to perform a physical assessment

## OUTLINE SHEET SCSC 2.6-1

## NEUROLOGICAL SYSTEM (CONT.)

Utilize neurological system physiology to perform a physical assessment

Obtain history from patient with common neurologic disorders

Perform a neurologic examination

List signs and symptoms of common neurologic disorders

List treatments for common neurologic disorders

State Red Flag criteria

JOB SHEET SCSC 2.6-3

NEUROLOGICAL SYSTEM

A. INTRODUCTION

Upon successful completion of this lesson the Trainee will be able to obtain a patients neurological history and conduct a neurologic examination on a real or simulated patient (a person acting as a patient).

B. EQUIPMENT LIST: The primary instructor is responsible for checking that all of the below equipment is available, functional and in the lab before the lab is scheduled to begin:

1. Real or simulated patient (a person acting as a patient)
2. Penlight
3. Cotton wisp
4. Tuning fork
5. Cotton tipped applicator
6. Familiar objects (e.g., keys, coin)
7. Tongue blade
8. Reflex hammer
9. Sterile needles or paper clips

C. REFERENCES

1. Seidel’s Guide to Physical Examination, 8th Ed., Jane W. Ball, Joyce E. Dains, John A. Flynn, Barry S. Soloman, Rosalyn W. Stewart, Mosby, an imprint of Elsevier Inc., 2015
2. Bates’ Guide to Physical Examination and History Taking, 12th Ed., Lynn S. Bickley and Peter G. Szilagyi, Wolters Kluwer, 2017.

D. SAFETY PRECAUTIONS

1. Instructors, Trainees and visitors must comply with all general safety procedures that are posted in the lab environment or provided in the lesson plan.
2. There are no skill specific safety hazards for this Performance Test.
3. Review TTO procedures in the Safety/Hazard Awareness Notice.
4. Trainees will not practice if an instructor is not present
5. Trainees may not take equipment out of the lab
6. Trainees will follow universal precautions and wear proper PPE.

E. JOB STEPS

Trainee Instructions:

1. The Trainee must perform a complete all parts of what constitutes a neurological examination and explain each step as it is performed.

JOB SHEET SCSC 2.6-3

NEUROLOGICAL SYSTEM (CONT.)

2. The Trainee has 30 minutes to complete this examination.
3. The Trainee is not allowed to use the reference in the performance of this PCL.
4. The Trainee will wear appropriate attire during the practice and actual PCL evaluation.

**AT MEDICAL REPRESENTATIVE DIRECTION, OBTAIN PATIENT HISTORY PERTAINING TO THE NEUROLOGY SYSTEM BY COMPLETING THE FOLLOWING STEPS:**

1. \*Ask patient's chief complaint
2. \*Ask patient about onset of symptoms and pain. Specific MOI.
3. \*Ask about pain location, does it radiate or stay in place.
4. Ask about duration, does it come and go or is it constant.
5. Ask about the character of the pain, what it feels like sharp, dull, ache etc.
6. Ask what makes it worse.
7. Ask what makes it better.
8. Ask if there is a time of day that their symptoms are better or worse.
9. \*Ask about where their pain is on the pain scale of (1-10).
10. Ask about any other symptoms they notice.
11. Ask about affect to activities of daily living
12. Gather patients past medical history, SAMPLE
13. Gather Surgical History
14. Gather Family History
15. Gather Social History
16. Review of systems, minimum of constitutional questions

JOB SHEET SCSC 2.6-3

NEUROLOGICAL SYSTEM (CONT.)

**AT MEDICAL REPRESENTATIVE DIRECTION, GATHER A GENERAL IMPRESSION BY COMPLETING THE FOLLOWING STEPS:**

1. \*Form General Impression
2. \*Obtain Vital Signs

**AT MEDICAL REPRESENTATIVE DIRECTION, ANALYSE MENTAL STATUS BY COMPLETING THE FOLLOWING STEPS:**

1. \*Obtain general observations related to a neurologic examination.
  - a. \*Balance
  - b. \*Coordination
  - c. \*Gait
2. \*Assess patients orientation
  - a. \*Orientated to person
  - b. \*Orientated to place
  - c. \*Orientated to time and situation

**AT MEDICAL REPRESENTATIVE DIRECTION, COMPLETE CRANIAL NERVE (CN) EXAMINATION BY COMPLETING THE FOLLOWING STEPS:**

1. Test sense of smell (CN I)
  - a. one naris at a time
2. Test visual acuity (CN II)
  - a. distant and near vision
3. Test visual fields (CN III, IV, VI)
  - a. Inspect eyelids
  - b. PEARRL-A

## JOB SHEET SCSC 2.6-3

## NEUROLOGICAL SYSTEM (CONT.)

- c. Test extraocular eye movements
4. Inspect the face for muscle atrophy (CN V)
  - a. Palpate jaw muscles
  - b. Test superficial pain
  - c. Test touch sensation
5. Inspect for symmetry of facial features and expressions (CN VII)
  - a. Raise both eyebrows
  - b. Frown
  - c. Muscle strength of eye lids
  - d. Show upper and lower teeth
  - e. Smile
  - f. Puffed cheeks
6. Test sense of hearing (CN VIII)
  - a. Finger rub bilaterally
7. Test gag reflex and ability to swallow (CN IX, X)
  - a. Inspect symmetry of uvula
  - b. Evaluate speech, voice quality
8. Test muscles of neck and upper back (CN XI)
  - a. Shoulder shrug against resistance
  - b. Turn head, each side against resistance
9. Inspect tongue movements (CN XII)
  - a. Symmetry, or atrophy

JOB SHEET SCSC 2.6-3

NEUROLOGICAL SYSTEM (CONT.)

- b. Movements side to side
- c. Movements up and down
- d. Movements during speech

**AT MEDICAL REPRESENTATIVE DIRECTION, COMPLETE CEREBELLAR FUNCTION TESTS BY COMPLETING THE FOLLOWING STEPS:**

1. Perform Rapid Alternating Movements (RAMs) Test
2. Perform Point to Point Movement Test
3. Perform Finger to Nose (FTN)
4. Perform Heel-to Toe Walk
5. Perform Hop in Place on Each Foot
6. Perform The Romberg Test

**AT MEDICAL REPRESENTATIVE DIRECTION, COMPLETE PRIMARY SENSORY TESTING BY COMPLETING THE FOLLOWING STEPS:**

1. Perform a superficial touch assessment
2. Perform a superficial pain assessment
3. Test vibratory sensations
4. Positions sense of joints (big toe)

**AT MEDICAL REPRESENTATIVE DIRECTION, COMPLETE CORTICAL SENSORY FUNCTIONS TESTING BY COMPLETING THE FOLLOWING STEPS:**

1. Perform Stereognosis test using items such as:
  - a. Keys
  - b. Coin
  - c. Paperclip

JOB SHEET SCSC 2.6-3

NEUROLOGICAL SYSTEM (CONT.)

2. Perform two point discrimination test using either sterile needles or paperclip ends
3. Perform a graphesthesia test using a blunt pen or applicator stick

**AT MEDICAL REPRESENTATIVE DIRECTION, COMPLETE SUPERFICIAL REFLEXES TESTING BY COMPLETING THE FOLLOWING STEPS:**

1. \*Perform a plantar reflex test using a reflex hammer
2. \*Perform a cremasteric reflex test on male patients

**AT MEDICAL REPRESENTATIVE DIRECTION, COMPLETE DEEP TENDON REFLEXES TESTING BY COMPLETING THE FOLLOWING STEPS:**

1. Examine patients biceps reflex
2. Examine patients triceps reflex
3. Examine patients supinator/branchioradialis reflex
4. Examine patients knee reflex
5. Examine patients ankle reflex
6. Examine patients plantar reflex
7. Examine patients Clonus

**AT MEDICAL REPRESENTATIVE DIRECTION, COMPLETE SPECIAL TESTING BY COMPLETING THE FOLLOWING STEPS:**

1. \*Perform patients neck flexion while palpating the neck
  - a. \*Annotate resistance or abnormalities
2. \*Perform Brudzinski's signs test while observing hips and knee reactions
  - a. \*Annotate resistance or abnormalities
3. \*Perform Kerning's signs
  - a. \*Annotate resistance and pain

## JOB SHEET SCSC 2.6-3

## NEUROLOGICAL SYSTEM (CONT.)

**AT MEDICAL REPRESENTATIVE DIRECTION, PRESENT FINDINGS BY COMPLETING THE FOLLOWING STEPS:**

1. \*Present findings of focused physical exam to provider
2. \*Document all history, findings interventions and procedures

**AT MEDICAL REPRESENTATIVE DIRECTION, COMPLETE PATIENT EDUCATION AND TREATMENT BY COMPLETING THE FOLLOWING STEPS:**

1. \*Distribute medication per provider's orders and with 5 rights.
2. Provides reassurance and answer patient questions.
3. Provide patient education and home therapy handouts.
4. \*Document and provide duty status determination paperwork.
5. Ensure patient understands need to follow up and/or referral procedures

OUTLINE SHEET SCSC 2.7-1

MUSCULOSKELETAL SYSTEM – UPPER EXTREMITIES

A. INTRODUCTION

B. ENABLING OBJECTIVES

- 1.46 Utilize the knowledge of musculoskeletal system anatomy while assessing a patient with a musculoskeletal complaint
- 1.47 Utilize the knowledge of musculoskeletal system physiology while assessing a patient with a musculoskeletal complaint
- 1.48 Obtain history from patient with common orthopedic disorders
- 1.49 Perform an orthopedic examination
- 1.50 State signs and symptoms of common orthopedic disorders
- 1.51 State treatments for common orthopedic disorders
- 1.16 State Red Flag criteria

C. SCSC 2.7-1 MUSCULOSKELETAL SYSTEM – UPPER EXTREMITIES TOPIC OUTLINE

- 1. Introduction to Musculoskeletal System – Upper Extremities
  - a. The upper extremities must be thoroughly and effectively examined because hands, arms, and shoulders are vital to a person's ability to function. To examine the upper extremities properly, you need to perform an integrated, systematic assessment of various aspects of the musculoskeletal, neurologic, and vascular systems, as well as the skin.
  - b. A clear understanding of the anatomy of the upper extremities, including supporting bones and muscles, their vascular supply, and the relationship between these parts of the body and the neurologic system is required.
- 2. Identify the bones and muscles which make up the musculoskeletal system
  - a. Upper Extremities Anatomy
    - (1) Wrist
      - (a) Ulna

OUTLINE SHEET SCSC 2.7-1

MUSCULOSKELETAL SYSTEM – UPPER EXTREMITIES (CONT.)

1. Located on the medial aspect of the forearm (the pinky is on the ulna side) and articulates with the head of the radius at the radial notch.

(b) Radius

1. Located on the lateral aspect of the forearm (thumb side). The radius is narrows at its proximal end and widens at the distal end which articulates to three bones of the wrist; lunate, scaphoid, and triquetrum.

(c) Carpal bones

1. There are eight (8) carpal bones; from lateral to medial in two rows from proximal to distal:
  - a. Scaphoid – most fractured
  - b. Lunate
  - c. Triquetrum
  - d. Pisiform
  - e. Trapezium
  - f. Trapezoid
  - g. Capitate – Largest carpal bone
  - h. Hamate
2. Carpal bones are joined together by ligaments. An articular disk separates the ulna and carpal bones.
3. The wrist moves in two planes, flexion and extension.
4. The hand has articulations between the carpals and metacarpals followed by proximal, middle and distal phalanges.

(2) Hand

(a) Metacarpals

1. Numbered I through V starting from thumb, from lateral to medial.

OUTLINE SHEET SCSC 2.7-1

MUSCULOSKELETAL SYSTEM – UPPER EXTREMITIES (CONT.)

2. The heads articulate to the proximal phalanges to form what is known as the ‘knuckles.’

(b) Phalanges

1. Proximal, Middle and Distal Phalanges:
  - a. There are 14 phalanges in the five digits of each hand.
  - b. The thumb (pollex) has two phalanges while the rest (II – V) have three.
  - c. A single bone of the digit is referred to as a phalanx. Each consisting of a proximal base, shaft and distal head.

(3) Elbow

- (a) The elbow is a hinge joint, made by the articulation of the distal humerus with the proximal portions of the ulna and radius. The medial and lateral aspects of the distal humerus have bony prominences known as epicondyles. The point bony prominences when the elbow is bent at 90 degrees is made by the olecranon process of the proximal ulna. The olecranon bursa surrounds this process. The sensitive ulnar nerve traverses between the olecranon and medial epicondyle.

1. Humerus

- a. Largest and longest bone in the upper limb. It articulates proximally to the glenoid cavity (shoulder cavity) by a rounded head.
  - b. At the distal end, an oblique groove, creating the lateral and medial epicondyle. This articulates to the ulna and radius.
2. Radius - has a disc-shape head that articulates with the humerus.
  3. Ulna - the proximal end of the ulna bone is the olecranon.
  4. Olecranon - forms the prominence, bony aspect, of the elbow. Articulates with the humerus by the coronoid process.

OUTLINE SHEET SCSC 2.7-1

MUSCULOSKELETAL SYSTEM – UPPER EXTREMITIES (CONT.)

5. Lateral/Medial epicondyle

- a. Rough projections on either side of the distal end of the humerus to which the tendons of most muscles of the forearm attached.
- b. Houses the ulnar nerve on the medial epicondyle commonly referred to the ‘funny bone’.

6. Olecranon bursa

- a. The thin sac of fluid that lies between the bony olecranon tip and the skin.
- b. It helps the skin slide over the bone smoothly.

7. Coronoid process - articulates with the trochlea of the humerus

8. Annular ligament - also known as the orbicular ligament, is a strong band of fibers that encircles the head of the radius and maintains it in contact with radial notch.

(4) Shoulder (glenohumeral joint)

(a) The shoulder is a complex arrangement of three (3) bones held together by muscles, tendons, and ligaments. The clavicle attaches the shoulder to the sternum and holds the shoulder out from the trunk forming the sternoclavicular joint. From behind the shoulder joint, the scapula forms two projections, the acromion and the coracoid, which together with the clavicle, form the glenoid fossa, a socket into which the ball-like head of the humerus is cradled. This combination forms the shoulder or glenohumeral joint.

(b) A third joint is formed where the acromion process from the scapula meets the distal clavicle, the acromioclavicular (AC) joint. The rotator cuff stabilizes the glenohumeral joint and is made up of a group of muscles: supraspinatus, infraspinatus, teres minor, and subscapularis. The biceps tendon is held in a groove in the humerus and attaches under the rotator cuff

1. Humerus - connects with the scapula at the glenohumeral joint (shoulder)

2. Scapula

- a. Large, triangular, flat bone situated in the posterior thorax between the second and seventh rib.



OUTLINE SHEET SCSC 2.7-1

MUSCULOSKELETAL SYSTEM – UPPER EXTREMITIES (CONT.)

- 2. Location/radiation - does it stay in one place, or is it radiating elsewhere?
  - 3. Duration of discomfort - Is the discomfort getting better or worse?
  - 4. Character – sharp, dull, ache?
  - 5. Aggravating factors - running, certain positions
  - 6. Relieving factors - medications, rest
  - 7. Timing and Severity – does the pain get worse at a certain time of day, what is the quality (1 to 10 scale)?
- (b) Do review of systems of the thorax and abdomen. Some internal organ can manifest with musculoskeletal pain.
  - (c) Past medical history of injuries, surgeries and treatment.
  - (d) Family history, genetic disorders, arthritis, scoliosis.
4. Perform an orthopedic examination
- a. Physical Examination
    - (1) When performing a musculoskeletal examination there are key elements which need to be assessed.
      - (a) Inspection
      - (b) Palpation
      - (c) Range of motion (ROM)
      - (d) Neurovascular exam - focused & brief, depending on body part examined
        - 1. Motor strength
        - 2. Sensation
        - 3. Reflexes
        - 4. Vascular status

OUTLINE SHEET SCSC 2.7-1

MUSCULOSKELETAL SYSTEM – UPPER EXTREMITIES (CONT.)

(e) Special tests - specific to the body part being examined.

b. Upper Extremities, Wrists and Hand

(1) Physical Examination of the Wrists and Hand

(a) Inspection

1. Check symmetry, obvious surface abnormalities (swelling, discoloration, skin breaks), evidence of trauma
2. Check for calluses and deviations along the joints

(b) Palpation

1. Feel for the normal anatomy (bony tips of radius and ulna). Note the precise location of pain, numbness, tingling.
2. Feel the different carpal bones. Palpate the anatomical "snuff box". Is there tenderness?
  - a. Navicular (scaphoid bone) radial side of the carpus. Most commonly fractured bone.
  - b. Trapezium (radial side, fusing point with first metacarpal)
  - c. Tubercle of the Radius (Lister's Tubercle) one-third of the way across the dorsum of the wrist.
  - d. Capitate, distal from Lister's Tubercle, the largest of metacarpal bone.
  - e. Lunate, proximal to the capitate. Most frequently dislocated.
  - f. Ulnar Styloid Process, palpate up the sharp, subcutaneous ulnar border to the elbow and back down. For the process you should feel a small, shallow groove running longitudinally.
  - g. Triquetrium, distal to the ulnar styloid process, in the proximal carpal row. It may be difficult to palpate as it lays under the pisiform (small sesamoid bone, formed within the flexor carpi ulnaris tendon.

OUTLINE SHEET SCSC 2.7-1

MUSCULOSKELETAL SYSTEM – UPPER EXTREMITIES (CONT.)

- h. Hook of the Hamate, distal and radial to the pisiform. You must press firmly to find its rather shallow contour as it is imbedded in soft tissue. Important because it transports the ulnar nerve and artery to the hand.
- i. Metacarpals, keeping your hand on the patient’s palm, palpate dorsal and radial aspects of metacarpals nothing full length. Any interruptions or excrescences along the bone may indicate a possible fracture.
- j. Phalangeal joints, as you examine the metacarpals, assess the points also known as knuckles as you move distally. Note the (metacarpophalangeal joint (MCP), proximal interphalangeal joint (PIP), distal interphalangeal joint (DIP) joints).

(c) ROM - check for smooth motion; can the patient complete the tests?

- 1. Flexion
- 2. Extension
- 3. Ulnar deviation
- 4. Radial deviation
- 5. The following can be assessed by asking patient to spread fingers out, then slowly making a fist and reopening the hand:
  - a. Movement of fingers at MCP, PIP, and DIP joints
  - b. Thumb adduction
  - c. Thumb abduction

(d) Neurovascular exam - Depending on the general area of the pain, focus your neurologic examination.

- 1. Motor Strength - Are they all 5/5?
  - a. Test wrist extension, flexion, pronation and supination with resistance
  - b. Finger extension - tested with finger flexed at PIP and extending the MCP joint against resistance

OUTLINE SHEET SCSC 2.7-1

MUSCULOSKELETAL SYSTEM – UPPER EXTREMITIES (CONT.)

- c. Finger flexion - tested with fingers flexed at all joints and attempting to straighten them out against resistance
- d. Finger abduction and adduction is tested by slipping a sheet of paper between each finger and attempt to remove it against the patient's resistance.
- e. Thumb extension - tested by attempting to move the thumb from extension into flexion. Thumb flexion is tested with the thumb touching the hypothenar surface and you attempt to force it into extension.
- f. Thumb abduction and adduction movements are tested against resistance and test the pinch grip by opposing the thumb to the little finger and attempt to force apart.

2. Sensation - Check for sharp-dull, light touch

3. Reflexes - Check biceps, triceps and brachioradialis reflexes

4. Neurovascular status - Check radial pulses (normal is 2+), capillary refill (normal is <2 seconds)

(e) Special tests for the hand:

- 1. Tinel's test - used to rule out carpal tunnel syndrome. Simply tap over the anterior wrist (volar carpal ligament) that lies in the midline between the ulnar and radial styloid to elicit or reproduce pain in the distribution of the median nerve.
- 2. Phalen's test - used to rule out carpal tunnel syndrome. Performed by flexing the wrist to their maximum degree and holding it in that position for at least one minute. If numbness or tingling develops over the distribution of the median nerve, the sign is positive.

c. Common Hand Conditions

(1) Boxer's fracture.

- (a) A fracture of the fifth metacarpal head caused by striking a hard object or most commonly, another individual. Very important to note what the patient hit. If patient punched someone in the mouth, check for bite marks (this may require antibiotic use).

OUTLINE SHEET SCSC 2.7-1

MUSCULOSKELETAL SYSTEM – UPPER EXTREMITIES (CONT.)

(b) Signs/Symptoms:

1. Patient complains of pain over the fifth metatarsal
2. There could be obvious deformity that is highly suggestive of a fracture such as angulation of the bone, swelling, ecchymosis, tenderness, and paresthesia.
3. Always look for abrasions and laceration to rule out human bite

(c) Plan:

1. Ice
2. NSAIDs
3. Limited use of hand/wrist
4. Refer to medical officer for x-ray
5. Orthopedic referral for casting or reduction of fracture, if needed.

(2) Scaphoid fracture of the wrist - Occurs when patient falls on outstretched hand with hyperextension of the wrist. Scaphoid is the carpal bone most prone to fracture. Uniquely, the blood supply to the scaphoid enters distally. Therefore, a fracture through the midsection may lead to aseptic necrosis of the proximal fragment. Nonunion occurs frequently.

(a) Signs/Symptoms:

1. Localized pain and swelling over distal radius and wrist.
2. There is significant pain over the "anatomical snuffbox" (the first metacarpal and scaphoid tubercle).
  - a. If one has pain over the "snuffbox" the diagnosis is scaphoid fracture until proven otherwise and should be taken seriously.

(b) Plan:

1. Ice

OUTLINE SHEET SCSC 2.7-1

MUSCULOSKELETAL SYSTEM – UPPER EXTREMITIES (CONT.)

- 2. NSAIDs
- 3. Limited use of hand/wrist
- 4. Refer to medical officer for x-ray (scaphoid series)
- 5. Orthopedic referral for casting (12 weeks) and close follow up

(3) Carpal tunnel syndrome.

(a) Compression neuropathy on the median nerve.

(b) Sign and Symptoms:

- 1. Patients complain of decreased sensation involving the first three fingers and grip strength weakness as well as distal forearm and wrist pain.
- 2. They may be decreased sensations on two-point discrimination, sharp-dull differentiation and light touch determination.
- 3. Positive Phalen's and Tinel's signs

(c) Plan:

- 1. Ice
- 2. NSAIDs
- 3. Limited use of hand/wrist - Avoid aggravating activities, repetitive wrist motions
- 4. Refer to medical officer
- 5. Orthopedic referral for brace or release of condition is severe.

(4) Dorsal ganglion.

(a) Abnormal accumulation of synovial and tendosynovial fluid. Subtle abnormalities in the wrist or the extensor tendon sheath can cause an overproduction of fluid that leaks in to the subcutaneous tissue. Ganglion cysts are separations between the layers of the tendon sheaths forming a cyst of fluid.

OUTLINE SHEET SCSC 2.7-1

MUSCULOSKELETAL SYSTEM – UPPER EXTREMITIES (CONT.)

(b) Signs and Symptoms:

1. The patient complains of a painless lump. Typically a 1-2 cm lump with mobility with ranges from fluid to tense.
2. It should not be grossly adherent to the underlying tissue. Tenderness is minimal unless pressing on cutaneous nerve.
3. Wrist motion is painless and full

(c) Plan:

1. Observation
2. Simple aspiration, if indicated
3. Limit wrist movements, repetitive use
4. Orthopedic referral if painful

(5) Finger and thumb sprain.

(a) Results from direct trauma causing hyperextension or hyperflexion of one of the joints.

(b) Signs and Symptoms:

1. There will be pain, swelling, possible ecchymosis and limited ROM
2. Distal neurovascular should be intact. If active ROM is limited or non-existent, an x-ray is warranted to rule out fractures.

(c) Plan:

1. Ice
2. NSAIDs
3. Limited use of hand/wrist
4. Refer to medical officer for x-ray
5. Buddy tape or splint finger until pain resolved

OUTLINE SHEET SCSC 2.7-1

MUSCULOSKELETAL SYSTEM – UPPER EXTREMITIES (CONT.)

d. Elbow

(1) Physical Examination of the Elbow

(a) Inspection

1. Check symmetry, obvious surface abnormalities (swelling, discoloration, skin breaks), evidence of trauma
2. Check for deviations along the joints

(b) Palpation

1. Feel for the normal anatomy (bony tips of radius and ulna) Note the precise location of pain and other abnormalities
2. Feel the different bony prominences
3. Feel the Medial Epicondyle, located on the medial side of the distal end of the humerus
4. Feel for the Medial supracondylar line of the humerus, upward from the epicondyle, palpate the short bony ridge.
5. Feel for the olecranon.

(c) ROM - check for smooth motion; can the patient complete the tests?

1. Flexion
2. Extension
3. Supination
4. Pronation

(d) Neurovascular exam - Depending on the general area of the pain, focus your neurologic examination.

1. Motor Strength - Are they all 5/5? - Perform ROM of extension, flexion, supination and pronation with resistance

OUTLINE SHEET SCSC 2.7-1

MUSCULOSKELETAL SYSTEM – UPPER EXTREMITIES (CONT.)

2. Sensation - Check for sharp-dull, light touch. Refer to neurologic chapter in this handbook on techniques.
3. Reflexes - Check biceps, triceps and brachioradialis reflexes. Refer to neurologic chapter in this handbook on techniques.
4. Neurovascular status - Check radial pulses (normal is 2+), capillary refill (normal is <2 seconds).

(e) Special tests for the wrist:

1. Tennis elbow test - stabilize the elbow and instruct the patient to make a fist and extend his wrist. Force the wrist into flexion against resistance. The test is positive if tenderness is noted over the lateral epicondyle.
2. Tinel sign - To assess for ulnar nerve injury, tap the groove between the olecranon and medial epicondyle. The test is positive if a tingling sensation radiates down the forearm along the ulnar distribution into the hand.

e. Common Elbow Conditions

(1) Olecranon bursitis.

- (a) An inflammation of the bursal sac which is located between the olecranon process and the ulna. May be a secondary development of trauma, inflammation, or infection. May also develop in patients who lean on their elbows for aid in daily tasks or occupation.

(b) Signs and Symptoms:

1. The patient will complain of swelling, stiffness, and possibly tenderness but is usually painless.
2. A large mass of up to 6 cm in diameter may be present over the tip of the elbow that may be red tinged and warm to touch.

(c) Plan:

1. NSAIDs
2. If red and warm, refer to MO

OUTLINE SHEET SCSC 2.7-1

MUSCULOSKELETAL SYSTEM – UPPER EXTREMITIES (CONT.)

- 3. Compression Ace wrap for 3 days, moist heat
- 4. Avoid aggravating activities, such as putting pressure on elbows

(2) Lateral Epicondylitis (Tennis Elbow).

(a) An injury of the extensor tendon as a result of overuse or repetitious extension of the wrist or rotation of the forearm from activities such as tennis, golf, or even turning a screwdriver.

(b) Signs and symptoms:

- 1. Patients will complain of gradual onset of tenderness over the lateral epicondyle and some associated weakness.
- 2. Usually, there is full ROM to the elbow, but an increase pain with elbow extension and when grasping objects.
- 3. Neurovascularly intact.

(c) Plan:

- 1. Cold compress, NSAIDs, rest extremity from lifting and repetitive hand/elbow movements
- 2. If discomfort is moderate to severe, consider using either a Velcro splint or placing the patient in a volar splint to alleviate repetitious extending and flexing the wrist.
- 3. Follow-up in 3-4 days
- 4. Physical therapy when initial symptoms resolve
- 5. Refer to medical provider if not improved

(3) Medial Epicondylitis (Golfer's Elbow). Inflammation of the medial epicondyle area at the insertion point of the muscles that flex and pronate the wrist.

(4) Signs and symptoms:

(a) ROM is normal, but there is tenderness with resisted flexion of the fingers

OUTLINE SHEET SCSC 2.7-1

MUSCULOSKELETAL SYSTEM – UPPER EXTREMITIES (CONT.)

- (b) Pain is deeper and is reproduced with moving valgus stress test and milking maneuver
- (c) There may be swelling and redness
- (d) No neurovascular deficiencies should be noted
- (e) Ulnar neuropathy may be present

(5) Plan:

- (a) Ice
- (b) NSAIDs
- (c) Rest extremity from lifting and repetitive hand/elbow movements.
- (d) If discomfort is moderate to severe, consider using either a Velcro splint or placing the patient in a volar splint to alleviate repetitious extending and flexing the wrist.
- (e) Follow-up in 3-4 days.
- (f) Physical therapy when initial symptoms resolve.

f. Shoulder

(1) Physical Examination of the Shoulder

(a) Inspection

1. Check symmetry, obvious surface abnormalities (swelling, discoloration, skin breaks), evidence of trauma
2. Check the shoulder blades and clavicle bones for symmetry
3. Check for muscle bulk of deltoids, biceps, triceps

(b) Palpation

1. Feel for the normal anatomy (manubrium of the sternum, the sternoclavicular joint, and the clavicle. Note the precise location of pain and other abnormalities.

OUTLINE SHEET SCSC 2.7-1

MUSCULOSKELETAL SYSTEM – UPPER EXTREMITIES (CONT.)

2. Feel the different bony prominences
3. Sternoclavicular joint. Beginning where the sternum meets the clavicle (suprasternal notch). The sternum naturally sits superior to the sternum however, dislocations manifest in major protrusion or lack of symmetry.
4. Clavicle. In a sliding motion inspect the surface of the clavicle. Any divots, breaks or steps may indicate a fracture.
5. Coracoid process. At the distal end of the clavicle you can feel the clavicular cavity. The tip of the coracoid process can be felt over muscle by pressing firmly over the pectoralis major muscle.
6. Acromioclavicular articulation. The joint is easiest to palpate if you push in a media direction against the thickness of the end of the clavicle. Slight motions of the shoulder make this joint much easier to identify and palpate.
7. Feel the rectangular Acromion (shoulders summit)
8. Greater tuberosity of the humerus lies inferior to the acromion lateral edge. There is a small step off between the lateral acromial border and the greater tuberosity.
9. Bicipital groove. Located anterior and medial to the greater tuberosity. More easily palpable if the arm is externally rotated. Palpation should be taken carefully, applying too much digital pressure may hurt patient making further examination difficult.
10. Spine of the scapula. Move posteriorly. Extending obliquely across the upper the upper four-fifths of the scapular dorsum and ends in a flat smooth triangle at the medial border and covered by the levator scapula muscle. Clinically important because the site is a point for referred pain originating from cervical spine.
11. Vertebral border of the scapula as you trace down the medial border of the scapula, follow the angle of the scapular bone. Palpate the border until the scapula disappears within the muscles.
12. Muscles
  - a. Subscapularis

OUTLINE SHEET SCSC 2.7-1

MUSCULOSKELETAL SYSTEM – UPPER EXTREMITIES (CONT.)

b. Supraspinatus

c. Teres major

d. Teres minor

(c) ROM - check for smooth motion; can the patient complete the tests?

1. Abduction and Adduction - tested by asking patient to raise both arms above his head; adduction is also tested by asking patient to touch his opposite shoulder.
2. Extension – tested by asking patient to straighten arm and reaching behind them
3. Flexion – tested by asking patient to bring arms up forward and parallel to the ears
4. External rotation - tested by asking patient to place both hands behind the neck with elbows out to the side
5. Internal rotation - tested by asking patient to place both hands behind the small of the back

(d) Neurovascular exam - Depending on the general area of the pain, focus your neurologic examination.

1. Motor Strength - Are they all 5/5?
  - a. Repeat all range of motion exercises, only this time with resistance
  - b. Have patient shrug his shoulder against resistance to check for accessory nerve.
2. Sensation - Check for sharp-dull, light touch
3. Reflexes - Check biceps, triceps and brachioradialis reflexes
4. Neurovascular status - Check brachial and radial pulses (normal is 2+), capillary refill (normal is <2 seconds).

(e) Special tests for the shoulder:

OUTLINE SHEET SCSC 2.7-1

MUSCULOSKELETAL SYSTEM – UPPER EXTREMITIES (CONT.)

1. Drop Arm Test - To assess whether or not there is a tear in the rotator cuff
  - a. Have patient fully abduct arms over their head, then have them slowly lower his arms to his side
  - b. The patient will be unable to do this if the rotator cuff is injured
  - c. If the patient is able to do this, have them lower their arms to shoulder level and hold them there
  - d. If the patient is able to maintain this position, gently tap on the forearms
  - e. If the rotator cuff is injured, they will not be able to keep the arm abducted and the arm will fall to their side
  
2. Apprehension Test - To test for shoulder ligamentous instability or chronic shoulder dislocation
  - a. With patient's arm at his side and elbow flexed, abduct and externally rotate the arm as if he was throwing a baseball while applying anterior pressure on the shoulder.
  - b. The test is positive if the patients resists further motion
  
3. The Yergason Test – to determine whether the biceps tendon is table in the bicipital groove
  - a. With patients arm flexed at the elbow, use one had to grasp elbow and the other holding the wrist. Externally rotate patients arm while pulling down on elbow.
  - b. The test is positive if patient experiences sharp pain

(2) Common Causes Of Shoulder Pain:

(a) Rotator cuff tear

1. Results in a loss of the normal integrity of the infraspinatus or supraspinatus tendons over the humeral head
  - a. Signs and Symptoms:

OUTLINE SHEET SCSC 2.7-1

MUSCULOSKELETAL SYSTEM – UPPER EXTREMITIES (CONT.)

- (1) The principal sign is weakness on external rotation (infraspinatus) or abduction (supraspinatus).
- (2) Patient may complain of pain when sleeping on the affected side
- (3) Signs of subacromial impingement and local subacromial tenderness is also present
- (4) Partial tears are distinguished by loss of smooth overhead reaching. Complete tears are distinguished by an inability to hold the arm elevated scoring a positive drop arm test.

(b) Plan:

- 1. Ice
- 2. NSAIDs
- 3. Limit use of shoulder, especially overhead activities
- 4. May use a sling, but not for more than three days as this may cause "frozen shoulder"
- 5. Physical therapy
- 6. Complete tears may require surgical repair

(3) AC Separation or Strain.

- (a) Shoulder pain associated with motion when reaching forward, lifting patients arm above the shoulder level or reaching across their chest.

(b) Signs and Symptoms:

- 1. There will be swelling, possible ecchymosis and tenderness on palpation over the AC joint, with limited ROM
- 2. Pain is aggravated by downward traction on the affected arm
- 3. Typically associated with a history of a direct fall to the shoulder, such as a bike. X-ray will confirm the diagnosis

OUTLINE SHEET SCSC 2.7-1

MUSCULOSKELETAL SYSTEM – UPPER EXTREMITIES (CONT.)

(c) Plan:

1. Ice
2. NSAIDs
3. Apply sling
4. Avoid aggravating activities, light duty
5. Physical therapy

(4) Subacromial bursitis.

(a) Often triggered by repetitive overhead activity

(b) Signs and symptoms:

1. The patient complains of pain and aching, often relieved with rest.
2. ROM is usually full, but uncomfortable
3. There may be tenderness on deep palpation over the subacromial bursa

(c) Plan:

1. Ice
2. NSAIDs
3. Apply sling
4. Avoid aggravating activities, light duty

(5) Biceps tendonitis.

(a) An inflammation of the tendon as it passes through the bicipital groove of the anterior humerus. Repeated irritation leads to micro-tearing and degenerative change. Vigorous lifting causing a chronically inflamed tendon can lead to a spontaneous rupture.

(b) Signs and Symptoms:

OUTLINE SHEET SCSC 2.7-1

MUSCULOSKELETAL SYSTEM – UPPER EXTREMITIES (CONT.)

1. The patient will complain of shoulder pain (pointing to the front of the shoulder) aggravated by lifting or overhead pushing and pulling.
2. There is local tenderness in the bicipital groove that is aggravated by resisting elbow flexion.
3. The patient may be able to describe a line of pain along the anterior humerus.
4. Discomfort is aggravated by abducting the arm (painful arc maneuver).
5. Rupture of the tendon is usually manifested by bulging in the antecubital fossa and a large ecchymosis along the inner aspect of the distal arm.
6. Strength of elbow flexion is usually intact
7. Patient may have biceps tendonitis after scoring positive to the Yergason test.

(c) Plan:

1. Ice
2. NSAIDs
3. No lifting or reaching over the shoulder, light duty
4. Confirm diagnosis with medical provider

5. Summary and Review

Utilize the knowledge of musculoskeletal system anatomy while assessing a patient with a musculoskeletal complaint

Utilize the knowledge of musculoskeletal system physiology while assessing a patient with a musculoskeletal complaint

Obtain history from patient with common orthopedic disorders

Perform an orthopedic examination

State signs and symptoms of common orthopedic disorders

OUTLINE SHEET SCSC 2.7-1

MUSCULOSKELETAL SYSTEM – UPPER EXTREMITIES (CONT.)

State treatments for common orthopedic disorders

State Red Flag criteria

JOB SHEET SCSC 2.7-3

UPPER EXTREMITIES

A. INTRODUCTION

Upon successful completion of this lesson the Trainee will be able to perform an upper extremity musculoskeletal system examination on a real or simulated patient (a person acting as a patient).

B. EQUIPMENT LIST: The primary instructor is responsible for checking that all of the below equipment is available, functional and in the lab before the lab is scheduled to begin:

1. Real or simulated patient (a person acting as a patient)
2. Cotton balls or cotton-tipped applicators
3. Tongue depressor
4. Reflex Hammer
5. Tuning Fork
6. Tape Measure

C. REFERENCES

1. Seidel’s Guide to Physical Examination, 8th Ed., Jane W. Ball, Joyce E. Dains, John A. Flynn, Barry S. Soloman, Rosalyn W. Stewart, Mosby, an imprint of Elsevier Inc., 2015
2. Bates’ Guide to Physical Examination and History Taking, 12th Ed., Lynn S. Bickley and Peter G. Szilagy, Wolters Kluwer, 2017, <https://STAT!Ref.com>
3. Essentials of Musculoskeletal Care, 5th Ed., April D. Armstrong and Mark C. Hubbard, AAOS, 2016; <https://Statref>

D. SAFETY PRECAUTIONS

1. Instructors, Trainees and visitors must comply with all general safety procedures that are posted in the lab environment or provided in the lesson plan.
2. There are no skill specific safety hazards for this Performance Test.
3. Review TTO procedures in the Safety/Hazard Awareness Notice.
4. Trainees will not practice if an instructor is not present
5. Trainees may not take equipment out of the lab
6. Trainees will follow universal precautions and wear proper PPE.

E. JOB STEPS

Trainee Instructions:

JOB SHEET SCSC 2.7-3

UPPER EXTREMITIES (CONT.)

1. The purpose of this assessment is to evaluate the Trainee’s knowledge of the practical application of conducting upper extremity musculoskeletal examination.
2. The Trainee must perform a complete physical examination of the upper extremity musculoskeletal system and explain each step as it is performed.
3. The Trainee has 20 minutes to complete this examination.
4. The Trainee is not allowed to use the reference in the performance of this assessment.
5. The Trainee will wear appropriate attire during the practice and actual assessment evaluation.

**AT MEDICAL REPRESENTATIVE DIRECTION, OBTAIN PATIENT HISTORY PERTAINING TO MUSCULOSKELETAL SYSTEM BY COMPLETING THE FOLLOWING STEPS:**

1. \*Ask patient’s chief complaint
2. \*Ask patient about onset of symptoms and pain. Specific MOI.
3. \*Ask about pain location, does it radiate or stay in place.
4. Ask about duration, does it come and go or is it constant.
5. Ask about the quality of the pain, what it feels like sharp, dull, ache etc.
6. Ask what makes it worse.
7. Ask what makes it better.
8. Ask if there is a time of day that their symptoms are better or worse.
9. \*Ask about where their pain is on the pain scale of (1-10).
10. Ask about any other symptoms they notice.
11. Ask about affect to activities of daily living
12. Gather patients past medical history, SAMPLE
13. Gather Surgical History

## JOB SHEET SCSC 2.7-3

## UPPER EXTREMITIES (CONT.)

14. Gather Family History
15. Gather Social History
16. Review of systems, minimum of constitutional questions

**AT MEDICAL REPRESENTATIVE DIRECTION, OBTAIN A GENERAL IMPRESSION PERTAINING TO MUSCULOSKELETAL SYSTEM BY COMPLETING THE FOLLOWING STEPS:**

1. \*Form General Impression
2. \*Obtain Vital Signs

**AT MEDICAL REPRESENTATIVE DIRECTION, PERFORM A WRIST AND HAND EXAMINATION BY COMPLETING THE FOLLOWING STEPS:**

1. Identify anatomical landmarks: Carpals, Metacarpals, PIP, MIP, DIP, scaphoid, thenar, hypothenar, ulna, radius, nerves
2. Inspect for alignment, edema, erythema, atrophy, hypertrophy, other deformities
3. \*Check ROM of fingers to flexion, extension, abduction and adduction
4. \*Check ROM of thumb to opposition, flexion and extension
5. \*Check ROM of wrist flexion and extension
6. Palpate for tenderness, crepitus, abnormalities and thickening palmar fascia
7. \*Test patient strength bilaterally, flexion, extension, flexor digitorum profundus, superficialis, thumb abduction and grip strength.
8. \*Test patient sensation bilaterally (if performed above with elbow do not repeat)
9. Test patient reflexes bilaterally(if performed above with elbow do not repeat)
10. \*Check pulses bilaterally

## JOB SHEET SCSC 2.7-3

## UPPER EXTREMITIES (CONT.)

**AT MEDICAL REPRESENTATIVE DIRECTION, PERFORM WRIST AND HAND SPECIAL TESTS BY COMPLETING THE FOLLOWING STEPS:**

1. Perform and explain Tinel's sign
2. Perform and explain Phalen maneuver

**AT MEDICAL REPRESENTATIVE DIRECTION, PERFORM AN ELBOW EXAMINATION BY COMPLETING THE FOLLOWING STEPS:**

1. Inspect elbows bilaterally for ecchymosis, effusion, edema, deformities
2. Identify anatomical structures: Humerus, Ulna, Radius, Epicondyles, Brachioradialis, Biceps Brachi, Triceps Brachi, Biceps Tendon, Ulnar Nerves
3. Palpate for tenderness, crepitus and abnormalities.
4. \*Check ROM for Elbow flexion, extension, forearm rotation (supination and pronation) and wrist flexion and extension
5. \*Test patient strength bilaterally, flexion, extension, rotation, and wrist flexion and extension
6. \*Test patient sensation bilaterally
7. Test patient reflexes bilaterally
8. \*Check pulses bilaterally and Cap Refill

**AT MEDICAL REPRESENTATIVE DIRECTION, PERFORM ELBOW SPECIAL TESTS BY COMPLETING THE FOLLOWING STEPS:**

1. Perform Varus test
2. Perform Valgus test
3. Perform Tinel's Sign test

JOB SHEET SCSC 2.7-3

UPPER EXTREMITIES (CONT.)

**AT MEDICAL REPRESENTATIVE DIRECTION, PERFORM A SHOULDER EXAMINATION BY COMPLETING THE FOLLOWING STEPS:**

1. Inspect shoulders bilaterally for symmetry, edema, effusion, deformity
2. Identify anatomical structures: SITS muscles, acromioclavicular joint, bicep tendon, scapula and clavicle
3. Palpate for tenderness, crepitus, deformities
4. \*Check ROM for flexion, extension, abduction, adduction, internal and external rotation
5. \*Test patient strength bilaterally
6. \*Test patient sensation bilaterally
7. Test patient reflexes bilaterally
8. \*Check pulses bilaterally

**AT MEDICAL REPRESENTATIVE DIRECTION, PERFORM SHOULDER SPECIAL TESTS BY COMPLETING THE FOLLOWING STEPS:**

1. Perform Drop Arm Test
2. Perform Apprehension Test
3. Perform Yergason Test

**AT MEDICAL REPRESENTATIVE DIRECTION, PRESENT FINDINGS BY COMPLETING THE FOLLOWING STEPS:**

1. \*Present findings of focused physical exam to provider
2. \*Document all history, findings interventions and procedures

## JOB SHEET SCSC 2.7-3

## UPPER EXTREMITIES (CONT.)

**AT MEDICAL REPRESENTATIVE DIRECTION, PROVIDE PATIENT EDUCATION AND TREATMENT BY COMPLETING THE FOLLOWING STEPS:**

1. \*Perform appropriate splinting and sling as required.
2. \*Distribute medication per provider's orders and with 5 rights
3. Provides reassurance and answer patient questions
4. Provide patient education and home therapy handouts
5. \*Document and provide duty status determination paperwork
6. Ensure patient understands need to follow up and/or referral procedures

OUTLINE SHEET SCSC 2.8-1

MUSCULOSKELETAL SYSTEM – NECK AND SPINE

A. INTRODUCTION

B. ENABLING OBJECTIVES

- 1.46 Utilize the knowledge of musculoskeletal system anatomy while assessing a patient with a musculoskeletal complaint
- 1.47 Utilize the knowledge of musculoskeletal system physiology while assessing a patient with a musculoskeletal complaint
- 1.48 Obtain history from patient with common orthopedic disorders
- 1.49 Perform an orthopedic examination
- 1.50 State signs and symptoms of common orthopedic disorders
- 1.51 State treatments for common orthopedic disorders
- 1.16 State Red Flag criteria

C. SCSC 2.8-1 MUSCULOSKELETAL SYSTEM – NECK AND SPINE TOPIC OUTLINE

- 1. Introduction to Musculoskeletal System – Neck and Spine
  - a. Without bones, you could not survive. You would be unable to perform movements such as walking or grasping, and the slightest blow to your head or chest could damage your brain or heart. Because the skeletal system forms the framework of the body, a familiarity with the names, shapes, and positions of individual bones will help you locate and name many other anatomical features. Movements such as throwing a ball, biking, and walking require interactions between bones and muscles. To understand how muscles produce different movements, from high fives to three-point shots, you will need to learn where the muscles attach on individual bones and what types of joints are involved. Together, the bones, muscles, and joints form an integrated system called the musculoskeletal system. Throughout this lesson you will not only learn about the musculoskeletal system but how to examine it and identify abnormalities. A working knowledge of the musculoskeletal system is crucial for the Corpsman’s tool box because it is the bread and butter of what we see and treat on a daily basis.
- 2. Identify the Anatomy and Physiology which make up the musculoskeletal system
  - a. Anatomy of the Spine

OUTLINE SHEET SCSC 2.8-1

MUSCULOSKELETAL SYSTEM – NECK AND SPINE (CONT.)

(1) Vertebral Column

- (a) The vertebral column, also called the spine, backbone, or spinal column, makes up about two-fifths of your total height and is composed of a series of bones called vertebrae.
- (b) The vertebral column, the sternum, and the ribs form the skeleton of the trunk of the body.
- (c) The vertebral column consists of bone and connective tissue; the spinal cord that it surrounds and protects consists of nervous and connective tissues.
- (d) The vertebral column functions as a strong, flexible rod with elements that can move forward, backward, and sideways, and rotate.
- (e) In addition to enclosing and protecting the spinal cord, it supports the head and serves as a point of attachment for the ribs, pelvic girdle, and muscles of the back and upper limbs.
- (f) The total number of vertebrae during early development is 33.
- (g) As a child grows, several vertebrae in the sacral and coccygeal regions fuse.
- (h) As a result, the adult vertebral column typically contains 26 vertebrae and are distributed as follows:
  - 1. 7 cervical vertebrae in the neck region.
  - 2. 12 thoracic vertebrae posterior to the thoracic cavity.
  - 3. 5 lumbar vertebrae supporting the lower back.
  - 4. 1 sacrum consisting of five fused sacral vertebrae.
  - 5. 1 coccyx usually consisting of four fused coccygeal vertebrae.

- (2) The cervical, thoracic, and lumbar vertebrae are movable, but the sacrum and coccyx are not.

(3) Normal Curves of the Vertebral Column

- (a) When viewed from the anterior or posterior, a normal adult vertebral column appears straight.

OUTLINE SHEET SCSC 2.8-1

MUSCULOSKELETAL SYSTEM – NECK AND SPINE (CONT.)

- (b) But when viewed from the side, it shows four slight bends called normal curves.
  - (c) Relative to the front of the body, the cervical and lumbar curves are convex (bulging out); the thoracic and sacral curves are concave (cupping in).
  - (d) The curves of the vertebral column increase its strength, help maintain balance in the upright position, absorb shocks during walking, and help protect the vertebrae from fracture.
  - (e) At about the third month after birth, when an infant begins to hold its head erect, the anteriorly convex cervical curve develops.
  - (f) The thoracic and sacral curves are called primary curves because they retain the original curvature of the embryonic vertebral column.
  - (g) The cervical and lumbar curves are known as secondary curves because they begin to form later, several months after birth.
- (4) Intervertebral Discs
- (a) Intervertebral discs are found between the bodies of adjacent vertebrae from the second cervical vertebra to the sacrum and account for about 25% of the height of the vertebral column.
  - (b) Each disc has an outer fibrous ring consisting of fibrocartilage called the annulus fibrosus and an inner soft, pulpy, highly elastic substance called the nucleus pulposus.
  - (c) The superior and inferior surfaces of the disc consist of a thin plate of hyaline cartilage.
  - (d) The discs form strong joints, permit various movements of the vertebral column, and absorb vertical shock.
  - (e) Under compression, they flatten and broaden.
  - (f) Decrease in vertebral height with age results from bone loss in the vertebral bodies and not a decrease in thickness of the intervertebral discs.
  - (g) Since intervertebral discs are avascular, the annulus fibrosus and nucleus pulposus rely on blood vessels from the bodies of vertebrae to obtain oxygen and nutrients and remove wastes.

OUTLINE SHEET SCSC 2.8-1

MUSCULOSKELETAL SYSTEM – NECK AND SPINE (CONT.)

- (h) Certain stretching exercises, such as yoga, decompress discs and increase general blood circulation, both of which speed up the uptake of oxygen and nutrients by discs and the removal of wastes.
- (5) Parts of a Typical Vertebra
- (a) Vertebrae in different regions of the spinal column vary in size, shape, and detail, but they are similar enough that we can discuss the structures (and the functions) of a typical vertebra.
  - (b) Vertebrae typically consist of:
    - 1. Vertebral Body
      - a. The vertebral body is the thick, disc-shaped anterior portion, and the weight-bearing part of a vertebra.
      - b. Its superior and inferior surfaces are roughened for the attachment of cartilaginous intervertebral discs.
      - c. The anterior and lateral surfaces contain nutrient foramina, openings through which blood vessels deliver nutrients and oxygen and remove carbon dioxide and wastes from bone tissue.
    - 2. Vertebral Arch
      - a. The vertebral arch extends posteriorly from the body of the vertebra; together, the vertebral body and the vertebral arch surround the spinal cord by forming the vertebral foramen.
      - b. The vertebral foramen contains:
        - (1) The spinal cord
        - (2) Adipose tissue
        - (3) Areolar connective tissue
        - (4) Blood vessels
      - c. Collectively, the vertebral foramina of all vertebrae form the vertebral (spinal) canal.

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MUSCULOSKELETAL SYSTEM – NECK AND SPINE (CONT.)

- d. The pedicles exhibit superior and inferior indentations called vertebral notches.
  - e. When the vertebral notches are stacked on top of one another, they form an opening between adjoining vertebrae on both sides of the column.
  - f. Each opening, called an intervertebral foramen, permits the passage of a single spinal nerve carrying information to and from the spinal cord.
3. Processes
- a. Seven processes arise from the vertebral arch.
  - b. A single spinous process (spine) projects posteriorly from the junction of the laminae.
  - c. These processes serve as points of attachment for muscles.
  - d. The remaining processes form joints with other vertebrae above or below.
  - e. The two superior articular processes of a vertebra articulate (form joints) with the two inferior articular processes of the vertebra immediately above them.
  - f. In turn, the two inferior articular processes of that vertebra articulate with the two superior articular processes of the vertebra immediately below them, and so on.
  - g. The articulating surfaces of the articular processes, which are referred to as facets, are covered with hyaline cartilage.
  - h. The articulations formed between the vertebral bodies and articular facets of successive vertebrae are termed intervertebral joints.
- b. Thorax
- (1) The term thorax refers to the entire chest region.
  - (2) The skeletal part of the thorax, the thoracic cage, is a bony enclosure formed by the sternum, ribs and their costal cartilages, and the bodies of the thoracic vertebrae.

OUTLINE SHEET SCSC 2.8-1

MUSCULOSKELETAL SYSTEM – NECK AND SPINE (CONT.)

- (3) The costal cartilages attach the ribs to the sternum.
- (4) The thoracic cage is narrower at its superior end and broader at its inferior end and is flattened from front to back.
- (5) It encloses and protects the organs in the thoracic and superior abdominal cavities, provides support for the bones of the upper limbs and plays a role in breathing.

c. Cervical Vertebrae

(1) General Information

- (a) Are smaller than all other vertebrae except those that form the coccyx.
- (b) Their vertebral arches, however, are larger.
- (c) All cervical vertebrae have three foramina: one vertebral foramen and two transverse foramina.
- (d) The vertebral foramina of cervical vertebrae are the largest in the spinal column because they house the cervical enlargement of the spinal cord.
- (e) Each cervical transverse process contains a transverse foramen through which the vertebral artery and its accompanying vein and nerve fibers pass.
- (f) The spinous processes of C2 through C6 are often bifid—that is, they branch into two small projections at the tips.

(2) The Atlas (C1)

- (a) The C1 is the first cervical vertebra inferior to the skull.
- (b) The atlas is a ring of bone with anterior and posterior arches and large lateral masses.
- (c) It lacks a body and a spinous process.
- (d) The superior surfaces of the lateral masses, called superior articular facets, are concave.
- (e) They articulate with the occipital condyles of the occipital bone to form the paired atlanto-occipital joints.

OUTLINE SHEET SCSC 2.8-1

MUSCULOSKELETAL SYSTEM – NECK AND SPINE (CONT.)

- (f) These articulations permit you to move your head to signify “yes”.
  - (g) The inferior surfaces of the lateral masses, the inferior articular facets, articulate with the second cervical vertebra.
  - (h) The transverse processes and transverse foramina of the atlas are quite large.
- (3) The second cervical vertebra (C2)
- (a) The axis, does have a vertebral body.
  - (b) A peg like process called the dens (= tooth) or odontoid process projects superiorly through the anterior portion of the vertebral foramen of the atlas.
  - (c) The dens makes a pivot on which the atlas and head rotate.
  - (d) This arrangement permits side to- side movement of the head, as when you move your head to signify “no”.
  - (e) The articulation formed between the anterior arch of the atlas and dens of the axis, and between their articular facets, is called the atlanto-axial joint.
  - (f) In some instances of trauma, the dens of the axis may be driven into the medulla oblongata of the brain.
  - (g) This type of injury is the usual cause of death from whiplash injuries.
- (4) The third through sixth cervical vertebrae (C3–C6)
- (a) Correspond to the structural pattern of the typical cervical vertebra previously described.
- (5) The seventh cervical vertebra (C7)
- (a) Called the vertebra prominens, is somewhat different.
  - (b) It has a large, nonbifid spinous process that may be seen and felt at the base of the neck, but otherwise is typical.
- (6) Thoracic vertebrae (T1–T12)
- (a) Are considerably larger and stronger than cervical vertebrae.

OUTLINE SHEET SCSC 2.8-1

MUSCULOSKELETAL SYSTEM – NECK AND SPINE (CONT.)

- (b) In addition, the spinous processes on T1 through T10 are long, laterally flattened, and directed inferiorly.
- (c) In contrast, the spinous processes on T11 and T12 are shorter, broader, and directed more posteriorly.
- (d) Compared to cervical vertebrae, thoracic vertebrae also have longer and larger transverse processes.
- (e) They are easily identified by their costal facets, which are articular surfaces for the ribs.
- (f) The feature of the thoracic vertebrae that distinguishes them from other vertebrae is that they articulate with the ribs.
- (g) Except for T11 and T12, the transverse processes of thoracic vertebrae have costal facets that articulate with the tubercles of the ribs.
- (h) The vertebral bodies of thoracic vertebrae have articular surfaces that form articulations with the heads of the ribs.
- (i) The articular surfaces on the vertebral bodies are called either facets or demifacets.
- (j) A facet is formed when the head of a rib articulates with the body of one vertebra.
- (k) A demifacet is formed when the head of a rib articulates with two adjacent vertebral bodies.
- (l) Each side of the vertebral body T1 has a superior facet for the first rib and an inferior demifacet for the second rib.
- (m) On each side of the vertebral body of T2–T8, there is a superior demifacet and an inferior demifacet as ribs two through nine articulate with two vertebrae, and T10–T12 have a facet on each side of the vertebral body for ribs 10–12.
- (n) These articulations between the thoracic vertebrae and ribs, called vertebrocostal joints, are distinguishing features of thoracic vertebrae.
- (o) Movements of the thoracic region are limited by the attachment of the ribs to the sternum.

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MUSCULOSKELETAL SYSTEM – NECK AND SPINE (CONT.)

(7) The lumbar vertebrae (L1–L5)

- (a) The largest and strongest of the unfused bones in the vertebral column because the amount of body weight supported by the vertebrae increases toward the inferior end of the backbone.
- (b) The superior articular processes are directed medially instead of superiorly, and the inferior articular processes are directed laterally instead of inferiorly.
- (c) The spinous processes are quadrilateral in shape, are thick and broad, and project nearly straight posteriorly.
- (d) The spinous processes are well adapted for the attachment of the large back muscles.

(8) Sacrum

- (a) The sacrum is a triangular bone formed by the union of five sacral vertebrae (S1–S5).
- (b) Positioned at the posterior portion of the pelvic cavity medial to the two hip bones, the sacrum serves as a strong foundation for the pelvic girdle.
- (c) The female sacrum is shorter, wider, and more curved between S2 and S3 than the male sacrum.
- (d) The concave anterior side of the sacrum faces the pelvic cavity. It is smooth and contains four transverse lines (ridges) that mark the joining of the sacral vertebral bodies.
- (e) At the ends of these lines are four pairs of anterior sacral foramina.
- (f) The lateral portion of the superior surface of the sacrum contains a smooth surface called the sacral ala, which is formed by the fused transverse processes of the first sacral vertebra (S1).
- (g) The convex, posterior surface of the sacrum contains a median sacral crest, the fused spinous processes of the upper sacral vertebrae; a lateral sacral crest, the fused transverse processes of the sacral vertebrae; and four pairs of posterior sacral foramina.
- (h) These foramina connect with anterior sacral foramina to allow passage of nerves and blood vessels.

OUTLINE SHEET SCSC 2.8-1

MUSCULOSKELETAL SYSTEM – NECK AND SPINE (CONT.)

- (i) The narrow inferior portion of the sacrum is known as the apex.
  - (j) The broad superior portion of the sacrum is called the base.
  - (k) The anteriorly projecting border of the base, called the sacral promontory, is one of the points used for measurements of the pelvis.
  - (l) On both lateral surfaces the sacrum has a large ear-shaped auricular surface that articulates with the ilium of each hip bone to form the sacroiliac joint.
  - (m) Posterior to the auricular surface is a roughened surface, the sacral tuberosity, which contains depressions for the attachment of ligaments.
  - (n) The sacral tuberosity unites with the hip bones to form the sacroiliac joints.
  - (o) The superior articular processes of the sacrum articulate with the inferior articular processes of the fifth lumbar vertebra, and the base of the sacrum articulates with the body of the fifth lumbar vertebra to form the lumbosacral joint.
- (9) Coccyx
- (a) The coccyx, like the sacrum, is triangular in shape.
  - (b) It is formed by the fusion of usually four coccygeal vertebrae, as Co1–Co4.
  - (c) The dorsal surface of the body of the coccyx contains two long coccygeal cornua that are connected by ligaments to the sacral cornua.
  - (d) The coccygeal cornua are the pedicles and superior articular processes of the first coccygeal vertebra.
  - (e) They are on the lateral surfaces of the coccyx, formed by a series of transverse processes; the first pair are the largest.
  - (f) The coccyx articulates superiorly with the apex of the sacrum.
  - (g) In females, the coccyx points inferiorly to allow the passage of a baby during birth; in males, it points anteriorly.
3. Obtain history from patient with common musculoskeletal disorders.

OUTLINE SHEET SCSC 2.8-1

MUSCULOSKELETAL SYSTEM – NECK AND SPINE (CONT.)

- a. Subjective: When obtaining a history for any musculoskeletal problems, determine if there has been an acute trauma or strain, or if this is a chronic condition. Use your PQRST acronym discussed in previous sections. Whatever musculoskeletal complaint the patient has, make sure to ask questions on the following topics:

(1) Chief Complaint (CC) - aches, weakness - Have you had aches like this before? If it's a new type ailment, refer to medical officer.

(2) History of present illness (HPI)

(a) Joint symptoms

1. Character: stiffness or limitation of movement, change in size or contour, swelling or redness, constant pain or pain with particular motion, unilateral or bilateral involvement, interference with daily activities, joint locking or giving way
2. Associated events: time of day, activity, specific movements, injury, strenuous activity, weather
3. Temporal factors: change in frequency or character of episodes, better or worse as day progresses, nature of onset (sudden or gradual)
4. Efforts to treat: exercise, rest, weight reduction, physical therapy, heat, ice, braces or splints
5. Medications: nonsteroidal anti-inflammatory drugs (NSAIDs), acetaminophen, biologic modifiers and other immune-suppressants, corticosteroids, topical analgesics; glucosamine, chondroitin, hyaluronic acid, complementary therapies.

(b) Muscular symptoms

1. Character: limitation of movement, weakness or fatigue, paralysis, tremor, tic, spasms, clumsiness, wasting, aching or pain
2. Precipitating factors: injury, strenuous activity, sudden movement, stress
3. Efforts to treat: heat, ice, splints, rest, massage
4. Medications: muscle relaxants, statins, NSAIDs

OUTLINE SHEET SCSC 2.8-1

MUSCULOSKELETAL SYSTEM – NECK AND SPINE (CONT.)

(c) Skeletal symptoms

1. Character: difficulty with gait or limping; numbness, tingling, or pressure sensation; pain with movement, crepitus; deformity or change in skeletal contour
2. Associated event: injury, recent fractures, strenuous activity, sudden movement, stress; postmenopause
3. Efforts to treat: rest, splints, chiropractic, acupuncture
4. Medications: hormone therapy, calcium; calcitonin, bisphosphonates

(d) Injury

1. Sensation at time of injury: click, pop, tearing, numbness, tingling, catching, locking, grating, snapping, warmth or coldness, ability to bear weight
2. Mechanism of injury: direct trauma, overuse, sudden change of direction, forceful contraction, overstretch
3. Pain: location, type, onset (sudden or gradual), aggravating or alleviating factors, position of comfort
4. Swelling: location, timing (with activity or injury)
5. Efforts to treat: rest, ice, heat, splints
6. Medications: analgesics, NSAIDS

(e) Back pain

1. Abrupt or gradual onset, better or worse with activity
2. Character of pain and sensation: tearing, burning, or steady ache; tingling or numbness; location and distribution (unilateral or bilateral), radiation to buttocks, groin, or legs; triggered by coughing or sneezing and sudden movements
3. Associated event: trauma, lifting of heavy weights, long distance driving, sports activities, change in posture or deformity

OUTLINE SHEET SCSC 2.8-1

MUSCULOSKELETAL SYSTEM – NECK AND SPINE (CONT.)

- 4. Efforts to treat: rest, avoid standing or sudden movements, chiropractic, acupuncture
- 5. Medications: muscle relaxants, analgesics, NSAIDs

(3) Past Medical History

- (a) Trauma: nerves, soft tissue, bones, joints; residual problems; bone infection
- (b) Surgery on joint or bone; amputation, arthroscopy
- (c) Chronic illness: cancer, arthritis, sickle cell disease, hemophilia, osteoporosis, renal or neurologic disorder
- (d) Skeletal deformities or congenital anomalies

(4) Family History

- (a) Congenital abnormalities of hip or foot
- (b) Scoliosis or back problems
- (c) Arthritis: rheumatoid, osteoarthritis, ankylosing spondylitis, gout
- (d) Genetic disorders: osteogenesis imperfecta, skeletal dysplasia, rickets, hypophosphatemia, hypercalciuria

(5) Personal and Social History

- (a) Employment: past and current, lifting and potential for unintentional injury, repetitive motions, typing/computer use, safety precautions, use of spinal support, chronic stress on joints
- (b) Exercise: extent, type, and frequency; weight bearing; stress on specific joints; overall conditioning; sport (level of competition, type of shoes and athletic gear); warm-up and cool-down routines with exercise
- (c) Functional abilities: personal care (eating, bathing, dressing, grooming, elimination); other activities (housework, walking, climbing stairs, caring for pet); use of prosthesis
- (d) Weight: recent gain, overweight or underweight for body frame

OUTLINE SHEET SCSC 2.8-1

MUSCULOSKELETAL SYSTEM – NECK AND SPINE (CONT.)

- (e) Height: maximum height achieved, any changes
- (f) Nutrition: amount of calcium, vitamin D, calories, and protein
- (g) Tobacco or alcohol use

4. Perform thorough musculoskeletal examination

- a. When performing a musculoskeletal examination there are key elements which need to be assessed.

(1) Inspection

- (a) Inspect the anterior, posterior, and lateral aspects of the patient's posture.
- (b) Observe the patient's ability to stand erect, symmetry of body parts, and alignment of the extremities.
- (c) Note any lordosis, kyphosis (overcurvature of the thoracic vertebrae), or scoliosis (curved from side to side) of the spine.
- (d) Inspect the skin and subcutaneous tissues overlying the articular structures for discoloration, swelling, and masses.
- (e) Observe the extremities for overall size, gross deformity, bony enlargement, alignment, contour, and symmetry of length and position.
- (f) Expect to find bilateral symmetry in length, circumference, alignment, and the position.
- (g) Inspect the muscles for gross hypertrophy or atrophy, fasciculations, and spasms.
- (h) Muscle size should approximate symmetry bilaterally.
- (i) Fasciculation (muscle twitching) occurs after injury to a muscle's motor neuron.
- (j) Muscle wasting occurs after injury as a result of pain, disease of the muscle, or damage to the motor neuron.

(2) Palpation

- (a) Palpate any bones, joints, tendons, and surrounding muscles if symptomatic.

OUTLINE SHEET SCSC 2.8-1

MUSCULOSKELETAL SYSTEM – NECK AND SPINE (CONT.)

- (b) Palpate inflamed joints last.
  - (c) Note any heat, tenderness, swelling, crepitus, pain, and resistance to movement.
  - (d) No discomfort should occur when you apply pressure to bones or joints.
  - (e) Muscle tone should be firm, not hard or doughy.
  - (f) Synovial thickening can sometimes be felt in joints that are close to the skin surface when the synovium is edematous or hypertrophied because of inflammation.
  - (g) Crepitus (a grating sound or sensation) can be felt when two irregular bony surfaces rub together as a joint moves, when two rough edges of a broken bone rub together, or with the movement of a tendon inside the tendon sheath when tenosynovitis is present.
- (3) Range of Motion and Muscle Tone
- (a) Examine both the active and passive range of motion for each major joint and its related muscle groups.
  - (b) Muscle tone is often evaluated simultaneously.
  - (c) Allow adequate space for the patient to move each muscle group and joint through its full range.
  - (d) Instruct the patient to move each joint through its range of motion as detailed in specific joint and muscle sections.
  - (e) Pain, limitation of motion, spastic movement, joint instability, deformity, or contracture suggest a problem with the joint, related muscle group, or nerve supply.
  - (f) Ask the patient to relax and allow you to passively move the same joints until the end of the range of motion is felt.
  - (g) Do not force the joint if there is pain or muscle spasm.
  - (h) Muscle tone may be assessed by feeling the resistance to passive stretch.
  - (i) During passive range of motion, the muscles should have slight tension.

OUTLINE SHEET SCSC 2.8-1

MUSCULOSKELETAL SYSTEM – NECK AND SPINE (CONT.)

- (j) Passive range of motion often exceeds active range of motion by 5 degrees.
- (k) Range of motion with active and passive maneuvers should be equal between contralateral joints.
- (l) Discrepancies between active and passive range of motion may indicate true muscle weakness or a joint disorder.
- (m) No crepitation or tenderness with movement should be apparent. Note the specific location of tenderness when present.
- (n) Spastic muscles are harder to put through the range of motion. Measurements may vary if the muscle tested relaxes with gentle persistence.

(4) Muscle Strength

- (a) Evaluating the strength of each muscle group is considered part of the neurologic examination.
- (b) This is generally integrated with examination of the associated joint for range of motion.
- (c) Ask the patient first to contract the muscle you indicate by extending or flexing the joint and then to resist as you apply force against that muscle contraction.
- (d) Alternatively, tell the patient to push against your hand to feel the resistance.
- (e) Compare the muscle strength bilaterally.
- (f) Expect muscle strength to be bilaterally symmetric with full resistance to opposition.
- (g) Full muscle strength requires complete active range of motion.

b. Examination of the Spine

- (1) Inspect the patient's neck from both the anterior and posterior position, observing for alignment of the head with the shoulders and symmetry of the skinfolds and muscles.
- (2) Expect the cervical spine curve to be concave with the head erect and in appropriate alignment.

OUTLINE SHEET SCSC 2.8-1

MUSCULOSKELETAL SYSTEM – NECK AND SPINE (CONT.)

- (3) Palpate the posterior neck, cervical spine, and paravertebral, trapezius, and sternocleidomastoid muscles.
- (4) The muscles should have good tone and be symmetric in size, with no palpable tenderness or muscle spasm.
- (5) Cervical Spine
  - (a) Evaluate by asking the patient to perform the following movements:
  - (b) Bend the head forward, chin to the chest. Expect flexion of 45 degrees.
  - (c) Bend the head backward, chin toward the ceiling. Expect extension of 45 degrees.
  - (d) Bend the head to each side, ear to each shoulder. Expect lateral bending of 40 degrees.
  - (e) Turn the head to each side, chin to shoulder. Expect rotation of 70 degrees.
- (6) Thoracic and Lumbar Spine
  - (a) Major landmarks of the back include each spinal process of the vertebrae (C7 and T1 are usually most prominent), the scapulae, iliac crests, and paravertebral muscles.
  - (b) Expect the head to be positioned directly over the gluteal cleft and the vertebrae to be straight as indicated by symmetric shoulder, scapular, and iliac crest heights.
  - (c) The curve of the thoracic spine should be convex.
  - (d) The curve of the lumbar spine should be concave.
  - (e) The knees and feet should be in alignment with the trunk, pointing directly forward.
  - (f) With the patient standing erect, palpate along the spinal processes and paravertebral muscles

OUTLINE SHEET SCSC 2.8-1

MUSCULOSKELETAL SYSTEM – NECK AND SPINE (CONT.)

- (g) Percuss for spinal tenderness, first by tapping each spinal process with one finger and then by percussing each side of the spine along the paravertebral muscles with the ulnar aspect of your fist.
- (h) No muscle spasm or spinal tenderness with palpation or percussion should be elicited.
- (i) Ask the patient to bend forward slowly and touch the toes while you observe from behind. Inspect the spine for unexpected curvature.
- (j) The patient's back should remain symmetrically flat as the concave curve of the lumbar spine becomes convex with forward flexion.
- (k) A lateral curvature or rib hump should make you suspect a medical condition
- (l) Evaluate range of motion by asking the patient to perform the following movements:
  1. Bend forward at the waist and, without bending the knees, try to touch the toes. Expect flexion of 75 to 90 degrees
  2. Bend back at the waist as far as possible. Expect hyperextension of 30 degrees.
  3. Bend to each side as far as possible. Expect lateral bending of 35 degrees bilaterally.
- (m) Swing the upper trunk from the waist in a circular motion front to side to back to side while you stabilize the pelvis.
- (n) Expect rotation of the upper trunk 30 degrees forward and backward
- (7) Lower Spine Assessment
  - (a) The straight leg raising test is used to test for nerve root irritation or lumbar disk herniation most commonly seen at the L4, L5, and S1 levels.
    1. Have the patient lie supine with the neck slightly flexed. Ask the patient to raise the leg, keeping the knee extended
    2. No pain should be felt below the knee with leg raising.
    3. Radicular pain below the knee may be associated with disk herniation.

OUTLINE SHEET SCSC 2.8-1

MUSCULOSKELETAL SYSTEM – NECK AND SPINE (CONT.)

4. Flexion of the knee often eliminates the pain with leg raising.
  5. Repeat the procedure on the unaffected leg.
  6. Crossover pain in the affected leg with this maneuver is more indicative of sciatic nerve impingements.
- (b) The femoral stretch test or hip extension test is used to detect inflammation of the nerve root at the L1, L2, L3, and sometimes L4 level.
1. Have the patient lie prone and extend the hip.
  2. No pain is expected.
  3. The presence of pain on extension is a positive sign of nerve root irritation.
5. List signs and symptoms and treatments of common musculoskeletal disorders
- a. Septic Arthritis
    - (1) Definition
      - (a) Septic arthritis is a highly destructive form of joint disease most often caused by hematogenous spread of organisms from a distant site of infection.
      - (b) Direct penetration of the joint as a result of trauma or surgery and spread from adjacent osteomyelitis may also cause bacterial arthritis.
      - (c) Any joint in the body may be affected.
    - (2) Synonyms
      - (a) Infectious arthritis
      - (b) Bacterial arthritis
      - (c) Pyogenic arthritis
    - (3) Physical Findings & Clinical Presentation

OUTLINE SHEET SCSC 2.8-1

MUSCULOSKELETAL SYSTEM – NECK AND SPINE (CONT.)

- (a) Hallmark: acute onset of monoarticular joint pain, erythema, heat, and immobility.
  - (b) Limited range of motion of the joint.
  - (c) Effusion, with varying degrees of erythema and increased warmth around the joint.
  - (d) Single joint affected in 80% to 90% of cases of nongonococcal arthritis.
  - (e) Gonococcal dermatitis-arthritis syndrome.
    - 1. Typical pattern is a migratory polyarthritis or tenosynovitis.
    - 2. Small pustules on the trunk or extremities.
  - (f) Febrile patient at presentation.
  - (g) Most commonly affected joints in adult: knee and hip, but any joint may be involved; in children: hip.
- (4) Differential Diagnosis
- (a) Gout.
  - (b) Pseudogout.
  - (c) Trauma.
  - (d) Hemarthrosis.
  - (e) Rheumatic fever.
  - (f) Adult or juvenile rheumatoid arthritis.
  - (g) Spondyloarthropathies such as reactive arthritis (Reiter’s syndrome).
  - (h) Osteomyelitis.
  - (i) Viral arthritides.
  - (j) Septic bursitis.
  - (k) Lyme disease caused by *Borrelia burgdorferi*.

## OUTLINE SHEET SCSC 2.8-1

## MUSCULOSKELETAL SYSTEM – NECK AND SPINE (CONT.)

## (5) Workup

- (a) Joint aspiration, Gram stain, and culture of the synovial fluid.
- (b) Immediate arthrocentesis before other studies are undertaken or antibiotics instituted.
- (c) Synovial fluid should be evaluated at bedside and then sent for lab evaluation.

## (6) Laboratory Tests

- (a) Joint fluid analysis.
  - 1. Synovial fluid leukocyte count is usually elevated  $>50,000$  cells/mm<sup>3</sup> with  $> 80\%$  polymorphonuclear cells.
  - 2. Counts are highly variable, with similar findings in gout, pseudogout, or rheumatoid arthritis. Lower WBC counts can occur in joint replacement, disseminated gonococcal disease, and peripheral leukopenia.
  - 3. Synovial fluid glucose or protein is not helpful because results are not specific for septic arthritis.
  - 4. The differential diagnosis of synovial fluid abnormalities is described in Section IV.
  - 5. PCR testing: useful for detection of uncommon organisms (e.g., Lyme disease).
  - 6. Crystal analysis: septic arthritis can coexist with crystal arthropathy; therefore, the presence of crystals does not preclude a diagnosis of septic arthritis.
- (b) Blood cultures: positive in 25% to 50% of patients with septic arthritis.
- (c) Culture of possible extra-articular sources of infection.
- (d) Elevated peripheral WBC count, ESR (nonspecific), C-reactive protein (CRP) (nonspecific).
- (e) When elevated, ESR and CRP may be useful to monitor therapeutic response.

OUTLINE SHEET SCSC 2.8-1

MUSCULOSKELETAL SYSTEM – NECK AND SPINE (CONT.)

- (f) If gonococcus is suspected, perform nucleic acid amplification tests (NAATs) on synovial fluid.

(7) Imaging Studies

- (a) Radiograph of the affected joint: useful to rule out osteomyelitis, fractures, chondrocalcinosis, or inflammatory arthritis.
- (b) MRI: findings that suggest an acute intraarticular infection include the combination of bony erosions with marrow edema.
- (c) CT scan: useful for early diagnosis of infections of the spine, hips, and sternoclavicular and sacroiliac joints.
- (d) Ultrasound: can be useful for detecting effusions in joints that are more difficult to examine (e.g., hip).

(8) Treatment

(a) Nonpharmacologic Therapy

1. Affected joints aspirated daily to remove necrotic material and to follow serial WBC counts and cultures.
2. If no resolution with IV antibiotics and closed drainage: open debridement and lavage, particularly in nongonococcal infections.
3. Prevention of contractures:
  - a. After acute stage of inflammation, range-of-motion exercises of the affected joint.
  - b. Physical therapy helpful.

(b) Acute General Rx

1. IV antibiotics immediately after joint aspiration and Gram stain of the synovial fluid.
2. Empiric antibiotic therapy is based on organism found on Gram stain of synovial fluid:
  - a. Gram-positive cocci: vancomycin: 15 to 20 mg/kg IV q8 to 12h. Keep trough levels at 15 to 20 mcg/ml.

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MUSCULOSKELETAL SYSTEM – NECK AND SPINE (CONT.)

- b. Gram-negative cocci: ceftriaxone: 1 to 2 g IV q day in adults.
- c. Gram-negative rods: ceftriaxone, cefepime: 1 to 2 g IV q8 to 12 h in adults, piperacillin-tazobactam: 4-5 g q6h. Aztreonam or fluoroquinolones can be used in patients with allergy to penicillin or cephalosporins.
- d. Negative Gram stain: vancomycin plus either cefepime or a carbapenem such as meropenem: 1 g IV q8h in adults or ertapenem.

b. Compartment Syndrome

(1) Definition

- (a) Compartment syndrome is a condition that occurs when elevated pressure within a confined space compromises circulation and results in ischemia and end organ damage (i.e., tissue necrosis).
- (b) Acute compartment syndrome is a surgical emergency necessitating prompt diagnosis and intervention.

(2) Pathophysiology

- (a) Compartment syndrome occurs when the pressure within a compartment limits blood flow and results in tissue ischemia and necrosis.
- (b) The perfusion pressure is defined as the difference between the diastolic and intracompartmental pressures.
- (c) Under normal physiologic conditions, tissue perfusion decreases as intracompartmental pressure increases.
- (d) Eventually, the pressure within the compartment exceeds capillary pressure and results in capillary bed collapse, venous congestion, and tissue hypoperfusion.
- (e) Local tissue hypoperfusion results in hypoxia and cell death.
- (f) Tissue perfusion has been shown to significantly decrease with intracompartmental pressures between 10 and 20 mm Hg.
- (g) Decreased tissue perfusion can result in reversible neuropraxia within 1 hour.

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MUSCULOSKELETAL SYSTEM – NECK AND SPINE (CONT.)

- (h) Cell death, myonecrosis, and other irreversible changes can occur within 4-6 hours.
- (i) A variety of clinical conditions have been associated with the development of compartment syndrome:
  1. Conditions that increase the volume within a compartment, such as bleeding from fracture, vascular injury, or diathesis.
  2. Other causes of significant soft-tissue swelling include reperfusion injury (e.g., following embolectomy or arterial bypass grafting), crush injury, high-energy soft-tissue injury (e.g., gunshot or ballistic injury), thermal or electrical burn injuries, and extravasation of intravenous fluids, injection of recreational drugs, massive fluid resuscitation, and snake bites.
  3. Conditions that decrease the volume of a compartment via external forces, such as tight external dressings (e.g., fracture casts/splints), prolonged downtime, or external pressure seen in sedated or comatose patients who lie on an extremity for a prolonged period (e.g., drug overdose, ICU patients, and prolonged surgical procedures).

(3) Physical Findings & Clinical Presentation

- (a) Signs and symptoms are usually apparent but can be unreliable in certain circumstances and may lead to delayed or missed diagnosis.
- (b) Acute compartment syndrome can develop within hours; therefore, serial examinations are critical for patients with high risk.
- (c) Patients with tense, painful compartments are considered to have acute compartment syndrome. In the majority of cases, compartment syndrome is a clinical diagnosis based on history and examination.
- (d) The diagnosis may be confirmed with the use of intracompartmental pressure-measuring devices in the setting of comatose or unresponsive patients and in clinically equivocal cases.
- (e) Clinical signs and symptoms of compartment syndrome include:
  1. Pain out of proportion to a given injury or worsening pain despite adequate or increasing analgesia requirement (earliest sign).
  2. Pain with passive stretch of the muscles within the compartment.

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MUSCULOSKELETAL SYSTEM – NECK AND SPINE (CONT.)

3. Patients typically endure constant, deep pain that is severe and located to the compartment with passive stretch of the musculature.
  4. Many trauma patients will complain of pain with any movement of the affected extremity, and it may be useful for providers to attempt to distract patients while testing for pain with passive stretch.
  5. Tingling or pins and needles or reduced sense of touch or sensation within the distribution of the nerve(s) traversing the compartment.
  6. Muscle weakness is a late finding suggestive of permanent muscle damage.
  7. Capillary refill can be sluggish or normal.
  8. Palpable peripheral pulses may be present even in late stages of the disease process due to collateral blood flow and reconstitution distal to the compartment of concern.
  9. Pediatric patients may demonstrate agitation, anxiety, and increasing analgesia requirement (the 3 A's).
  10. Comatose, nonresponsive, or unreliable patients may require intracompartmental pressure measurements.
  11. Compartment syndrome can develop in the setting of an open fracture.
- (4) Diagnosis: The diagnosis of compartment syndrome is based on clinical signs and symptoms with intracompartmental pressure measurements being reserved for comatose, unreliable, or nonresponsive patients.
- (5) Differential Diagnosis
- (a) Physiologic soft-tissue edema or swelling
  - (b) Muscle strains or contusion
  - (c) Cellulitis
  - (d) Gangrene
  - (e) Peripheral vascular injury

OUTLINE SHEET SCSC 2.8-1

MUSCULOSKELETAL SYSTEM – NECK AND SPINE (CONT.)

- (f) Necrotizing fasciitis
  - (g) Stress fractures
  - (h) Deep vein thrombosis and thrombophlebitis
  - (i) Tendinitis
  - (j) Tarsal tunnel or posterior ankle syndrome
  - (k) Popliteal artery impingement
  - (l) Claudication
  - (m) Tumor
  - (n) Venous insufficiency
- (6) Laboratory Tests
- (a) Diagnosis is based on clinical findings and intracompartmental pressures as needed.
  - (b) Laboratory values are not useful in the diagnosis of compartment syndrome but are important for other diagnoses or associated conditions.
  - (c) The exception to this is an INR or a coagulation panel in patients on anticoagulation (e.g., fall while on Coumadin).
    - 1. INR/PT and PTT to assess coagulation profile and bleeding diathesis
    - 2. CBC with differential for evaluation of infection
    - 3. Creatine phosphokinase (CK) levels, which can rise as muscle injury develops (e.g., crush injury)
    - 4. Metabolic panel for the assessment of electrolytes and renal function
    - 5. Urinalysis for rhabdomyolysis
    - 6. Urine and serum myoglobin levels

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MUSCULOSKELETAL SYSTEM – NECK AND SPINE (CONT.)

(7) Imaging Studies

- (a) Radiography of the affected extremity should be obtained to evaluate for fracture or foreign body.
- (b) Direct intracompartmental pressure measurement can be obtained as needed using handheld manometer, wick or slit catheter technique, or a simple needle manometer system.
- (c) Compartment syndrome is diagnosed or confirmed when the difference between diastolic blood pressure and compartment pressure ( $\Delta$  pressure) is  $\leq 30$  mm Hg.
- (d) Ultrasonography or Doppler ultrasonography can be used to rule out deep vein thrombosis and evaluate blood flow to the extremity.
- (e) Arteriography can be used to evaluate for arterial injury as well as blood flow within a compartment.
- (f) Near-infrared spectroscopy and technetium-99m methoxyisobutylisonitrile scintigraphy can also be used.

(8) Treatment

(a) Acute General Rx

- 1. Analgesics for pain control.
- 2. Advanced trauma life support (hypotension can worsen tissue perfusion and ischemia).
- 3. Remove circumferential dressings, cast, and all external pressure generators.
- 4. The affected extremity should be elevated above the level of the heart to aid in resolution of swelling.
- 5. Emergent fasciotomies and thorough debridement of nonviable tissue is the standard of care.
- 6. This should be performed within 4-6 hours of symptom onset.
- 7. Measurement of compartment pressure is not necessary to perform fasciotomy if clinical suspicion is high.

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MUSCULOSKELETAL SYSTEM – NECK AND SPINE (CONT.)

8. Concomitant fractured bones should be stabilized with plating, external fixation, or intramedullary nailing.

(b) Chronic Rx

1. Patients should return to the operating room every 48 hours to assess for tissue viability and repeat debridement as needed.
2. A negative pressure wound therapy system may be placed over fasciotomy wounds with delayed wound closure and skin grafting performed as needed.
3. Opposite sheet and boot lace techniques may also be used for fasciotomy site closure.
4. Local wound care should be emphasized to decrease the risk of infection.

(9) Disposition

- (a) With early diagnosis and prompt intervention, the prognosis and functional outcomes are excellent.
- (b) The following are sequelae of delayed or undiagnosed compartment syndrome:
  1. Myonecrosis
  2. Permanent nerve damage and paralysis
  3. Muscle contracture (e.g., Volkmann’s contracture in the forearm)
  4. Gangrene
  5. Infection and possible sepsis
  6. Amputation
  7. Rhabdomyolysis and possible renal failure
  8. Cardiac arrhythmias and possible death from reperfusion injury and electrolyte abnormalities

OUTLINE SHEET SCSC 2.8-1

MUSCULOSKELETAL SYSTEM – NECK AND SPINE (CONT.)

- (10) Referral: Patients with suspected compartment syndrome should be promptly referred to an orthopedic and general surgeon.

c. Cervical Strain

(1) Definition

- (a) Cervical strain is a common, usually self-limiting condition.
- (b) By strict definition, an acute cervical strain is a muscle injury in the neck, whereas the term sprain generally refers to a ligamentous injury.
- (c) These terms are often used interchangeably, however, by both the medical profession and the lay public.
- (d) Moreover, because neither physical examination nor imaging can distinguish between muscle and ligament injuries in the deeply located soft-tissue structures of the neck, the term cervical strain includes ligamentous injuries of the facet joints and/or intervertebral disks.
- (e) Regardless which soft-tissue structures have been injured, the diagnostic and treatment protocols are similar:
  - 1. Evaluate the patient to identify unstable injuries
  - 2. Evaluate the patient to identify neurologic deficits and then provide appropriate treatment.
- (f) A whiplash mechanism (acceleration-deceleration of the neck with rapid flexion-extension) occurs commonly as a result of motor vehicle accidents.
- (g) The classic mechanism is a stopped car that is struck from behind by another vehicle.
- (h) These injuries may cause prolonged disability despite no apparent pathologic process.
- (i) The cause may be a combination of a ligament/muscle injury and symptom amplification.
- (j) On occasion, severe injuries result in definite instability patterns and/or cervical disk displacements.

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MUSCULOSKELETAL SYSTEM – NECK AND SPINE (CONT.)

- (k) The concept of symptom amplification should not be advanced until after a thorough history, physical examination, and appropriate imaging studies have been performed.
- (2) Synonym: Neck Sprain
- (3) Clinical Symptoms
- (a) Cervical pain may follow an incident of trauma or may be spontaneous in onset.
  - (b) Non-radicular, non-focal neck pain, noted anywhere from the base of the skull to the cervicothoracic junction, is most common.
  - (c) Patients may also have pain in the region of the sternocleidomastoid muscles and/or the trapezius muscles.
  - (d) Pain is often worse with motion and may be accompanied by paraspinal spasm.
  - (e) Occipital headaches may occur in the early phase and may persist for months.
  - (f) Pain following trauma often persists longer than pain following strains or sprains of spontaneous onset.
  - (g) Patients may report increased irritability, fatigue, sleep disturbances, and difficulty concentrating.
  - (h) Work tolerance may be impaired.
- (4) Physical Examination
- (a) Examination may reveal areas of tenderness in the paraspinous muscles, trapezii, sternocleidomastoid muscles, spinous processes, interspinous ligaments, and/or the medial border of the scapula.
  - (b) Limited motion is common and may involve rotation, lateral bending, and/or flexion and extension.
  - (c) Pain is often noted at the extremes of motions.
  - (d) The neurologic examination is usually normal.

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MUSCULOSKELETAL SYSTEM – NECK AND SPINE (CONT.)

(5) Diagnostic Tests

- (a) AP, lateral, and open-mouth (odontoid) radiographs are necessary if the patient has a history of trauma or associated neurologic deficit or if the patient is elderly.
- (b) All seven cervical vertebrae must be seen.
- (c) Anterior displacement of the pharyngeal air shadow indicates soft-tissue swelling that may develop following spinal fracture, injury to the intervertebral disk or anterior longitudinal ligament, or injury at the occipitocervical level.
- (d) The presence of precervical swelling mandates a specialty consultation to assess the numerous possible causes.
- (e) In normal adults, the width of the prevertebral soft tissue at the level of C3 should not exceed one third the width of the C3 vertebral body.
- (f) The normal lordotic curve of the cervical spine may be straightened or reversed as a result of muscle spasm, but this finding is also observed in approximately 10% of normal adults.
- (g) Preexisting degenerative changes may be noted; they are most commonly age related and occur most frequently at C5-6 or C6-7.
- (h) If the patient has severe pain, the screening radiographs should be examined for signs of instability that include translation of a vertebral body of more than 3.5 mm and/or more than 11° of angulation of adjacent vertebrae.
- (i) Routine flexion-extension radiographs of the cervical spine should not be ordered until the patient has been evaluated by a specialist because of the risk of increased neurologic damage from the maneuvers.

(6) Differential Diagnosis

- (a) Cervical disk herniation (neurologic abnormality and radicular pain)
- (b) Cervical spine tumor or infection (night pain, weight loss, history, fever, chills, sweats)

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MUSCULOSKELETAL SYSTEM – NECK AND SPINE (CONT.)

- (c) Dislocation or subluxation of the spine (usually evident on radiographs; however, on occasion a spontaneous reduction occurs, masking the severity of the injury)
  - (d) Inflammatory conditions of the cervical spine (rheumatoid arthritis with abnormal radiographs)
  - (e) Spinal fracture (abnormal radiographs)
  - (f) Symptom amplification/secondary gain (inconsistent or exaggerated findings)
- (7) Adverse Outcomes of the Disease
- (a) Symptoms resolve completely in most patients within the first 4 to 6 weeks.
  - (b) With whiplash, resolution typically is delayed, but most symptoms resolve within 6 to 12 months, with few residual symptoms.
  - (c) Patients with subtle disk injuries superimposed on existing degenerative conditions of the cervical spine may have intractable pain.
  - (d) In some instances, radiculopathy due to lateral nerve root entrapment or myelopathy due to central spinal stenosis may develop.
- (8) Treatment
- (a) Providing the patient with reassurance about the natural history of these disorders represents an important first step.
  - (b) Acute care (1 to 2 weeks) involves appropriate pain medications and/or short-term NSAIDs and possible use of a soft cervical collar.
  - (c) Muscle relaxants may help if the patient has muscle spasm. Commercially available cervical pillows help with reestablishing a normal sleep pattern.
  - (d) Appropriately applied rehabilitation may help, especially in the first 4 weeks.
  - (e) Mild narcotic medication may be useful initially but should be restricted to the first week or two following the injury.
  - (f) Doxepin or amitriptyline may also be helpful for sleep.

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MUSCULOSKELETAL SYSTEM – NECK AND SPINE (CONT.)

- (g) Manipulation of the cervical spine is contraindicated in patients with acute cervical injuries.
- (h) Aerobic activities, such as walking, should be initiated as soon as possible.
- (i) Add isometric exercises as the patient's comfort improves, preferably in the first 2 weeks.
- (j) Encourage an early return to normal activities and work.

(9) Rehabilitation Prescription

- (a) A home program of exercises may be provided.
- (b) If the symptoms do not respond to the home program within 2 to 3 weeks, formal rehabilitation should be considered.
- (c) The evaluation should include an assessment to determine specific segmental limitations and muscle involvement.
- (d) Cervical spine traction and mobilization of the restricted segments may be added.

(10) Adverse Outcomes of Treatment

- (a) NSAIDs may cause gastric, renal, or hepatic complications.
- (b) In 2015, the FDA strengthened its warning linking NSAIDs with the risk of heart attack or stroke, even in the first weeks of use of an NSAID.
- (c) If the patient's condition fails to improve, depression may develop.
- (d) Chronic pain syndrome and drug dependence also may develop in these patients.

(11) Referral Decisions/Red Flags: Patients with pain refractory to treatment, nerve root deficits, or myelopathy or who present a diagnostic dilemma must be evaluated thoroughly.

d. Cervical Radiculopathy

(1) Definition

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MUSCULOSKELETAL SYSTEM – NECK AND SPINE (CONT.)

- (a) Cervical radiculopathy is referred neurogenic pain in the distribution of a cervical nerve root or roots, with or without associated numbness, weakness, or loss of reflexes.
  - (b) The usual cause in young adults is herniation of a cervical disk that entraps the root as it enters the foramen.
  - (c) In older patients, a combination of foraminal narrowing due to vertical settling of the disk space and arthritic involvement of the uncovertebral joint is the most common cause of lateral nerve root entrapment.
- (2) Synonym: Herniated Cervical Disk
- (3) Clinical Symptoms
- (a) Neck pain and radicular pain with associated numbness and paresthesias in the upper extremity in the distribution of the involved root are common; these findings are often unilateral.
  - (b) Muscle spasms, or fasciculations, in the involved myotomes may occur.
  - (c) Other symptoms may include weakness, lack of coordination, changes in handwriting, diminished grip strength, dropping objects from the hand, and difficulty with fine manipulative tasks.
  - (d) Occipital headaches and pain radiating into the paraspinal and scapular regions also may occur.
  - (e) Symptoms indicative of cervical myelopathy, such as trunk or leg dysfunction, gait disturbances, bowel or bladder changes, and signs of upper motor neuron involvement, occur more commonly with stenosis of the cervical spinal canal.
  - (f) Patients may state that they can relieve the pain by placing their hands on top of their head, as this decreases tension on the involved nerve root.
- (4) Physical Examination
- (a) Cervical lordosis may be reduced, and the range of neck motion may be mildly restricted.
  - (b) Extension and axial rotation will often cause pain in the arm or shoulder.

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MUSCULOSKELETAL SYSTEM – NECK AND SPINE (CONT.)

- (c) Assess motor and sensory function of the C5-T1 nerve roots as well as upper extremity reflexes and other upper motor neuron signs.
  - (d) Careful examination for signs of shoulder pathology, vascular disturbances, and peripheral nerve entrapment is necessary.
  - (e) A complete neurologic examination should be performed.
  - (f) Signs of upper motor neuron involvement suggest spinal cord compression.
- (5) Diagnostic Tests
- (a) Radiographs may identify regions of spondylosis or degenerative involvement of the disk and the facet joint.
  - (b) MRI or CT with intrathecal contrast (myelogram) confirms the diagnosis.
  - (c) Advanced imaging studies are necessary in patients who have not responded to nonsurgical management, in patients with profound neurologic deficits, or in patients who are considering surgical management.
  - (d) Symptoms must be correlated to imaging because there can be a high false-positive rate on MRI.
  - (e) Electromyography and nerve conduction velocity studies help in some instances to identify the location of neurologic dysfunction.
  - (f) These studies are valuable to differentiate radiculopathy from peripheral neuropathy and various nerve compression syndromes, such as carpal tunnel syndrome.
- (6) Differential Diagnosis
- (a) Adhesive capsulitis of the shoulder (restricted passive and active motion)
  - (b) Demyelinating conditions (varying symptoms, intensity, and location)
  - (c) Myocardial ischemia (abnormal electrocardiogram or stress tests)
  - (d) Peripheral nerve entrapment (positive Phalen test, positive Tinel sign at elbow or wrist)

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MUSCULOSKELETAL SYSTEM – NECK AND SPINE (CONT.)

- (e) Rotator cuff disease (painful wince with active shoulder abduction and circumduction movements)
  - (f) Thoracic outlet syndrome (distinctly uncommon; decrease in radial pulse with shoulder abduction and external rotation may be observed)
- (7) Adverse Outcomes of the Disease
- (a) Muscle paralysis, weakness, or chronic pain syndromes may develop.
  - (b) Rarely, the condition may progress to a myelopathy with spinal cord involvement.
- (8) Treatment
- (a) Spontaneous resolution of all or most symptoms occurs within 2 to 8 weeks in most patients.
  - (b) With radicular pain, a short course of anti-inflammatory medication coupled with cervical traction in a head halter is usually beneficial.
  - (c) Referral to a physical therapist/rehabilitation specialist is often more effective than use of a traction unit on its own.
  - (d) The physical therapist may treat the patient with appropriately selected exercises, manual therapy techniques, modalities, education regarding posture, avoidance of aggravating factors, and body mechanics.
  - (e) Narcotic medication is best avoided and seldom warranted.
  - (f) Manipulation of the cervical spine also is usually not indicated in patients with radiculopathy.
- (9) Adverse Outcomes of Treatment
- (a) Quadriplegia
  - (b) Herniation of an intervertebral disk
  - (c) Stroke
  - (d) Vertebral fracture may follow manipulation of the cervical spine.

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MUSCULOSKELETAL SYSTEM – NECK AND SPINE (CONT.)

(10) Referral Decisions/Red Flags

- (a) Patients in whom nonsurgical treatment fails or who develop atrophy, motor weakness, or signs of myelopathy may require surgical evaluation.
- (b) Patients with any signs that suggest a demyelinating condition, infection, or tumor require further evaluation.
- (c) If radicular symptoms are accompanied by intolerable pain, early specialty evaluation should be obtained.

e. Lower Back Strain/Pain

(1) Description

- (a) Low back pain (LBP) is extremely common and includes a wide range of symptoms involving the lumbosacral spine and pelvic girdle.
- (b) Characterized by duration or associated symptoms
- (c) Duration
  - 1. Acute (<6 weeks)
  - 2. Subacute (>6 weeks but <3 months)
  - 3. Chronic (>3 months)
- (d) Associated symptoms
  - 1. Localized/nonspecific "mechanical" LBP
  - 2. Back pain with lower extremity symptoms
  - 3. Systemic and visceral symptoms
- (e) A specific cause is not found for most patients with LBP. Most cases resolve in 4 to 6 weeks.
- (f) Rule out "red" flag symptoms indicating the need for immediate intervention.
- (g) System(s) affected: musculoskeletal, neurologic

## OUTLINE SHEET SCSC 2.8-1

## MUSCULOSKELETAL SYSTEM – NECK AND SPINE (CONT.)

## (2) Synonyms

- (a) Lumbago
- (b) Lumbar sprain/strain
- (c) Low back syndrome

## (3) Risk Factors

- (a) Age
- (b) Activity (lifting, sudden twisting, bending)
- (c) Obesity
- (d) Sedentary lifestyle
- (e) Physically strenuous work
- (f) Psychosocial factors—anxiety, depression, stress
- (g) Smoking

## (4) General Prevention

- (a) Maintain normal weight
- (b) Adequate physical fitness and activity
- (c) Stress reduction
- (d) Proper lifting technique and good posture
- (e) Smoking cessation
- (f) There is insufficient evidence to recommend for or against routine preventive measures in adults.

## (5) Diagnosis

- (a) History

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MUSCULOSKELETAL SYSTEM – NECK AND SPINE (CONT.)

1. Onset of pain (sudden or gradual)
2. Pain from spinal structures (musculature, ligaments, facet joints, and disks) can refer to the thigh region but rarely below the knee
3. Sacroiliac pain often refers to the thigh and can also radiate below the knee
4. Irritation, impingement, or compression of lumbar nerve roots often results in more leg pain than back pain
5. Pain from the L1-L3 nerve roots radiates to the hip and/or thigh, whereas pain from the L4-S1 nerve roots radiates below the knee.
6. Red flags
  - a. Recent trauma
  - b. Neurologic deficits
    - (1) Bowel/bladder incontinence or urinary retention
    - (2) Saddle anesthesia
    - (3) Weakness, falls
  - c. Night pain, sweats, fever, weight loss
  - d. Age >70 years with or without trauma
  - e. Age >50 years with minor trauma
  - f. History of cancer
  - g. Osteoporosis
  - h. Immunosuppression, prolonged glucocorticoid use
7. Yellow flags (predicting poor long-term prognosis):
  - a. Lack of social support
  - b. Unsupportive work environment

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MUSCULOSKELETAL SYSTEM – NECK AND SPINE (CONT.)

- c. Depression and/or anxiety
- d. Abuse of alcohol or other substances
- e. History of physical or sexual abuse
- 8. Pain can be provoked with motion: flexion-extension, side-bending rotation, sitting, standing, and lifting. Pain often relieved with rest.
- 9. Radicular pain may radiate to buttocks, thighs, and lower legs.

(b) Physical Exam

- 1. Observe gait, positioning, and facial expressions.
- 2. Test lumbar spine range of motion.
- 3. Evaluate for point tenderness or muscle spasm.
- 4. Evaluate for signs of muscle atrophy.
  - a. Completely evaluate reflexes, strength, pulses, sensation
  - b. Straight leg test
  - c. FABER test (flexion, abduction, and external rotation)
  - d. Stork test: Stand on one leg with opposite hip held in flexion. Extend back. Pain in lumbosacral area is a positive test—consider spondylolisthesis.

(6) Differential Diagnosis

- (a) Localized/nonspecific "mechanical" LBP (87%)
- (b) Lumbar strain/sprain (70%)
  - 1. Disc/facet degeneration (10%)
  - 2. Osteoporotic compression fracture (4%)
  - 3. Spondylolisthesis (2%)

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MUSCULOSKELETAL SYSTEM – NECK AND SPINE (CONT.)

- 4. Severe scoliosis, kyphosis
- 5. Asymmetric transitional vertebrae (<1%)
- 6. Traumatic fracture (<1%)

(c) Back pain with lower extremity symptoms (7%)

- 1. Disc herniation (4%)
- 2. Spinal stenosis (3%)

(d) Systemic and visceral symptoms

- 1. Neoplasia (0.7%)
  - a. Multiple myeloma; metastatic carcinoma
  - b. Lymphoma/leukemia
  - c. Spinal cord tumors, retroperitoneal tumors
- 2. Infection (0.01%)
  - a. Osteomyelitis
  - b. Septic discitis
  - c. Paraspinous abscess; epidural abscess
  - d. Shingles
- 3. Inflammatory disease (0.03%)
  - a. Ankylosing spondylitis, psoriatic spondylitis
  - b. Reactive arthritis
  - c. Inflammatory bowel disease
- 4. Visceral disease (0.05%)
  - a. Prostatitis

OUTLINE SHEET SCSC 2.8-1

MUSCULOSKELETAL SYSTEM – NECK AND SPINE (CONT.)

- b. Endometriosis
- c. Chronic pelvic inflammatory disease
- d. Nephrolithiasis, pyelonephritis
- e. Perinephric abscess
- f. Aortic aneurysm
- g. Pancreatitis; cholecystitis
- h. Penetrating ulcer

5. Other

- a. Osteochondrosis
- b. Paget disease

(7) Diagnostic Tests & Interpretation

(a) Initial Tests (lab, imaging)

- 1. Imaging studies are unnecessary during the first 6 weeks if no Red Flag signs or symptoms.
- 2. X-ray of the lumbar spine
  - a. Not recommended for initial presentation without Red Flags.
  - b. Defer films for 6 weeks unless there is a high risk of disease.
  - c. Useful to evaluate bony etiology (e.g., fracture)
- 3. MRI of the lumbar spine for patients presenting with neurologic deficits
  - a. Failure to improve with 6 weeks of conservative treatment, or if there is a strong suspicion of cancer or cauda equina syndrome
  - b. Useful for suspected herniated disc, nerve root compression, or metastatic disease

OUTLINE SHEET SCSC 2.8-1

MUSCULOSKELETAL SYSTEM – NECK AND SPINE (CONT.)

- 4. CT scan of the lumbar spine: appropriate alternative to MRI for patient with pacemaker, metallic hardware, or other contraindication to MRI
- 5. Labs are unnecessary with initial presentation if no related Red Flags, signs, or symptoms
- 6. If infection or bone marrow neoplasm is suspected, consider
  - a. Complete blood count (CBC) with differential
  - b. Erythrocyte sedimentation rate (ESR)
  - c. C-reactive protein (CRP) level
- (b) Diagnostic Procedures/Other: Neurosurgical consult for acute neurologic deficits or suspected cauda equina syndrome.

(8) Treatment

(a) First Line

- 1. Patient education
  - a. Reassure patients that pain is usually self-limited; treatment should relieve pain and improve function.
  - b. Encouraging activity as tolerated leads to quicker recovery.
- 2. Medications
  - a. Acetaminophen 325 to 650 mg PO q4-6h PRN pain (max 4 g/day)
  - b. NSAIDs
    - (1) Ibuprofen 400 to 600 mg PO 3 to 4 times daily (max 3,200 mg/day)
    - (2) Naproxen 250 to 500 mg PO q12h (max 1,500 mg/day)
  - c. Manual medicine, osteopathic manipulative treatments (OMT): myofascial, counterstrain, bilateral ligamentous techniques, as well as muscle energy, if tolerated

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MUSCULOSKELETAL SYSTEM – NECK AND SPINE (CONT.)

- 3. Obstetric considerations
  - a. Use medications cautiously in pregnancy.
  - b. Benefit must clearly outweigh risk.
- 4. OMT and chiropractic care may be used in a multidisciplinary approach may be used in the general population as well as the obstetric patient.

(b) Second Line

- 1. Second-line therapy for moderate to severe pain
  - a. Cyclobenzaprine 5 to 10 mg PO up to TID PRN (max 30 mg/day)
  - b. Tizanidine 2 mg PO up to TID PRN
  - c. Hydrocodone 2.5 to 10 mg PO q4-6h PRN pain; use of hydrocodone or other opioids for LBP is based on clinical judgment.
- 2. Other treatments
  - a. Antidepressants
    - (1) Tricyclic antidepressants (amitriptyline, nortriptyline, and desipramine) have been shown in randomized trials to provide a small pain reduction in patients.
    - (2) No clear evidence that SSRIs are more effective than placebo in cases of chronic LBP.
- 3. Injections
  - a. Facet: Lumbar radiofrequency neurotomy, therapeutic facet joint nerve blocks in the lumbar spine, and lumbar intra-articular injections have all shown benefit.
  - b. Epidural: provide short-term relief of persistent pain associated with documented radicular symptoms caused by herniated disc

OUTLINE SHEET SCSC 2.8-1

MUSCULOSKELETAL SYSTEM – NECK AND SPINE (CONT.)

f. Herniated Disc

(1) Definition

- (a) The intervertebral disk is composed of the nucleus pulposus, a gel-like material containing type II collagen that cushions axial compression; the anulus fibrosus, a specialized ligamentous structure surrounding the nucleus pulposus that helps to stabilize the spine; and the superior and inferior cartilaginous end plates.
- (b) Activities such as lifting and twisting increase pressure on the nucleus pulposus.
- (c) Lumbar disk herniations develop over time as the weaker posterolateral portion of the anulus fibrosus develops fissures that permit the egress of other disk components that herniate into the lumbar canal adjacent to the exiting lumbar nerve root.
- (d) The resultant herniated disk syndrome (commonly called sciatica) causes pain, numbness, and/or weakness in one or both lower extremities, depending on the anatomic location of the herniation.
- (e) The pain results in part from direct mechanical compression of the nerve root and in part from chemical irritation of the nerve root by substances within the nucleus pulposus.
- (f) Lumbar disk herniation most commonly occurs at the L4-5 or L5-S1 levels, with subsequent irritation of the L5 or S1 nerve root. Herniations at more proximal intervertebral levels constitute only 5% of all lumbar disk herniations.
- (g) Lumbar disk herniations affect approximately 2% of the population.
- (h) Even though only 10% of these patients have symptoms that persist longer than 3 months, the numbers are so great that this represents approximately 600,000 patients.
- (i) Most of these patients improve with nonsurgical care, but those who remain symptomatic generally consider surgical management to improve their quality of life.

OUTLINE SHEET SCSC 2.8-1

MUSCULOSKELETAL SYSTEM – NECK AND SPINE (CONT.)

(2) Synonyms

- (a) Herniated nucleus pulposus (HNP)
- (b) Lumbar radiculopathy
- (c) Neurogenic leg pain
- (d) Sciatica

(3) Clinical Symptoms

- (a) The onset of symptoms is often abrupt, but it also may be insidious.
- (b) Unilateral radicular leg pain frequently follows the onset of acute low back pain.
- (c) The theory is that the initial posterolateral disk bulge results in low back pain that then becomes sciatic pain as the herniation emerges past the anulus fibrosus to the spinal canal.
- (d) The pain is often severe and is exaggerated by sitting, walking, standing, coughing, and sneezing.
- (e) Typically, the pain radiates from the buttock down the posterior or posterolateral leg to the ankle or foot.
- (f) Patients have a difficult time finding a position of comfort.
- (g) Usually, lying on the back with a pillow under the knees or lying on the side in a fetal position provides some relief.
- (h) Upper or midlumbar radiculopathy (L1 to L4 nerve root compression) refers pain to the anterior aspect of the thigh and often does not radiate below the knee.

(4) Physical Examination

- (a) As the patient stands, look for the presence of a trunk list to one side.
- (b) The patient may also evidence limited forward flexion with dysrhythmia of the paraspinous muscles (that is, they contract asymmetrically).

OUTLINE SHEET SCSC 2.8-1

MUSCULOSKELETAL SYSTEM – NECK AND SPINE (CONT.)

- (c) With the patient sitting, perform the seated straight leg raising test.
- (d) As the knee is extended on the symptomatic side, a patient with true sciatic tension will lean back to relieve the pressure on the exiting nerve root.
- (e) This sign has a high correlation with a herniated lumbar disk.
- (f) Even more specific is the crossed straight leg raising sign:
  - 1. When the nonsymptomatic extremity is elevated
  - 2. The patient reports buttock or sciatic pain on the symptomatic side.
- (g) Evaluate motor and sensory function of the lumbosacral nerve roots as well as the deep tendon reflexes.
- (h) With the patient supine, perform supine straight leg raising on the involved and uninvolved limbs.
- (i) This test places the L5 and S1 nerve roots on stretch.
- (j) Ipsilateral restriction of straight leg raising is common with a variety of lumbar spine problems, but a positive crossed straight leg raising test (pain that occurs in the involved leg or buttock when the uninvolved leg is lifted) is highly specific for lumbar nerve root entrapment.
- (k) To stretch the upper lumbar nerve roots, perform the reverse straight leg raising test. Classic findings include the following:
  - 1. The L3-4 disk (L4 nerve root) may produce weakness in the anterior tibialis, numbness in the shin, pain in the thigh, and an asymmetric knee reflex. Approximately 5% of disk ruptures occur at this level.
  - 2. The L4-5 disk (L5 nerve root) may produce weakness in the great toe extensor, numbness on the top of the foot and first web space, and pain in the posterolateral thigh and calf. There is no predictable reflex test for a herniated lumbar disk at the L4-L5 level. Thus, checking the extensor hallucis longus is especially important because this may be the only sign to confirm an L5 radiculopathy.
  - 3. The L5-S1 disk (S1 nerve root) may produce weakness in the great toe flexor as well as in the gastrocnemius-soleus complex, with inability to

OUTLINE SHEET SCSC 2.8-1

MUSCULOSKELETAL SYSTEM – NECK AND SPINE (CONT.)

sustain toe-walking, numbness in the lateral foot, pain and ache in the posterior calf, and an asymmetric ankle reflex.

(5) Diagnostic Tests

- (a) Radiographs demonstrate age-appropriate changes with no specific findings.
- (b) MRI should be ordered to confirm the diagnosis if symptoms persist longer than 4 weeks, if a substantial neurologic deficit is identified, or as a part of the preoperative evaluation.
- (c) MRI is otherwise not necessary unless there are progressive neurologic changes or intolerable pain.
- (d) In the setting of recurrent radicular symptoms after previous lumbar surgery, a contrast-enhanced MRI can be used to differentiate between a recurrent disk herniation and scar tissue.

(6) Differential Diagnosis

- (a) Cauda equina syndrome (perianal numbness, urinary overflow incontinence or retention, reduced anal sphincter tone, bilateral involvement)
- (b) Demyelinating conditions (clonus)
- (c) Extrapinial nerve entrapment (abdominal or pelvic mass)
- (d) Hip or knee arthritis (decreased internal rotation of hip, knee deformity or effusion)
- (e) Lateral femoral cutaneous nerve entrapment (sensory only, lateral thigh)
- (f) Spinal stenosis (older population)
- (g) Thoracic cord compression (clonus, spasticity, high sensory pattern, abdominal reflexes)
- (h) Trochanteric bursitis (no tension signs, pain down lateral thigh and leg, exquisite tenderness over the trochanter)
- (i) Vascular insufficiency (absent posterior tibial pulse, claudication, trophic changes)

OUTLINE SHEET SCSC 2.8-1

MUSCULOSKELETAL SYSTEM – NECK AND SPINE (CONT.)

- (7) Adverse Outcomes of the Disease
  - (a) Cauda equina syndrome with permanent motor loss, urinary incontinence, and sensory numbness may develop.
  - (b) Specific root deficit, with permanent dysesthesia, pain, or weakness, may occur.
  
- (8) Treatment
  - (a) NSAIDs may be used in the acute phase, along with 1 to 2 days of minimal activity.
  - (b) Narcotic medication may be helpful in the acute phase for selected patients but typically should not be prescribed for longer than 7 days.
  - (c) Patients should limit sitting, prolonged standing, or walking.
  - (d) Patients should be reassured that most disk herniations resolve without residual problems.
  - (e) Most patients who have a lumbar disk herniation will improve within 3 to 4 weeks.
  - (f) If they do not, an evaluation by a specialist should be performed.
  - (g) Rehabilitation as described for acute low back pain is also appropriate for patients with a lumbar herniated disk.
  - (h) Patients with true radiculopathy with a lumbar herniated disk take longer to recover, however, and usually require activity modification for at least 4 to 8 weeks.
  - (i) Both aerobic conditioning and trunk strengthening are essential for the best outcome.
  - (j) Patients whose symptoms do not improve and who experience a clear decrease in their quality of life are candidates for surgical discectomy.
  - (k) Profound or progressive neurologic disorders, including cauda equina syndrome, require urgent surgery.

OUTLINE SHEET SCSC 2.8-1

MUSCULOSKELETAL SYSTEM – NECK AND SPINE (CONT.)

- (l) Epidural steroid injections (up to three in a 6-month period), which are usually administered under radiologic guidance, may be considered.
  - (m) These injections should be avoided in any patient who presents with a substantial neurologic deficit.
  - (n) Although the risk of substantial complications is low, epidural steroid injections should not be recommended without consideration of these risks.
  - (o) Also, if the patient experiences no relief of symptoms, repeating the injections later is not warranted.
  - (p) The effectiveness of manipulative therapy, traction, or acupuncture for patients with a confirmed lumbar herniated disk remains unproved in level I studies.
- (9) Adverse Outcomes of Treatment
- (a) NSAIDs may cause gastric, renal, or hepatic complications.
  - (b) In 2015, the FDA strengthened its warning linking NSAIDs with the risk of heart attack or stroke, even in the first weeks of use of an NSAID.
  - (c) Progression of neurologic deficit or persistent numbness and weakness may occur despite treatment.
- (10) Referral Decisions/Red Flags
- (a) Patients with any of the following conditions require further evaluation:
    1. Cauda equina syndrome
    2. Urinary retention
    3. Perianal numbness
    4. Motor loss
    5. Severe single nerve root paralysis
    6. Progressive neurologic deficit
    7. Radicular symptoms that persist for more than 6 weeks

OUTLINE SHEET SCSC 2.8-1

MUSCULOSKELETAL SYSTEM – NECK AND SPINE (CONT.)

- 8. Intractable leg pain
- 9. Recurrent episodes of sciatica that interfere with the patient's life activities.

6. Summary and Review

Utilize the knowledge of musculoskeletal system anatomy while assessing a patient with a musculoskeletal complaint

Utilize the knowledge of musculoskeletal system physiology while assessing a patient with a musculoskeletal complaint

Obtain history from patient with common orthopedic disorders

Perform an orthopedic examination

State signs and symptoms of common orthopedic disorders

State treatments for common orthopedic disorders

State Red Flag criteria

## JOB SHEET SCSC 2.8-3

## NECK AND SPINE

## A. INTRODUCTION

Upon successful completion of this lesson the Trainee will be able to perform a neck and spine examination on a real or simulated patient (a person acting as a patient).

B. EQUIPMENT LIST: The primary instructor is responsible for checking that all of the below equipment is available, functional and in the lab before the lab is scheduled to begin:

1. Real or simulated patient (a person acting as a patient)
2. Cotton balls or cotton-tipped applicators
3. Tongue depressor
4. Reflex Hammer
5. Tuning Fork
6. Tape Measure

## C. REFERENCES

1. Seidel's Guide to Physical Examination, 8th Ed., Jane W. Ball, Joyce E. Dains, John A. Flynn, Barry S. Soloman, Rosalyn W. Stewart, Mosby, an imprint of Elsevier Inc., 2015
2. Bates' Guide to Physical Examination and History Taking, 12th Ed., Lynn S. Bickley and Peter G. Szilagyi, Wolters Kluwer, 2017, <https://STAT!Ref.com>
3. Essentials of Musculoskeletal Care, 5th Ed., April D. Armstrong and Mark C. Hubbard, AAOS, 2016; <https://StatrefGuide> to Physical Examination, 8th Ed., Jane W. Ball, Joyce E. Dains, John A. Flynn, Barry S. Soloman, Rosalyn W. Stewart, Mosby, an imprint of Elsevier Inc., 2015

## D. SAFETY PRECAUTIONS

1. Instructors, Trainees and visitors must comply with all general safety procedures that are posted in the lab environment or provided in the lesson plan.
2. There are no skill specific safety hazards for this Performance Test.
3. Review TTO procedures in the Safety/Hazard Awareness Notice.
4. Trainees will not practice if an instructor is not present
5. Trainees may not take equipment out of the lab
6. Trainees will follow universal precautions and wear proper PPE.

## JOB SHEET SCSC 2.8-3

## NECK AND SPINE (CONT.)

## E. JOB STEPS

Trainee Instructions:

1. The purpose of this PCL is to evaluate the Trainee's knowledge of the practical application of conducting a neck and spine examination.
2. The Trainee must perform a complete physical examination of the neck and spine and explain each step as it is performed.
3. The Trainee has 20 minutes to complete this examination.
4. The Trainee is not allowed to use the reference in the performance of this PCL.
5. The Trainee will wear appropriate attire during the practice and actual PCL evaluation.

**AT MEDICAL REPRESENTATIVE DIRECTION, OBTAIN PATIENT HISTORY PERTAINING TO MUSCULOSKELETAL SYSTEM BY COMPLETING THE FOLLOWING STEPS:**

1. \*Ask patient's chief complaint
2. \*Ask patient about onset of symptoms and pain. Specific MOI.
3. \*Ask about pain location, does it radiate or stay in place.
4. Ask about duration, does it come and go or is it constant.
5. Ask about the quality of the pain, what it feels like sharp, dull, ache etc.
6. Ask what makes it worse.
7. Ask what makes it better.
8. Ask if there is a time of day that their symptoms are better or worse.
9. \*Ask about where their pain is on the pain scale of (1-10).
10. Ask about any other symptoms they notice.
11. Ask about affect to activities of daily living
12. Gather patients past medical history, SAMPLE

JOB SHEET SCSC 2.8-3

NECK AND SPINE (CONT.)

13. Gather Surgical History
14. Gather Family History
15. Gather Social History
16. Review of systems, minimum of constitutional questions

**AT MEDICAL REPRESENTATIVE DIRECTION, OBTAIN A GENERAL IMPRESSION PERTAINING TO MUSCULOSKELETAL SYSTEM BY COMPLETING THE FOLLOWING STEPS:**

1. \*Form General Impression
2. \*Obtain Vital Signs

**AT MEDICAL REPRESENTATIVE DIRECTION, PERFORM A NECK AND SPINE INSPECTION BY COMPLETING THE FOLLOWING STEPS:**

1. Inspect the anterior, posterior, and lateral aspects of the patient's posture.
2. Observe the patient's ability to stand erect, symmetry of body parts, and alignment of the extremities.
3. Note any lordosis, kyphosis (overcurvature of the thoracic vertebrae), or scoliosis (curved from side to side) of the spine.
4. Inspect the skin and subcutaneous tissues overlying the articular structures for discoloration, swelling, and masses.
5. Inspect the extremities for overall size, gross deformity, bony enlargement, alignment, contour, and symmetry of length and position.
6. Inspect the muscles for gross hypertrophy or atrophy, fasciculations, and spasms.

**AT MEDICAL REPRESENTATIVE DIRECTION, PERFORM NECK AND SPINE PAPANATION BY COMPLETING THE FOLLOWING STEPS:**

1. Palpate bones, joints, tendons, and surrounding muscles if symptomatic.
  - a. Palpate inflamed joints last.
2. Check for heat, tenderness, swelling, crepitus, pain, and resistance to movement.

JOB SHEET SCSC 2.8-3

NECK AND SPINE (CONT.)

3. \*Document any discomfort felt when you apply pressure to bones or joints.

**AT MEDICAL REPRESENTATIVE DIRECTION, CHECK RANGE OF MOTION AND MUSCLE TONE BY COMPLETING THE FOLLOWING STEPS:**

1. \*Examine both the active and passive range of motion for each major joint and its related muscle groups.
2. Instruct the patient to move each joint through its range of motion as detailed in specific joint and muscle sections.
3. Note any pain, limitation of motion, spastic movement, joint instability, deformity, or contracture
4. Ask the patient to relax and allow you to passively move the same joints until the end of the range of motion is felt.
5. Assess the muscle tone by feeling the resistance to passive stretch.
  - a. During passive range of motion, the muscles should have slight tension.
  - b. Passive range of motion often exceeds active range of motion by 5 degrees.
6. Perform range of motion with active and passive maneuvers equally between contralateral joints
7. \*Document any discrepancies between active and passive range of motion that may indicate true muscle weakness or a joint disorder.

**AT MEDICAL REPRESENTATIVE DIRECTION, PERFORM A CERVICAL SPINE EXAMINATION BY COMPLETING THE FOLLOWING STEPS:**

1. Inspect the patient's neck from both the anterior and posterior position, observing for alignment of the head with the shoulders and symmetry of the skinfolds and muscles
2. Palpate the posterior neck, cervical spine, and paravertebral, trapezius, and sternocleidomastoid muscles.
3. Instruct the patient to bend the head forward, chin to the chest.
  - a. Expect flexion of 45 degrees.

JOB SHEET SCSC 2.8-3

NECK AND SPINE (CONT.)

4. Instruct the patient to bend the head backward, chin toward the ceiling.
  - a. Expect extension of 45 degrees
5. Instruct the patient to bend the head to each side, ear to each shoulder.
  - a. Expect lateral bending of 40 degrees.
6. Instruct the patient to turn the head to each side, chin to shoulder.
  - a. Expect rotation of 70 degrees

**AT MEDICAL REPRESENTATIVE DIRECTION, PERFORM A THORACIC AND LUMBAR SPINE EXAMINATION BY COMPLETING THE FOLLOWING STEPS:**

1. Ensure that the head to be positioned directly over the gluteal cleft and the vertebrae to be straight as indicated by symmetric shoulder, scapular, and iliac crest heights.
2. Ensure that the curve of the thoracic spine is convex.
3. Ensure that the curve of the lumbar spine is concave.
4. With the patient standing erect, palpate along the spinal processes and paravertebral muscles
5. Percuss for spinal tenderness, first by tapping each spinal process with one finger and then by percussing each side of the spine along the paravertebral muscles with the ulnar aspect of your fist.
6. Ask the patient to bend forward slowly and touch the toes while you observe from behind. Inspect the spine for unexpected curvature.
7. Ask the patient to bend forward at the waist and, without bending the knees, try to touch the toes.
  - a. Expect flexion of 75 to 90 degrees
8. Ask the patient to bend back at the waist as far as possible.
  - a. Expect hyperextension of 30 degrees.
9. Ask the patient to bend to each side as far as possible.

JOB SHEET SCSC 2.8-3

NECK AND SPINE (CONT.)

- a. Expect lateral bending of 35 degrees bilaterally.
10. Ask the patient to swing their upper trunk from the waist in a circular motion front to side to back to side while you stabilize the pelvis.
- a. Expect rotation of the upper trunk 30 degrees forward and backward

**AT MEDICAL REPRESENTATIVE DIRECTION, PERFORM A LOWER SPINE EXAMINATION BY COMPLETING THE FOLLOWING STEPS:**

- 1. Perform the Straight Leg raising test
- 2. Perform the femoral stretch test or hip extension test

**AT MEDICAL REPRESENTATIVE DIRECTION, PRESENT FINDINGS BY COMPLETING THE FOLLOWING STEPS:**

- 1. \*Present findings of focused physical exam to provider
- 2. \*Document all history, findings interventions and procedures

**AT MEDICAL REPRESENTATIVE DIRECTION, PROVIDE PATIENT EDUCATION AND TREATMENT BY COMPLETING THE FOLLOWING STEPS:**

- 1. \*Distribute medication per provider's orders and with 5 rights
- 2. Provides reassurance and answer patient questions
- 3. Provide patient education and home therapy handouts
- 4. \*Document and provide duty status determination paperwork
- 5. Ensure patient understands need to follow up and/or referral procedures

OUTLINE SHEET SCSC 2.9-1

MUSCULOSKELETAL SYSTEM – LOWER EXTREMITIES

A. INTRODUCTION

B. ENABLING OBJECTIVES

- 1.46 Utilize the knowledge of musculoskeletal system anatomy while assessing a patient with a musculoskeletal complaint
- 1.47 Utilize the knowledge of musculoskeletal system physiology while assessing a patient with a musculoskeletal complaint
- 1.48 Obtain history from patient with common orthopedic disorders
- 1.49 Perform an orthopedic examination
- 1.50 State signs and symptoms of common orthopedic disorders
- 1.51 State treatments for common orthopedic disorders
- 1.16 State Red Flag criteria

C. SCSC 2.9-1 MUSCULOSKELETAL SYSTEM – LOWER EXTREMITIES TOPIC OUTLINE

- 1. Introduction to Musculoskeletal System – Lower Extremities
- 2. Identify the bones and muscles which make up the musculoskeletal system
  - a. Introduction to Lower Extremity anatomy
    - (1) The hip joint consists of the articulation between the acetabulum and the femur. The depth of the acetabulum in the pelvic bone—as well as the joint, which is supported by three strong ligaments—helps stabilize and protect the head of the femur in the joint capsule. Multiple bursae reduce friction in the hip. The hip is a ball-and-socket joint, permitting movement of the femur on many axes
    - (2) The knee consists four bones (femur, tibia, fibula, and patella), with three separate articulating compartments: the lateral tibiofemoral, the medial tibiofemoral, and the patellofemoral. Fibrocartilaginous disks (medial and lateral menisci), which cushion the tibia and femur, are attached to the tibia and the joint capsule. Collateral ligaments give medial and lateral stability to the knee. Two cruciate ligaments cross obliquely within the knee, adding anterior and posterior stability. The anterior cruciate ligament protects the knee from hyperextension. There are four separate bursae in the anterior knee helping reduce the friction of knee

OUTLINE SHEET SCSC 2.9-1

MUSCULOSKELETAL SYSTEM – LOWER EXTREMITIES (CONT.)

movement. The knee is a hinge joint, permitting movement (flexion and extension) between the femur and tibia in one plane.

- (3) The tibiotalar joint (ankle) consists of the articulation of the tibia, fibula, and talus. It is protected by ligaments on the medial and lateral surfaces. The tibiotalar joint is a hinge joint that permits flexion and extension (dorsiflexion and plantar flexion) in one plane. Additional joints in the ankle—the talocalcaneal joint (subtalar) and transverse tarsal joint—permit it to pivot or rotate (pronation and supination). Articulations of the foot between the tarsals and metatarsals, the metatarsals and proximal phalanges, and the middle and distal phalanges allow flexion and extension to occur.

b. Pelvis and Hip

- (1) The hip joint lies below the middle third of the inguinal ligament but on a deeper plane. It is the meeting point of the pelvic bones and the head of the femur. Because of overlying muscles, it is not readily palpable. Anterior to the joint is the iliopsoas bursa with which it may communicate. The bony prominence lateral to the joint is the greater trochanter of the femur. To the opposite side of this, and slightly inferior, is the lesser trochanter. Numerous bursa surround this joint to serve as cushion.

c. Knee

- (1) Bones: Composed of the articulation of various bones. The femur, which connects the hips to the knees is the proximal part of the knee joint. It has medial and lateral epicondyles. The patella is the floating bone of the knee is the major connecting point of the superior and inferior patellar tendon. The tendon ultimately attaches to the tibial tubercle. The tibia also medial and lateral condyles. The fibula is lateral to the tibia and is not directly involved in the articulation of the knee joint.

(2) Muscles:

- (a) Quadriceps (made up of 4 muscles). They form a tendon that envelops the patella. The quadriceps attaches to the tibia by way of the patellar tendon and is responsible for knee extension
- (b) Hamstring muscles – found in the back of the thigh, cause flexion of the knee.

(3) Parts of the Knee Joint:

- (a) Ligaments: (hold bones together)

OUTLINE SHEET SCSC 2.9-1

MUSCULOSKELETAL SYSTEM – LOWER EXTREMITIES (CONT.)

1. Collateral Ligaments - lateral and medial
  2. Cruciate Ligaments - Anterior and posterior
- (b) Menisci: Distributes weight over the surface of the joint and functions as shock absorbers or cushions. There are two - medial and lateral menisci.
- (c) Patella: Our kneecap rides in the groove between the femoral condyles.
- (d) Bursa: fibrous sacs of fluid that reduce friction between bones, ligaments and tendons.
- d. Ankle And Foot
- (1) There are seven tarsal bones. The calcaneus (heel bone) is the largest and forms the attachment for the calf muscles via the Achilles tendon. The talus rests on the calcaneus and articulates with the tibia to form the ankle joint. The talus bears the weight of the whole body which is transferred to the foot. The remaining bones of the foot are the phalanges, metatarsals, and the tarsal bones. The ankle is further defined by the medial and lateral malleoli. The most distal portion of the fibula forms the lateral malleolus, while the medial malleolus is formed by the distal bony prominence of the tibia. The ankle joint is held together by ligaments. The three important ligaments of the lateral ankle are:
- (a) Anterior Talofibular Ligament
  - (b) Posterior Talofibular Ligament
  - (c) Calcaneofibular Ligament
- e. These are important to know because 85% of ankle sprains involve these lateral ligaments. The ligaments of the medial ankle are grouped into one broad strong ligament called the deltoid ligament. The foot and its bones are held together along the sole by the thick plantar fascia.
3. Obtain history from patient with musculoskeletal disorders
- a. Subjective (S) – “What the patient tells you.” In this section, we will focus on the complaint of “knee pain”, a complaint you will definitely encounter in military sick call.
    - (1) Chief Complaint (CC) – “knee pain”.

OUTLINE SHEET SCSC 2.9-1

MUSCULOSKELETAL SYSTEM – LOWER EXTREMITIES (CONT.)

(2) History of present illness (HPI)

(a) Duration – 2 days, 10 minutes, etc.

(b) Use the mnemonic “OLDCARTS” to explore the complaint of pain.

1. Onset

2. Location

3. Duration

4. Character

5. Aggravating/ Associated factors: e.g. going up stairs, jogging, any kind of movement, bumpy ride in the car

6. Relieving Factors: e.g. rest/fetal position, remedies tried already – Ex: NSAIDS, heat pad on abdomen – effective or ineffective?

7. Temporal Factors

8. Severity of Symptoms

(c) Past Medical & Surgical History (PMHx & PSurgHx):

1. Chronic medical conditions

2. Hospitalizations/review previous sick call visits

3. Surgeries: Ex: knee replacement

4. Medications. NSAIDs, Pain relievers

5. Allergies to food and medications. Note what happens to patient when taking such food or meds. Ex: penicillin allergy – hives and shortness of breath.

(d) Family history

(e) Social history – tobacco, alcohol, dietary habits, travels (especially to exotic locations)

OUTLINE SHEET SCSC 2.9-1

MUSCULOSKELETAL SYSTEM – LOWER EXTREMITIES (CONT.)

- (3) Review of Systems (ROS). It's important to know how the other parts of the body are doing in relation to the chief complaint.
- (a) Respiratory – cough, sputum (color, quantity), hemoptysis, wheezing, asthma, bronchitis, pneumonia, TB, last PPD, pleurisy
  - (b) Gastrointestinal – (review these symptoms to check for pertinent negatives) trouble swallowing, heartburn, appetite, nausea, vomiting, vomiting blood, indigestion, frequency of BM's, last BM, change in habit, rectal bleeding or tarry stools, constipation, diarrhea, abdominal pain, food intolerance, excessive belching or farting, hemorrhoids, jaundice, liver or gall bladder trouble, hepatitis, pancreatitis, esophageal lesions, etc.
  - (c) Cardiac –heart trouble, HTN, rheumatic fever, heart murmurs, dyspnea/orthopnea, edema, chest pain/palpitations, last EKG
  - (d) Urinary – frequency of urination, polyuria, nocturia, dysuria, hematuria, urgency, hesitancy, incontinence, urinary infections and STD's, stones (renal calculi)
  - (e) Genitourinary & reproductive – discharge from or sores on genitals, STD Hx and treatment, last HIV test, hernias, testicular/vaginal pain or masses, frequency of intercourse, libido, sexual difficulties, vaginal irritation, vaginal bleeding.
  - (f) Musculoskeletal – joint pain/stiffness, arthritis, backache, thoracic muscle pain, weight lifting activities, history of costochondritis, past injuries, trauma.
  - (g) Psychiatric – mood, affect, feelings of impending doom, stress, nervousness, tension, depression, hospitalization, mania

4. Perform an orthopedic examination

a. Physical Examination

- (1) All orthopedic examination should have the following, no matter which body part is being examined.
- (a) General observation and inspection.
  - (b) Palpation

OUTLINE SHEET SCSC 2.9-1

MUSCULOSKELETAL SYSTEM – LOWER EXTREMITIES (CONT.)

(c) ROM

(d) Neurologic exam - focused & brief, depending on body part examined

1. Motor strength

2. Sensation

3. Reflexes

4. Vascular status

(e) Special tests - specific to the body part being examined.

b. Lower Extremity

(1) Physical Examination Of The Pelvis & Hip

(a) Inspection

1. Check symmetry, obvious surface abnormalities (swelling, discoloration, skin breaks), evidence of trauma.

2. Observe the patient's gait as he comes in to the sick call space

(b) Palpation

1. Feel for the normal anatomy (greater trochanter of the femur). Palpate soft and bony prominences. Note the precise location of pain.

(c) ROM – Have the patient lying on exam table during these tests; check for smooth motion; can the patient complete the tests?

1. Hip flexion – While supine, raise the leg with the knee extended above the body. Expect up to 90 degrees.

2. Hyperextension – While either standing or prone, swing the straightened leg behind the body without arching the back. Expect 30 degrees or less.

3. Hip flexion w/ knee flexed – While Supine, raise one knee to the chest while keeping the other leg straight. Expect hip flexion of 120 degrees.

OUTLINE SHEET SCSC 2.9-1

MUSCULOSKELETAL SYSTEM – LOWER EXTREMITIES (CONT.)

4. Abduction and adduction – While supine, swing the leg laterally and medially with knee straight. With the adduction movement, passively lift the opposite leg to permit the examined leg full movement. Expect up to 45 degrees of abduction and up to 30 degrees of adduction.
5. Internal rotation – While supine, place the lateral aspect of the foot on the table and then rotate the leg with the flexed knee toward the other leg. Expect 40 degrees of internal rotation.
6. External rotation – While supine, place the lateral aspect of the foot on the knee of the other leg; move the flexed knee toward the table. Expect 45 degrees of external rotation.

(d) Neurologic exam - Depending on the general area of the pain, focus your neurologic examination.

1. Motor Strength - Are they all 5/5?
2. Test hip flexors
  - a. Ask the patient to sit on the edge of the exam table with legs dangling.
  - b. Stabilize the pelvis by placing your hand over the PT’s iliac crest
  - c. Ask PT to raise their thigh off the table
  - d. Place your free hand over the distal end of the thigh and ask them to raise their thigh further, while you apply resistance.
  - e. Repeat test on opposite leg for comparison.
  - f. Record findings
3. Test hip extensors
  - a. Ask the patient to lie prone and flex their knee to relax their hamstring.
  - b. Place forearm over the iliac crest to stabilize the pelvis.
  - c. With your other hand apply resistance to their motion by pushing on the posterior aspect of the thigh just above the knee joint.
  - d. Palpate gluteus maximus muscle for tone during test.

OUTLINE SHEET SCSC 2.9-1

MUSCULOSKELETAL SYSTEM – LOWER EXTREMITIES (CONT.)

- e. Repeat test on opposite leg for comparison.
- f. Record findings
- 4. Test adductors
  - a. Ask the patient turn to their side.
  - b. Stabilize their pelvis by placing you hand over the iliac crest and tubercle.
  - c. Instruct PT to abduct their leg
  - d. Try to return their leg to the adduction position by applying resistance on the lateral side of the thigh.
  - e. Palpate the gluteus medius muscle during test.
  - f. Repeat test on opposite leg for comparison.
  - g. For an alternate test method, have patient lay supine with legs abducted about 20 degrees. Place hands on the lateral side of their knees and provide resistance. Both legs can be compared simultaneously with this method.
- 5. Test abductors
  - a. Have the PT lay supine with legs abducted.
  - b. Place your hand on the medial side of their knee.
  - c. Ask PT to pull leg back toward the midline against your resistance.
  - d. Repeat test on opposite leg for comparison.
  - e. For alternate test method, have patient either seated or laying supine with legs abducted. Have PT adduct legs while you exert resistance to their medial aspect of their knees. Both legs can be compared simultaneously with this method.

OUTLINE SHEET SCSC 2.9-1

MUSCULOSKELETAL SYSTEM – LOWER EXTREMITIES (CONT.)

(e) Special tests

1. Trendelenburg test – Procedure that is designed to evaluate the strength of the gluteus medius muscle.
  - a. Stand behind PT and locate the dimples overlaying the posterior superior iliac spines.
  - b. Dimples should appear level when the PT bears weight evenly on both legs.
  - c. Ask the patient to stand on one leg.
  - d. If the gluteus medius muscle is functioning properly, the PT should be standing erect. (Negative Trendelenburg Sign)
  - e. If the pelvis on the unsupported side descends, then the gluteus medius muscle on the supported side is either weak or nonfunctioning. (Positive Trendelenburg sign)
2. Examination of Related Areas
  - a. Most often, primary hip pain is perceived as inguinal pain.
  - b. Symptoms of pain in the hip's posterior aspect are usually referred for the lumbar spine, and run along the course of the sciatic nerve.
  - c. In some instances, pain may also be referred to the hip from the knee.
- (f) Sensation - Check for sharp-dull, light touch. Refer to neurologic chapter in this handbook on techniques.
- (g) Reflexes - Check patellar and Achilles reflexes. Refer to neurologic chapter in this handbook on techniques.
- (h) Gait - assess patient's ability to ambulate. Refer to neurologic chapter in this handbook on techniques.
- (i) Neurovascular status - Check distal pulses (normal is 2+), capillary refill (normal is <2 seconds).

OUTLINE SHEET SCSC 2.9-1

MUSCULOSKELETAL SYSTEM – LOWER EXTREMITIES (CONT.)

(2) Physical Examination of the Knee.

(a) The key to a good examination of the knee is examining both knees, not just the affected part. This will help in comparing the two knees to each other and truly elucidate what part of the exam is abnormal.

(b) Inspection

1. Note PT's gait. Should flow in a smooth, rhythmic motion.
2. Have PT undress from the waist down
3. Check symmetry, obvious surface abnormalities (swelling, discoloration, skin breaks), evidence of trauma
4. Alignment – bowlegged (genu varum), knock knees (genu valgum), or Back Knee (genu recurvatum)

(c) Palpation

1. To prep for palpation have PT sit on the edge of the exam table
2. Popliteal space
  - a. Note any swelling or tenderness
  - b. Fullness in the popliteal space may indicate a popliteal (Baker) cyst
3. Tibiofemoral joint space
  - a. Feel for the patella, the suprapatellar pouch, and the infrapatellar fat pad
  - b. The joint should feel smooth and firm
  - c. Note any tenderness, swelling, bogginess, nodules, or crepitus
4. Feel for the normal anatomy and the area where the patient is hurting specifically. Note the precise location. Feel for bony prominences. Palpate the medial epicondyle and the lateral epicondyle. Palpate along the course of the collateral ligaments. Identify any points of tenderness.

OUTLINE SHEET SCSC 2.9-1

MUSCULOSKELETAL SYSTEM – LOWER EXTREMITIES (CONT.)

5. Patella

- a. With leg flexed at 90 degrees, press thumb on each side of the patellar tendon, into the groove of the knee joint. Note that patella lies just above this joint line. As you press your thumbs downward you can feel the edge of the tibial plateau, the upper surface of the tibia. Follow it medially, then laterally until you are stopped by the converging femur and tibia. The medial and lateral menisci lies on the tibial plateaus and forms cushions between the femur and tibia.
- b. With leg extended, compress the patella and move it against the femur. Then push the patella distally and ask the patient to tighten his quadriceps. Note pain or crepitus.

(d) ROM – There are three basic movements in the knee joint: (1) flexion, (2) extension, and (3) internal and external rotation.

1. To examine the knees’ active range of motion, ask the patient to:

- a. Bend each knee. Expect 130 degrees of flexion
- b. Straighten the leg and stretch it. Expect full extension and up to 15 degree of hypertension.
- c. Rotate each foot medially and laterally. Expect about 10 degrees to either side.

2. To examine the knees’ passive range of motion:

- a. Patient may lie either prone or supine, or sit on the edge of the table with legs dangling fee.
- b. Grab on leg at the ankle joint and place your other hand on the posterior side of the knee
- c. Flex the leg as far as it will go. Expect 135 degrees of flexion
- d. Maintain hands in position on PT, and extend their leg. Expect up to 15 degrees of hypertension.
- e. Move one hand to the PT’s thigh, just above the knee to stabilize the femur. And with the other hand grasp their heel.



OUTLINE SHEET SCSC 2.9-1

MUSCULOSKELETAL SYSTEM – LOWER EXTREMITIES (CONT.)

2. Sensation - Check for sharp-dull, light touch. Refer to neurologic chapter in this handbook on techniques. See peripheral nerve testing below.
3. Reflexes - Check patellar and Achilles reflexes. Refer to neurologic chapter in this handbook on techniques.
4. Gait - assess patient's ability to ambulate. Refer to neurologic chapter in this handbook on techniques.
5. Neurovascular status - Check radial pulses (normal is 2+), capillary refill (normal is < 2 seconds).

(f) Special tests for the knees:

1. Ballottement – Used to determine the presence of excess fluid or an effusion in the knee.
  - a. Have PT lie supine with knee extended.
  - b. With one hand, grasp their thigh above the knee (on the suprapatellar pouch) and apply downward pressure for stabilization.
  - c. With a finger of the free hand, push the patella sharply downward against the femur.
  - d. If and effusion is present, a tapping or clicking will be sensed when the patella is pushed against the femur
  - e. Release the pressure against the patella, but keep your finger lightly touching it
  - f. If an effusion is present, the patella will float out as if a fluid wave were pushing it.
2. Examination for the Bulge sign – also used to determine the presence of excess fluid in the knee.
  - a. With the PT’s knee extended, milk the medial aspect of the knee upward two or three times.
  - b. Then milk the lateral side of the patella.

OUTLINE SHEET SCSC 2.9-1

MUSCULOSKELETAL SYSTEM – LOWER EXTREMITIES (CONT.)

- c. Observe for a bulge of returning fluid to the hollow area medial to the patella.
- 3. Drawer's test - tests the integrity of the ACL and PCL.
  - a. Have PT lie supine on the exam table with knees flexed to 90 degrees and feet flat on the table
  - b. Position yourself on the edge of the table and stabilize their foot by sitting on it.
  - c. Grasp their knee around the joint with thumbs anterior and fingers posterior.
  - d. Draw tibia towards you, then push backwards
  - e. Movement of the knee greater than 5mm in either direction is an unexpected finding.
- 4. Lachman's - Performed to rule out an injury of the ACL. Performed similar to the Drawer's test, but the knee is only flexed to 15-20 degrees.
- 5. McMurray's sign – test is used to detect a torn medial or lateral meniscus.
  - a. Have lie supine and flex one knee.
  - b. Position your thumb and fingers on either side of the joint space.
  - c. Hold the heel with your other hand
  - d. Fully flex their knee, and rotate the foot and knee outward to a lateral position
  - e. Extend and then flex the PT's knee.
  - f. Any palpable or audible click, grinding, pain, or limited extension of the knee is a positive sign of a torn medial meniscus.
  - g. Repeat the procedure, rotating the foot and knee inward.
  - h. Any palpable or audible click, grinding, pain, or limited extension of the knee is a positive sign of a torn lateral meniscus.

OUTLINE SHEET SCSC 2.9-1

MUSCULOSKELETAL SYSTEM – LOWER EXTREMITIES (CONT.)

6. Apley's compression or grinding test – is another procedure designed to aid in the diagnosis of a torn meniscus.
  - a. Ask the PT to lie prone on the examining table with one leg flexed to 90 degree.
  - b. Gently kneel on the back of his thigh to stabilize it, while leaning hard on the heel to compress the medial and lateral menisci.
  - c. Rotate the tibia internally and externally on the femur as you maintain firm compression.
  - d. If the PT complains of pain on the medial side, this indicates the medial meniscus is damaged. And pain on the lateral side suggests a lateral meniscal tear.
  - e. Now, apply distraction pressure by lifting up on the foot while stabilizing the thigh on table and internally and externally rotating the foot. If discomfort is elicited during foot rotation, there may be an injury to either collateral ligament. If the menisci is injured alone, this test should not produce discomfort.
  
7. Apley's distraction test – Helps to distinguish between meniscal and ligamentous problems of the knee joint.
  - a. This test should follow the compression test, and you should remain in the same position.
  - b. Apply traction to the leg while rotating the tibia internally on the femur.
  - c. If the ligaments are damaged, the PT will complain of pain.
  - d. If the meniscus alone is torn, the test should not be painful for them
  
8. Apprehension test for Patellar Dislocation and Subluxation – Designed to determine whether or not the patella is prone to lateral dislocation. If you suspect that your PT has a recurrent dislocating patella, you should attempt to dislocate it manually while observing their face as they react to this test.
  - a. Ask the PT to lie supine on the exam table, with legs flat and quadriceps relaxed.

OUTLINE SHEET SCSC 2.9-1

MUSCULOSKELETAL SYSTEM – LOWER EXTREMITIES (CONT.)

- b. If a lateral patella dislocation is suspected, press against the medial border of the patella with your thumb.
- c. If everything is in order, this will produce little reaction
- d. If the patella begins to dislocate, the expression on the PT's face will become one of apprehension and distress.

9. Examination of related areas

- a. The joints both above and below the knee should be examined in a truly comprehensive examination of the knee joint.
- b. A herniated disc in the lumbar spine or osteoarthritis of the hip both can refer pain to the knee.
- c. Foot problems such as ligamentous sprains or infections may occasionally manifest in the knee.

(3) Physical examination of the ankle and foot

(a) Inspection

- 1. Inspect the external appearance of the shoe. In many cases the shoe is a literal showcase for certain disorders.
- 2. A deformed foot can deform any good shoe
- 3. Also, foot trouble may also stem from objects protruding inside the shoe, such as nails and rivets, or from rough stitching or a wrinkled shoe lining.
- 4. A comprehensive examination of the foot and ankle also includes an inspection of the entire lower extremity as well as the lumbar spine.
- 5. Have the patient remove clothing from the waist down.
- 6. As they undress, observe their foot and ankle as they bear weight. In the weight-bearing position most abnormal conditions manifest themselves.
- 7. Begin the inspection of the foot, by counting the number of toes.
- 8. Toes should appear straight, flat, and in proportion to each other as well as to those of the other foot.

OUTLINE SHEET SCSC 2.9-1

MUSCULOSKELETAL SYSTEM – LOWER EXTREMITIES (CONT.)

9. Have patient sit down
10. Observe angle of feet when relaxed
11. Evaluate the general shape of the foot, note depth of arches
12. Note any color changes from the weight bearing to non-weight bearing.
13. Check symmetry, obvious surface abnormalities (swelling, skin breaks), evidence of trauma
14. Check for calluses, corns, hallux valgus, and hammer toes.
15. Several unexpected deviations of the toes can occur.
  - a. Hammer toe – Hyperextension of the metatarsophalangeal joint with flexion of the toe’s proximal joint.
  - b. Mallet toe – a flexion deformity at the distal interphalangeal joint
  - c. Claw toe – hyperextension of the metatarsophalangeal joint with flexion of the toe’s proximal and distal joints.
  - d. Hallux valgus – lateral deviation of the great toe, which may cause overlapping with the second toe.
  - e. Bunion – a bursa often forms at the pressure point.

(b) Palpation

1. Have patient sit on the edge of the exam table with legs dangling free
2. Stabilize the foot and lower leg with one hand by holding the foot around the calcaneus.
3. Palpate the Achilles tendon, the anterior surface of the ankle, and the medial and lateral malleoli.
4. Feel for the normal anatomy and the area where the patient is hurting specifically.

OUTLINE SHEET SCSC 2.9-1

MUSCULOSKELETAL SYSTEM – LOWER EXTREMITIES (CONT.)

5. Note the precise location. Feel for bony prominences.
6. Palpate anterior aspect of each ankle joint noting any swelling, deformity, or tenderness.
7. With thumb and fingers of both hands, compress the forefoot and palpate each metatarsophalangeal joints looking for discomfort or swelling.
8. Palpate on the plantar surface of the foot for any tenderness.

(c) ROM - check for smooth motion; can the patient complete the tests?

1. Active ROM:

- a. To test Plantar Flexion and Toe Motion, ask the PT to walk on their toes.
- b. To test Dorsiflexion, instruct PT to walk on their heels
- c. To test Inversion, have PT walk on the lateral borders of their feet.
- d. To test Eversion, instruct PT to walk on the medial borders of their feet.
- e. If PT cannot perform any these procedures, conduct passive testing to determine the cause of their limited ROM.

2. Passive ROM:

- a. Instruct PT to sit on the edge of the examining table, with legs dangling.
- b. To test Ankle Dorsiflexion and Ankle Plantar flexion:
  - (1) Stabilize the subtalar joint by holding the calcaneus.
  - (2) To ensure the ankle motion alone takes place and that there is no substitution of forefoot motion, invert the forefoot to lock it onto the hindfoot.
  - (3) As you grip the forefoot, push the foot as one unit into dorsiflexion and plantar flexion.

OUTLINE SHEET SCSC 2.9-1

MUSCULOSKELETAL SYSTEM – LOWER EXTREMITIES (CONT.)

(4) Expect about 20 degree in dorsiflexion and about 50 degrees in plantar flexion.

(5) Restricted ankle movement may also be caused by extra-articular swelling (edema secondary to sprain or to cardiac failure).

(6) Such swelling also constrict the ankle almost as if it were bandaged or placed in a cast.

c. To test Subtalar Inversion and Eversion (Talar Tilt):

(1) Have PT remain seated in the same position.

(2) Stabilize their tibia by holding it around its distal end.

(3) Then, grip the calcaneus.

(4) Alternately invert and evert the heel.

(5) If PT has subtalar arthritis or a calcaneal fracture, the PT may complain about pain during this motion.

(6) Expect 5 degrees in both directions.

d. To test the Forefoot Adduction and Abduction:

(1) Hold the PT's foot at the calcaneus with one hand to stabilize the heel in the neutral position during the test.

(2) Move the forefoot medially and laterally with your free hand.

(3) This ROM may be difficult to measure accurately, but expect about 20 degrees in Adduction and about 10 degrees in Abduction.

e. To test the First Metatarsophalangeal Joint:

(1) Stabilize the PT's foot and move their great toe through flexion and extension at the metatarsophalangeal joint.

(2) Normal toe-off requires a minimum of 35 degrees to 40 degrees of extension.

OUTLINE SHEET SCSC 2.9-1

MUSCULOSKELETAL SYSTEM – LOWER EXTREMITIES (CONT.)

(3) Expect about 45 degrees on Flexion and 70-90 degrees on Extension.

(d) Neurovascular exam - Depending on the general area of the pain, focus your examination to assess the integrity of the neurovascular complex.

1. Motor Strength - Are they all 5/5?
  - a. Test dorsiflexion and eversion against resistant to check for muscle strength in the anterior compartment of the leg
  - b. Test plantar flexion and inversion against resistance to check for calf muscle strength.
2. Sensation - Check for sharp-dull, light touch. Refer to neurologic chapter in this handbook on techniques.
3. Reflexes - Check patellar and Achilles reflexes. Refer to neurologic chapter in this handbook on techniques.
4. Gait - assess patient's ability to ambulate. Refer to neurologic chapter in this handbook on techniques.
5. Neurovascular status - Check radial pulses (normal is 2+), capillary refill (normal is <2 seconds).

(e) Special tests for the foot and ankle:

1. Anterior Drawers Test: assesses the stability of the anterior talofibular ligament.
  - a. With the patient seated and the knee flexed approximately 90°
  - b. Place the ankle in approximately 20° of plantar flexion.
  - c. Stabilize or provide a slight posterior force to the anterior aspect of the distal tibia with one hand
  - d. Cup the palm of the other hand around the posterior aspect of the calcaneus
  - e. Attempt to bring the calcaneus and talus forward on the tibia.

OUTLINE SHEET SCSC 2.9-1

MUSCULOSKELETAL SYSTEM – LOWER EXTREMITIES (CONT.)

- f. Normally, you should be able to translate the foot slightly forward on the ankle before reaching a relatively firm end point provided by the anterior talofibular ligament.
- g. Absence of this firm end point with asymmetric or excessive motion indicates moderate to severe injury to the anterior talofibular ligament and/or chronic ankle laxity.
- h. When performing this test, always compare the affected ankle with the opposite (normal) side.
- i. If this test elicits pain, the results may be unreliable due to an inability of the patient to relax the muscles that provide dynamic support to the ankle. If the test is inconclusive, patients can be tested under mini C-arm fluoroscopy
- j. Comparative views can be obtained.

2. Talar Tilt Test

- a. The eversion stress test evaluates the integrity of the deltoid ligament.
- b. With the patient seated and the knee flexed approximately 90°, place the ankle in neutral.
- c. Use one hand to stabilize the lateral aspect of the leg just above the lateral malleolus.
- d. Place your other hand somewhat inferomedial on the calcaneus and evert the hindfoot.
- e. Pain over the deltoid ligament and increased eversion as compared to the uninvolved side indicates possible injury to the mid portion of the deltoid or a possible avulsion fracture of the medial malleolus.
- f. Repeated again in plantar flexion to evaluate the anterior aspect of the deltoid ligament.
- g. When performing this test, always compare the affected ankle with the opposite side.
- h. The inversion stress test evaluates laxity of the calcaneofibular ligament.

OUTLINE SHEET SCSC 2.9-1

MUSCULOSKELETAL SYSTEM – LOWER EXTREMITIES (CONT.)

- i. With the patient seated and the knee flexed approximately 90°, use one hand to stabilize the medial aspect of the leg just above the medial malleolus.
  - j. Place your other hand somewhat inferolateral on the calcaneus and invert the hindfoot.
  - k. An end point should normally be appreciated upon reaching full inversion, and absence of one indicates moderate to severe injury to the calcaneofibular ligament.
  - l. Excessive or asymmetric motion will occur with chronic laxity of the calcaneofibular ligament.
  - m. When performing this test, always compare the affected ankle with the opposite side.
  - n. If the patient has pain during this test, the results may be unreliable.
3. Anterior Tibialis (Ankle Dorsiflexion) Test:
- a. Grasp the posterolateral aspect of the leg with one hand and apply resistance to the dorsal medial aspect of the foot.
  - b. Ask the patient to flex the toes (to eliminate activity of the toe extensors) and then invert and dorsiflex the foot against your resistance.
  - c. Weakness indicates a lesion involving the L4 nerve root or deep peroneal nerve.
4. Thompson Test: tests for ruptured Achilles tendon.
- a. Position the patient on his stomach with feet hanging over the edge of the table.
  - b. If a rupture is present, there will be less natural flexion on the injured side.
  - c. Squeeze the calf muscles. A normal or partially torn Achilles tendon will produce planter flexion. A ruptured tendon will not.

OUTLINE SHEET SCSC 2.9-1

MUSCULOSKELETAL SYSTEM – LOWER EXTREMITIES (CONT.)

5. Rigid or Supple Flat Feet Test:
  - a. Observe the PT's feet as they stand on their toes and while seated.
  - b. If the medial longitudinal arch is absent in all positions, the PT has rigid flat feet.
  - c. If the arch is present while they're on their toes or seated and absent only when they stand, this is considered supple flat feet. And it is correctable with longitudinal arch supports.
  
6. Interdigital (Morton) Neuroma Test: Interdigital neuromas are most commonly located between the third and fourth metatarsal heads, occasionally between the second and third metatarsal heads, and rarely between the other metatarsal heads.
  - a. Apply upward pressure between adjacent metatarsal heads and then compress the metatarsals from side to side with the free hand
  - b. The upward pressure places the neuroma between the metatarsal heads, allowing it to be compressed during side-to-side compression.
  - c. Sometimes you will hear or, more likely, feel a click (Mulder sign) at the painful site, which is usually diagnostic.
  
7. Homans' Sign – test for deep vein thrombophlebitis
  - a. Forcibly dorsiflex the PT's ankle when their leg is extended
  - b. Pain in the calf resulting from this maneuver indicates a positive Homans' sign.
  - c. Tenderness elicited upon deep palpation of the calf muscle is further evidence of deep vein thrombophlebitis.
  
8. Examination of related areas
  - a. All the other joints in the lower extremity should be examined in conjunction with a complete examination of the foot and ankle
  - b. It is possible for pathology in the knee, hip, or lumbar region to refer pain to the foot and ankle.

OUTLINE SHEET SCSC 2.9-1

MUSCULOSKELETAL SYSTEM – LOWER EXTREMITIES (CONT.)

5. List signs and symptoms of common orthopedic disorders

a. Common Hip Conditions

(1) Groin Pull – A strain to the musculature in the inguinal area.

- (a) Patient reports history of acute repetitive abduction of the hip.
- (b) Tenderness may be present over the groin or the medial thigh.
- (c) Pain will be found on passive stretch or resisted contraction of the involved muscles.
- (d) Examination for a hernia and ruling out inguinal lymphadenopathy should also be conducted.
- (e) Plan:
  - 1. Ice for the first 2 days.
  - 2. NSAIDS, ROM exercises.
  - 3. Light duty if indicated.

(2) Hamstring pull – Results from acute or repetitive strain

- (a) Presents as pain or tenderness anywhere along the posterior thigh.
- (b) Hip ROM, strengths, and neurovascular status should be intact.
- (c) Plan:
  - 1. RICE, Ace wrap
  - 2. NSAIDS
  - 3. Light duty if indicated.
  - 4. ROM exercises
  - 5. Refer to medical provider if no improvement

OUTLINE SHEET SCSC 2.9-1

MUSCULOSKELETAL SYSTEM – LOWER EXTREMITIES (CONT.)

- (3) Iliotibial Band Tendonitis (ITB) or Tensor Fascia Lata Syndrome – Inflammation of the tensor fascia lata (aka iliotibial tract)
- (a) Located along the lateral leg.
  - (b) The patient may complain of a gradual onset of pain along the lateral thigh and knee
  - (c) Seen commonly in runners or individuals with abnormal tight iliotibial tracts.
  - (d) Pain is referred to the anterior thigh and may be intensified through active range of motion of the hip and knee.
  - (e) Plan:
    - 1. Ice and rest for 2-3 days; then moist heat
    - 2. NSAIDS, light duty
    - 3. Once pain is relieved, start on gradual stretching and exercise program.
    - 4. Physical therapy referral.
- (4) Trochanteric bursitis – Inflammation of the lubricating sac
- (a) Located between the midportion of the trochanteric process of the femur and the gluteus medius tendon/iliotibial tract.
  - (b) Repetitive or uneven contracture of the gluteus medius and direct pressure over the trochanteric process are the two most common aggravating factors.
  - (c) An underlying back, sacroiliac, or lower leg gait disturbances are predisposing conditions.
  - (d) The patient may complain of hip pain over the outer thigh or difficulty walking.
  - (e) Local tenderness is present at the midportion of the greater trochanter.
  - (f) This is best identified in the lateral decubitus position.
  - (g) The maximum tenderness is about 1.5 inches below the superior portion of the trochanter, directly over the maximum lateral prominence.

OUTLINE SHEET SCSC 2.9-1

MUSCULOSKELETAL SYSTEM – LOWER EXTREMITIES (CONT.)

- (h) Stiffness or mild discomfort may be experienced in extremes of internal or external rotation of the hip.
- (i) Resisted hip abduction may aggravate the pain.
- (j) Range of motion should be normal in uncomplicated cases.
- (k) Plan:
  1. Reduce weight bearing and restrict repetitive bending; light duty
  2. NSAIDS
  3. Avoid direct pressure
  4. Physical therapy referral.

b. Common Knee Problems

- (1) Osgood-Schlatter Syndrome – Pain over the tibial tubercle, with a palpable defect due to partial avulsion of the patellar tendon from the tubercle.
  - (a) Actual injury occurs in early teens with the chronic pulling of the patellar tendon associated with sports.
  - (b) Osgood Schlatter not usually found after 22-23 years.
  - (c) This heals with a large calcium deposit at the tibial tubercle.
  - (d) Recurrence could occur at late times and caused pain.
  - (e) Patient usually associate pain with extension of lower leg.
  - (f) Plan:
    1. X-ray studies.
    2. NSAIDS
    3. RICE therapy; Light duty if indicated.
    4. Physical therapy referral.

OUTLINE SHEET SCSC 2.9-1

MUSCULOSKELETAL SYSTEM – LOWER EXTREMITIES (CONT.)

- (2) Patellofemoral pain syndrome (PFPS) – An ill-defined pain under the patella caused by mistracking of the patella out of the groove and atrophy of the vastus medialis oblique muscle of the quadriceps.
- (a) Cartilage can become soft and pitted.
  - (b) Discomfort is associated with squatting, kneeling, prolonged walking and standing, going up and down the stairs, or sitting for a prolonged period of time with knee flexed.
  - (c) There is full ROM with possible crepitus.
  - (d) Knee integrity is intact.
  - (e) Plan:
    1. Ice massage, NSAIDs, avoid contact sports that involve running, jumping, squatting or kneeling.
    2. Home physical therapy. ROM exercises, quadriceps strengthening. Consider referral to physical therapy.
    3. Light duty if indicated.
    4. Consider other diagnosis if not improving and do appropriate work-up.
    5. If persistent for months and years with negative work-up, the likelihood of doing well in the military is low.
- (3) Iliotibial Band Syndrome – Is caused by inflammation and irritation from the friction of the iliotibial band moving over the thigh bone (femur) when you repeatedly bend and straighten your knee.
- (a) It can also cause pain in the outside of your hip, thigh, and knee.
  - (b) Repeatedly bending and straightening your knee can irritate the iliotibial band.
  - (c) Patient may complain of pain or a feeling tightness in hips as well as pain along the outside of their knee that may worsen with activity, especially running or going up and down stairs.
  - (d) They may also describe a “snapping” sensation over their knee.

OUTLINE SHEET SCSC 2.9-1

MUSCULOSKELETAL SYSTEM – LOWER EXTREMITIES (CONT.)

- (e) Findings may be swelling on the outside of their knee.
- (f) Plan:
  1. Resting and limiting exercise.
  2. Returning to activities gradually.
  3. Doing range-of-motion and strengthening exercises (physical therapy) as told by your health care provider.
  4. Including low-impact activities, such as swimming, in exercise routine.
- (4) Knee Effusion – Abnormal accumulation of synovial fluid in the joint resulting from PFPS, tendonitis, bursitis or trauma.
  - (a) Characterized by tenderness, swelling, tightness and restricted joint motion.
  - (b) Examination reveals loss of medial and lateral pre-patellar dimples of the anterior knee.
  - (c) Plan:
    1. Refer to medical provider.
    2. NSAIDS, Ace wrap for compression
    3. RICE therapy for 3 days; Light duty if indicated.
    4. Limit weight bearing
- (5) Meniscal injuries – One of the most common knee injuries encountered in military sick call.
  - (a) Mechanism of injury involves twisting of the knee with the foot is planted in one spot and in weight bearing portion.
  - (b) Medial meniscus is injured 10 times more frequently because it is more firmly attached and less mobile.
  - (c) Clinical features include history of a "popping", "grinding", or "tearing" sensation inside joint.

OUTLINE SHEET SCSC 2.9-1

MUSCULOSKELETAL SYSTEM – LOWER EXTREMITIES (CONT.)

- (d) There is also "locking" of the knees (preventing full extension).
  - (e) This indicates a "bucket handle" tear.
  - (f) Joint line tenderness (medial or lateral) is the most reliable physical sign.
  - (g) Effusion usually occurs slowly over several hours.
  - (h) McMurray's and Apley's tests may be positive.
  - (i) Plan:
    1. Refer to medical provider.
    2. NSAIDS
    3. RICE therapy for 3 days; Light duty.
    4. Immobilized knee, non-weight bearing with crutches
    5. Physical therapy and Orthopedics referral.
- (6) Collateral Ligament Injury – Mechanism of injury usually involved direct blow to either the medial or lateral aspect of the knee.
- (a) Results in pain and sometimes swelling.
  - (b) There may be valgus or varus laxity and tenderness.
  - (c) Effusion may occur.
  - (d) The PT will have difficulty walking, pivoting and twisting.
  - (e) Pain may also be noted along the medial joint line to the insertion point of the ligament on the tibia.
  - (f) Plan:
    1. Refer to medical provider.
    2. NSAIDS
    3. RICE therapy for 3 days; Light duty.

OUTLINE SHEET SCSC 2.9-1

MUSCULOSKELETAL SYSTEM – LOWER EXTREMITIES (CONT.)

- 4. Immobilized knee, non-weight bearing with crutches
  - 5. Physical therapy referral. Orthopedic referral for complete tears.
  
- (7) Cruciate Ligament Injury – Mechanism of injury involves direct anterior or posterior blow to the knee
  - (a) Results in acute knee pain with anterior cruciate injury occurring more frequently than a posterior injury.
  - (b) Swelling is present and may have bloody effusion.
  - (c) Drawer and Lachman's will be positive.
  - (d) Plan:
    - 1. Refer to medical provider.
    - 2. NSAIDS
    - 3. RICE therapy for 3 days; Light duty.
    - 4. Immobilized knee, non-weight bearing with crutches
    - 5. Physical therapy referral. Orthopedic referral for complete tears.
  
- (8) Patellar tendonitis – Often known as jumpers’ knee.
  - (a) Results from inflammation of the patellar tendon.
  - (b) Patients complain of generalized knee pain with or without knee swelling.
  - (c) There is point tenderness over the patellar tendon, just inferior to the patella.
  - (d) Plan:
    - 1. Refer to medical provider.
    - 2. NSAIDS
    - 3. Rest, moist heat; Light duty if indicated.

OUTLINE SHEET SCSC 2.9-1

MUSCULOSKELETAL SYSTEM – LOWER EXTREMITIES (CONT.)

4. Physical therapy referral.

c. Common Foot and Ankle Problems.

(1) Sprained Ankle – Results from a traumatic injury following sudden stress on one or more of the supporting ligaments.

(a) Can be either an acute inversion or eversion injury.

(b) Characterized by sudden pain, swelling, ecchymosis and possible instability of the ankle.

(c) Pain increases over the injured ligament with attempted movement of the foot.

(d) ROM may be decreased, but the neurovascular status should be intact.

(e) If bony tenderness is present, obtain an x-ray to rule out fracture.

(f) Classification

1. Grade I: (mild) Ligaments stretched but not torn. Mild tenderness and mild swelling.

2. Grade II: (moderate) Ligaments torn but not completely ruptured. Marked swelling and tenderness, but with negative anterior drawers test.

3. Grade III: (severe) A complete ligamentous rupture. Marked swelling and tenderness with instability indicated by a positive anterior drawers test.

(g) Plan:

1. X-rays are generally not indicated for ankle sprains. Only need if unable to weight bear, significant immediate swelling. Refer to medical officer for opinion.

2. NSAIDs, RICE, LD, non-weight bearing If fractured, refer to Orthopedics for casting/surgical correction

(2) Shin splints – A painful condition that is felt on the bone that is located in the front of the lower leg (tibia or shin bone) or in the muscles on either side of the bone.

OUTLINE SHEET SCSC 2.9-1

MUSCULOSKELETAL SYSTEM – LOWER EXTREMITIES (CONT.)

- (a) Usually due to running, jogging, changing the type of running surface or shoes, prolonged standing or walking uphill or stairs.
- (b) No history of trauma. Pain has gradual onset during exercise. Usually there is no warm up period or patient has been running on hard surfaces. Tenderness will be noted along the anterior medial or lateral aspect of the tibia with normal ROM of knee and ankle. Distal neurovascular status is intact. Swelling in the area of tenderness may be present.
- (c) Plan:
  - 1. NSAIDS, ice massage, light duty as appropriate.
  - 2. Bone scan indicated if condition is chronic to rule-out stress fractures (X-ray are poor for identifying stress fractures).
  - 3. Refer to your medical provider if persistent.
- (3) Achilles Tendonitis – An inflammation or small tear near the insertion point of the Achilles tendon.
  - (a) Pain associated with weight bearing, stiffness and swelling.
  - (b) Palpation along the tendon is painful and pain increases with resisted plantar flexion of the foot.
  - (c) Passive dorsiflexion may also be painful. ROM, strengths and neurovascular status should be intact.
  - (d) Plan:
    - 1. RICE, NSAIDS
    - 2. Follow-up in 7 days or sooner if worse
    - 3. Light duty if needed.
- (4) Gout – An acute monoarticular arthritis involving the first metatarsophalangeal joint (big toe).
  - (a) It is characterized by acute swelling, tenderness that increases with the slightest movement of the toe, redness and possibly warmth.

OUTLINE SHEET SCSC 2.9-1

MUSCULOSKELETAL SYSTEM – LOWER EXTREMITIES (CONT.)

- (b) The gait will be modified due to pain associated with walking.
  - (c) Patients don't necessarily eat a lot of meat with gout, but it can exacerbate it.
  - (d) Plan:
    - 1. Refer to medical provider.
    - 2. NSAIDS. Light duty if needed.
    - 3. Limit weight bearing.
    - 4. May need referral to Ortho for gout analysis
- (5) Ingrown toenail – Nail pierces the lateral nail fold and grows into the dermis.
- (a) Presents red, warm, swollen and is tender.
  - (b) There may be drainage of a serous or purulent exudates along the nail margin.
  - (c) Plan:
    - 1. Refer to medical provider.
    - 2. Partial or complete toe nail removal.
    - 3. Motrin, LD
- (6) Metatarsalgia – Pain in the area of the ball of the foot, usually pinpointed at the second MTP.
- (a) The pain is associated with prolonged weight bearing.
  - (b) There is no redness or swelling.
  - (c) May be due to a stress fracture.
  - (d) Plan:
    - 1. NSAIDs
    - 2. LD if indicated

OUTLINE SHEET SCSC 2.9-1

MUSCULOSKELETAL SYSTEM – LOWER EXTREMITIES (CONT.)

- 3. Shoe inserts help
  - 4. X-ray to rule-out stress fracture
  - 5. Refer to Podiatry if no improvement
  
- (7) Plantar fasciitis – Inflammation of the longitudinal ligaments that form the arch of the foot.
  - (a) It is characterized by mid foot and heel pain that increases in severity with prolonged weight bearing and is worse in the morning or after periods of prolonged sitting.
  - (b) The heel tenderness is usually midline with increased tenderness on calcaneal compression.
  - (c) There may be limited Achilles tendon flexibility and decreased dorsiflexion.
  - (d) Plan:
    - 1. NSAIDs and ice massage.
    - 2. Arch support
    - 3. Light weight bearing for 3 days.
    - 4. Refer to Podiatry if no improvement
  
- (8) Morton Neuroma – Chronic irritation or inflammation and enlargement of the digital nerve located in the web space between the MTP heads.
  - (a) Pressure from below (walking or standing on hard surfaces with poorly padded shoes) and pressure from the sides (tight shoes) cause irritation.
  - (b) The PT complains of pain between the toes or numbness of the sides of two adjacent toes.
  - (c) Local tenderness is greatest in the web space between the MTP heads.
  - (d) This is in contrast to tenderness at the MTP heads of metatarsalgia.
  - (e) Firm pressure is needed to elicit the pain.

OUTLINE SHEET SCSC 2.9-1

MUSCULOSKELETAL SYSTEM – LOWER EXTREMITIES (CONT.)

- (f) Pain can also be reproduced by squeezing the MTP head from either side (medial and lateral).
  - (g) This compression may cause an electric-like pain to shoot to the ends of the adjacent two toes.
  - (h) More severe cases may show loss of sensation along the inner aspects of the adjacent two toes.
  - (i) Light touch and pain sensation may be decreased.
  - (j) Plan:
    1. Wide toe-box shoes.
    2. Padded insoles
    3. Use cotton or rubber spaces between toes.
    4. Refer to Podiatry if no improvement
- (9) Septic Arthritis (Gonococcal Arthritis) – Inflammation of a joint that results from an infection.
- (a) Caused by germs (bacteria) that enter the joint. Septic arthritis often starts with a painful joint that suddenly gets hot and red.
  - (b) Often starts with a painful joint that suddenly gets swollen, hot and red.
  - (c) The knee and hip joints are most often affected, but other joints may become infected.
  - (d) Also presents with fever, chills and inability to move the joint.
  - (e) Plan:
    1. Lab tests
    2. Fluid removal from the joint to look for signs of infection (synovial fluid analysis)
    3. X-ray

OUTLINE SHEET SCSC 2.9-1

MUSCULOSKELETAL SYSTEM – LOWER EXTREMITIES (CONT.)

4. Antibiotics

5. Fluid drained from the joint every day for several days to relieve pain

6. Summary and Review

Utilize the knowledge of musculoskeletal system anatomy while assessing a patient with a musculoskeletal complaint

Utilize the knowledge of musculoskeletal system physiology while assessing a patient with a musculoskeletal complaint

Obtain history from patient with common orthopedic disorders

Perform an orthopedic examination

State signs and symptoms of common orthopedic disorders

State treatments for common orthopedic disorders

State Red Flag criteria

JOB SHEET SCSC 2.9-3

LOWER EXTREMITIES

A. INTRODUCTION

Upon successful completion of this lesson the Trainee will be able to perform a musculoskeletal system – lower extremity examination on a real or simulated patient (a person acting as a patient).

B. EQUIPMENT LIST: The primary instructor is responsible for checking that all of the below equipment is available, functional and in the lab before the lab is scheduled to begin:

1. Real or simulated patient (a person acting as a patient)
2. Cotton balls or cotton-tipped applicators
3. Tongue depressor
4. Reflex Hammer
5. Tuning Fork
6. Tape Measure

C. REFERENCES

1. Seidel’s Guide to Physical Examination, 8th Ed., Jane W. Ball, Joyce E. Dains, John A. Flynn, Barry S. Soloman, Rosalyn W. Stewart, Mosby, an imprint of Elsevier Inc., 2015
2. Bates’ Guide to Physical Examination and History Taking, 12th Ed., Lynn S. Bickley and Peter G. Szilagyi, Wolters Kluwer, 2017, <https://STAT!Ref.com>
3. Essentials of Musculoskeletal Care, 5th Ed., April D. Armstrong and Mark C. Hubbard, AAOS, 2016; <https://Statref>

D. SAFETY PRECAUTIONS

1. Instructors, Trainees and visitors must comply with all general safety procedures that are posted in the lab environment or provided in the lesson plan.
2. There are no skill specific safety hazards for this Performance Test.
3. Review TTO procedures in the Safety/Hazard Awareness Notice.
4. Trainees will not practice if an instructor is not present
5. Trainees may not take equipment out of the lab
6. Trainees will follow universal precautions and wear proper PPE.

E. JOB STEPS

1. Trainee Instructions:
  - a. The purpose of this assessment is to evaluate the Trainee’s knowledge of the practical application of conducting lower extremity musculoskeletal examination.

JOB SHEET SCSC 2.9-3

LOWER EXTREMITIES (CONT.)

- b. The Trainee must perform a complete physical examination of the lower extremity musculoskeletal system and explain each step as it is performed.
- c. The Trainee has 20 minutes to complete this examination.
- d. The Trainee is not allowed to use the reference in the performance of this assessment.
- e. The Trainee will wear appropriate attire during the practice and actual assessment evaluation.

**AT MEDICAL REPRESENTATIVE DIRECTION, OBTAIN PATIENT HISTORY PERTAINING TO MUSCULOSKELETAL SYSTEM BY COMPLETING THE FOLLOWING STEPS:**

- 1. \*Ask patient’s chief complaint
- 2. \*Ask patient about onset of symptoms and pain. Specific MOI
- 3. \*Ask about pain location, does it radiate or stay in place
- 4. Ask about duration, does it come and go or is it constant
- 5. Ask about the quality of the pain, what it feels like sharp, dull, ache etc.
- 6. Ask what makes it worse
- 7. Ask what makes it better
- 8. Ask if there is a time of day that their symptoms are better or worse
- 9. \*Ask about where their pain is on the pain scale of (1-10)
- 10. Ask about any other symptoms they notice
- 11. Ask about affect to activities of daily living
- 12. Gather patients past medical history, SAMPLE
- 13. Gather Surgical History
- 14. Gather Family History

JOB SHEET SCSC 2.9-3

LOWER EXTREMITIES (CONT.)

15. Gather Social History

16. Review of systems, minimum of constitutional questions

**AT MEDICAL REPRESENTATIVE DIRECTION, OBTAIN A GENERAL IMPRESSION PERTAINING TO MUSCULOSKELETAL SYSTEM BY COMPLETING THE FOLLOWING STEPS:**

1. \*Form General Impression
2. \*Obtain Vital Signs

**AT MEDICAL REPRESENTATIVE DIRECTION, PERFORM AN ANKLE AND FOOT EXAMINATION BY COMPLETING THE FOLLOWING STEPS:**

1. Inspect ankles bilaterally for symmetry, ecchymosis, edema, effusion, deformities, hallux valgus, claw toes, hammer toes, ingrown nails
2. Identify anatomical structures: medial/lateral malleolus, Achilles tendon, calcaneus, navicular bone
3. Explain Ottawa criteria
4. Palpate for tenderness, crepitus, tendon thickening, plantar fascia, metatarsophalangeal joints, metatarsal heads
5. \*Check ROM for plantar flexion, dorsiflexion, inversion, eversion, forefoot adduction, forefoot abduction
6. \*Test patient strength bilaterally
7. \*Test patient sensation bilaterally
8. Test patient reflexes bilaterally
9. \*Check pulses bilaterally and cap refill

**AT MEDICAL REPRESENTATIVE DIRECTION, PERFORM ANKLE AND FOOT SPECIAL TESTS BY COMPLETING THE FOLLOWING STEPS:**

1. Perform Anterior/Posterior Drawers Test
2. Perform Talar Tilt Test

JOB SHEET SCSC 2.9-3

LOWER EXTREMITIES (CONT.)

3. Perform Ankle Dorsiflexion Test
4. Perform Thompson's Test
5. Perform Morton's Test
6. Perform Test for Homan's Sign

**AT MEDICAL REPRESENTATIVE DIRECTION, PERFORM A KNEE EXAMINATION BY COMPLETING THE FOLLOWING STEPS:**

1. Inspect knees bilaterally for symmetry, edema, effusion, deformities
2. Identify anatomical structures: Tibial tuberosity, patella, medial/lateral joint lines, patellar tendon
3. Palpate for tenderness, crepitus, abnormalities, ligament tenderness and joint line tenderness
4. \*Check ROM for flexion, extension, abduction, adduction, internal and external rotation
5. \*Test patient strength bilaterally
6. \*Test patient sensation bilaterally
7. Test patient reflexes bilaterally
8. \*Check pulses bilaterally and Cap Refill

**AT MEDICAL REPRESENTATIVE DIRECTION, PERFORM KNEE SPECIAL TESTS BY COMPLETING THE FOLLOWING STEPS:**

1. Perform Apprehension test
2. Patellar grind test
3. Check for Bulge sign
4. Perform Varus/Valgus
5. Perform Anterior/Posterior Drawers Test

## JOB SHEET SCSC 2.9-3

## LOWER EXTREMITIES (CONT.)

6. Perform Lachman's Test
7. Perform McMurray Test
8. Perform Apley's Compression Test

**AT MEDICAL REPRESENTATIVE DIRECTION, PRESENT FINDINGS BY COMPLETING THE FOLLOWING STEPS:**

1. \*Present findings of focused physical exam to provider
2. \*Document all history, findings interventions and procedures

**AT MEDICAL REPRESENTATIVE DIRECTION, PROVIDE PATIENT EDUCATION AND TREATMENT BY COMPLETING THE FOLLOWING STEPS:**

1. \*Perform appropriate splinting and sling as required
2. \*Distribute medication per provider's orders and with five rights
3. Provides reassurance and answer patient questions
4. Provide patient education and home therapy handouts
5. \*Document and provide duty status determination paperwork
6. Ensure patient understands need to follow up and/or referral procedures

OUTLINE SHEET SCSC 2.10-1

INTEGUMENTARY SYSTEM

A. INTRODUCTION

B. ENABLING OBJECTIVES

1.52 Utilize the knowledge of integumentary system anatomy while assessing a patient with an integumentary complaint

1.53 Utilize the knowledge of integumentary system physiology while assessing a patient with an integumentary complaint

1.54 Identify types of lesions

1.55 Perform a dermatological examination

1.56 State signs and symptoms of common dermatological disorders

1.57 State treatments for common dermatological disorder

1.16 Identify Red Flag criteria

C. SCSC 2.10-1 INTEGUMENTARY SYSTEM TOPIC OUTLINE

1. Introduction

- a. The integumentary system helps maintain a constant body temperature, protects the body, and provides sensory information about the surrounding environment. Of all of the body's organs, none is more easily inspected or more exposed to infection, disease, and injury than the skin. Although its location makes it vulnerable to damage from trauma, sunlight, microbes, and pollutants in the environment, the skin's protective features ward off such damage. Because of its visibility, skin reflects our emotions (frowning, blushing) and some aspects of normal physiology (such as sweating).

2. Identify the anatomy of the Integumentary system

- a. The Integumentary system is composed of the skin, hair, oil and sweat glands, nails and sensory receptors. Of all the body's organs none is more easily inspected or more exposed to infections, disease and injury than the skin.

b. Layers of the skin

- (1) Epidermis: The avascular layer that provides the major part of the barrier, and consists of two layers:

OUTLINE SHEET SCSC 2.10-1

INTEGUMENTARY SYSTEM (CONT.)

- (a) Stratum Corneum: Protects the body against harmful environmental substances and restricts water loss.
  - (b) Cellular Stratum: Where keratin cells are synthesized.
  - (2) Dermis: The connective tissue layer of the skin that supports and separates the epidermis from the cutaneous adipose tissue. Contains autonomic motor nerves that innervate blood vessels and glands.
  - (3) Hypodermis: Also known as the subcutaneous layer (Sub-Q). The dermis is connected to underlying organs by the hypodermis, a subcutaneous layer that consists of loose connective tissue filled with fatty cells.
- c. Skin appendages
- (1) Sebaceous Glands
    - (a) Also known as the Oil Glands, and are often connected to the hair follicles
    - (b) The secreting portion of a sebaceous gland lies in the dermis and usually opens into the neck of a hair follicle. In some locations, such as the lips, glans penis, labia minora, and tarsal glands of the eyelids, sebaceous glands open directly onto the surface of the skin.
  - (2) Sweat Glands: The cells of these glands release sweat, or perspiration, into hair follicles or onto the skin surface through pores.
  - (3) Hair:
    - (a) Each hair is composed of columns of dead, keratinized epidermal cells bonded together by extracellular proteins.
    - (b) Is present on most skin surfaces except the palms, palmar surfaces of the fingers, the soles and plantar surface of the feet.
  - (4) Nails:
    - (a) Nails are plates of tightly packed, hard, dead, keratinized epidermal cells that form a clear, solid covering over the dorsal surfaces of the distal portions of the digits.
    - (b) Each nail consists of a nail body, a free edge, and a nail root

OUTLINE SHEET SCSC 2.10-1

INTEGUMENTARY SYSTEM (CONT.)

3. Describe the physiology of the Integumentary system
  - a. Functions of the Skin.
    - (1) The numerous functions of the integumentary system include: thermoregulation, storage of blood, protection, cutaneous sensations, excretion and absorption, and synthesis of vitamin D.
      - (a) Thermoregulation: The skin contributes to thermoregulation in two ways: by liberating sweat at its surface and by adjusting the flow of blood in the dermis.
      - (b) Blood Reservoir: The dermis houses an extensive network of blood vessels that carry 8–10% of the total blood flow in a resting adult. For this reason, the skin acts as a blood reservoir.
      - (c) Protection: The skin provides protection to the body in various ways. Keratin protects underlying tissues from microbes, abrasion, heat, and chemicals, and the tightly interlocked keratinocytes resist invasion by microbes.
      - (d) Cutaneous Sensations: Are sensations that arise in the skin, including tactile sensations (touch, pressure, vibration, and tickling) as well as thermal sensations such as warmth and coolness. Another cutaneous sensation, pain, usually is an indication of impending or actual tissue damage.
      - (e) Excretion and Absorption: The skin normally has a small role in excretion, the elimination of substances from the body, and absorption, the passage of materials from the external environment into body cells.
      - (f) Synthesis of vitamin D: Requires activation of a precursor molecule in the skin by ultraviolet (UV) rays in sunlight. Enzymes in the liver and kidneys then modify the activated molecule, finally producing calcitriol, the most active form of vitamin D.
    - (2) Functions of the Sebaceous Glands. Sebaceous glands secrete an oily substance called sebum. Sebum coats the surface of hairs, prevents them from drying or becoming brittle and inhibits the growth of some bacteria.
    - (3) Functions of the Sweat Glands: The main function of sweat glands are to help regulate body temperature through evaporation. As sweat evaporates, large quantities of heat energy leave the body surface. The homeostatic regulation of body temperature is known as thermoregulation.

OUTLINE SHEET SCSC 2.10-1

INTEGUMENTARY SYSTEM (CONT.)

(4) Functions of the Hair

- (a) Provides protection from the sun's rays and decrease heat loss.
- (b) Eyebrows and Eyelashes protect the eyes from foreign particles
- (c) Touch receptors (hair root plexuses) associated with hair follicles are activated whenever a hair is moved even slightly. Thus, hairs also function in sensing light touch.

(5) Functions of the Nails

- (a) They protect the distal end of the digits.
- (b) They provide support and counter-pressure to the palmar surface of the fingers to enhance touch perception and manipulation.
- (c) They allow us to grasp and manipulate small objects, and they can be used to scratch and groom the body in various ways.

4. Identify types of lesions

a. Many cutaneous lesions can be identified based upon clinical appearance, biopsy is necessary for definitive diagnosis.

(1) It is critical to differentiate benign lesions from those with malignant potential, because some bear a close resemblance to more invasive and malignant lesions

(2) Skin irregularities should be evaluated for:

- (a) Asymmetry: Of one side compared to the other
- (b) Borders: Especially if ragged, notched, or blurred
- (c) Color: More than two colors, especially blue-black, white (loss of pigment due to regression), or red (inflammatory reaction to abnormal cells)
- (d) Diameter: Greater than 6 mm (Approximately the size of a pencil eraser).
- (e) Evolution over time: Changing rapidly in size, symptoms, or morphology

OUTLINE SHEET SCSC 2.10-1

INTEGUMENTARY SYSTEM (CONT.)

b. Skin Lesions

(1) It is important to use specific terminology to describe skin lesions and rashes. Good descriptions include each of the following elements: number, size, color, shape, texture, primary lesion, location, and configuration.

(2) Describing Skin Findings

(a) Primary lesion: Primary lesions are flat or raised.

1. Flat: You cannot palpate the lesion with your eyes closed.

a. Macule: Lesion is flat and <1 cm.

b. Patch: Lesion is flat and >1 cm.

2. Raised: You can palpate the lesion with eyes closed.

a. Papule: Lesion is raised, <1 cm, and not fluid filled.

b. Plaque: Lesion is raised, >1 cm, but not fluid filled.

c. Vesicle: Lesion is raised, <1 cm, and filled with fluid.

d. Bulla: Lesion is raised, >1 cm, and fluid filled.

3. Other primary lesions include erosions, ulcers, nodules, ecchymosis, petechiae, and palpable purpura.

4. Number: Lesions can be solitary or multiple. If multiple, record how many. Also consider estimating the total number of the type of lesion you are describing.

5. Size: Measure with a ruler in millimeters or centimeters. For oval lesions, measure in the long axis, then perpendicular to the axis.

6. Shape: Some good words to learn are "circular," "oval," "annular" (ring-like, with central clearing), "nummular" (coin-like, no central clearing), and "polygonal."

7. Color: Use your imagination and be creative. Refer to a color wheel, if needed. There are many shades of tan and brown, but start with tan, light brown, and dark brown if you are having trouble.

OUTLINE SHEET SCSC 2.10-1

INTEGUMENTARY SYSTEM (CONT.)

- a. Use "skin-colored" to describe a lesion that is the same shade as the patient's skin.
  - b. For red lesions or rashes, blanch the lesion by pressing it firmly with your finger or a glass slide to see if the redness temporarily lightens then refills.
8. Texture: Palpate the lesion to see if it is smooth, fleshy, verrucous or warty, or scaly (fine, keratotic, or greasy scale).
  9. Location: Be as specific as possible. For single lesions, measure their distance from other landmarks (e.g., 1 cm lateral to left oral commissure).
  10. Configuration: Although not always necessary, describing patterns is often very helpful.
- (b) Secondary Lesions: Evolve from primary lesions. Can be due to infection, trauma, etc. (e.g. scratching)
1. Scales: Spontaneous shedding of the outer layer of the skin (such as dandruff).
  2. Crusts: An accumulation of dried fluid (blood, serum or pus) on the skin surface. Usually the result of the rupture of a vesicle or pustule (the honey colored crusts of impetigo)
  3. Excoriations: Breaks in the skin resulting from scratching.
  4. Erosion: Superficial loss of epidermis.
  5. Ulcer - Loss of epidermis and dermis below dermal-epidermal junction; associated with scars when healed.
  6. Scar - Formation of connective tissue that indicates the dermal-epidermal junction has been violated. A keloid results from overproduction of connective tissue scar.
  7. Fissure - Line-shaped break in the epidermis with vertical wall through the dermal-epidermal junction. (chapped lips, hands)

OUTLINE SHEET SCSC 2.10-1

INTEGUMENTARY SYSTEM (CONT.)

5. Perform a dermatological examination

a. Subjective. This is the subjective portion of your SOAP Notes.

(1) Chief Complaint (CC) - What skin problem is the patient complaining of? ("itchy rash in the groin for 10 months")

(2) History of present illness (HPI)

(a) Changes in skin: Dryness, pruritus, sores, rashes, lumps, color, texture, odor, amount of perspiration; changes in wart or mole; lesion that does not heal or is chronically irritated

(b) Date of initial onset: Time sequence of occurrence and development; sudden or gradual onset; date of recurrence, if any.

(c) Symptoms: Itching, pain, exudate, bleeding, color changes, seasonal or climate variations

(d) Location: Skinfolds, extensor or flexor surfaces, localized or generalized, sun exposed or protected, mucosal involvement

(e) Recent Exposure to environmental or occupational toxins or chemicals, new skin or personal care products, new household cleaning products (aerosols)

(f) Recent exposure to persons with similar skin condition

(g) Apparent cause of problem, patient's perception of cause

(h) Travel history: where, when, length of stay, exposure to diseases, contact with travelers

(i) What the patient has been doing for the problem, response to treatment, what makes the condition worse or better

(j) How the patient is adjusting to the problem

(k) Medications: antibiotics, any new medications, topical preparations to treat—steroids, antifungals

(3) Past Medical History (PMHx)

OUTLINE SHEET SCSC 2.10-1

INTEGUMENTARY SYSTEM (CONT.)

(a) Skin

1. Previous skin problems: sensitivities, allergic skin reactions, skin disorders (e.g., atopic dermatitis), congenital or acquired lesions, treatment
2. Tolerance to sunlight
3. Diminished or heightened sensitivity to touch
4. Cardiac, respiratory, liver, endocrine, or other systemic diseases

(b) Hair

1. Previous hair problems: Loss, thinning, unusual growth or distribution, brittleness, breakage, treatment
2. Systemic problems: Thyroid disorder, rheumatologic disease, any severe illness, malnutrition, associated skin disorder

(c) Nails

1. Previous nail problems: injury; bacterial, fungal, or viral infection
2. Systemic problems: associated skin disorder; congenital anomalies; respiratory, cardiac, endocrine, hematologic, or other systemic disease

(4) Family History

- (a) Current or past dermatologic diseases or disorders in family members; melanoma; dermatoses (e.g., psoriasis); infestations; bacterial, fungal, or viral infections
- (b) Allergic hereditary diseases such as asthma or allergic rhinitis
- (c) Familial hair loss or pigmentation patterns

(5) Personal and Social History

- (a) Skin care habits: cleansing routine; soaps, oils, emollients, or local applications used; cosmetics; home remedies or preparations used; sun exposure patterns and history; sunburn history; use of sunscreen agents; recent changes in skin care habits

OUTLINE SHEET SCSC 2.10-1

INTEGUMENTARY SYSTEM (CONT.)

- (b) Hair care habits: cleansing routine, shampoos and oils and moisturizers, coloring preparations used, permanents, applied heat, hair straightening, extensions, and recent changes in hair care habits. Note that hair care practices can vary by race and hair type
  - (c) Nail care habits: any difficulty in clipping or trimming nails, instruments used; biting nails; use of artificial nail overlays
  - (d) Exposure to environmental or occupational hazards: dyes, chemicals, plants, toxic substances, frequent immersion of hands in water, frequent sun exposure
  - (e) Recent psychological or physiologic stress
  - (f) Use of alcohol, tobacco
  - (g) Sexual history: sexually transmitted infections (syphilis, gonorrhea, human immunodeficiency virus HIV)
- (6) Review of Systems
- (a) Constitutional: Fever, chills, fatigue, weakness, weight changes, night sweats
  - (b) Cardiovascular: Chest pain or distress (precipitating causes, timing and duration, relieving factors), palpitations, orthopnea, edema, hypertension, previous myocardial infarction, exercise tolerance, past electrocardiogram and other cardiac tests, tendency to bruise or bleed
  - (c) Gastrointestinal: Dysuria, flank or suprapubic pain, urgency and frequency or urination, nocturia, hematuria, polyuria, dark or discolored urine, hesitancy, dribbling, loss in force of stream, passage of stone, stress incontinence, hernias, STD's
  - (d) Endocrine: Diabetes, pigmentation changes, heat or cold intolerance, sweating, frequent urination, excessive thirst, decreased libido, hirsutism
  - (e) Blood and lymph: Lumps, bruising, bleeding tendencies, lymphadenopathy, anemia, cancer
- b. Objective. This is the objective portion of your SOAP Notes.
- (1) Physical Examination

OUTLINE SHEET SCSC 2.10-1

INTEGUMENTARY SYSTEM (CONT.)

(a) Skin

1. Inspection

- a. Adequate lighting is essential. Direct, overhead lighting should be used when examining patients. Inadequate lighting can result in inadequate assessment.
- b. Although the skin is commonly observed as each part of the body is examined, it is important to make a brief but careful overall visual sweep of the entire body. This “bird's-eye view” gives a good idea of the distribution, extent, and symmetry of any lesions
- c. Adequate exposure of the skin is necessary. It is essential to remove clothing and to fully remove drapes or coverings as each section of the body is examined.
- d. When inspecting the skin, it is important to have a systematic routine in place to ensure that no areas are forgotten.
- e. Callused areas may appear yellow. Vascular flush areas (e.g., cheeks, neck, upper chest, and genital area) may appear pink or red, especially with anxiety or excitement. Be aware that skin color may be masked by cosmetics and tanning agents. Look for localized areas of discoloration.
- f. Nevi (moles) occur in forms that vary in size and degree of pigmentation. Nevi are present on most persons regardless of skin color, and may occur anywhere on the body. They may be flat, raised, dome-shaped, smooth, rough, or hairy. Their color ranges from pink, tan, gray, and shades of brown to black.

2. Palpation

- a. As you inspect, palpate the skin for moisture, temperature, texture, turgor, and elasticity. Palpation may yield additional data for describing lesions, particularly in relation to elevation or depression.
- b. Minimal perspiration or oiliness should be present. Increased perspiration may be associated with activity, warm environment, obesity, anxiety, or excitement; it may be especially noticeable on the palms, scalp, forehead, and in the axillae.

OUTLINE SHEET SCSC 2.10-1

INTEGUMENTARY SYSTEM (CONT.)

- c. The skin should range from cool to warm to the touch. Use the dorsal surface of your hands or fingers because these areas are most sensitive to temperature perception.
- d. Assessment of skin elasticity can be helpful to detect certain conditions.

(b) Hair

- 1. Inspection: Hair is commonly present on the scalp, lower face, neck, nares, ears, chest, axillae, back and shoulders, arms, legs, toes, pubic area, and around the nipples. Note hair loss, which can be either generalized or localized. Inspect the lower legs and feet for hair loss that may indicate poor circulation or nutritional deficit.
- 2. Palpate the hair for texture while inspecting it for color, distribution, and quantity. The scalp hair may be coarse or fine, curly or straight, and should be shiny, smooth, and resilient. Palpate the scalp hair for dryness and brittleness that could indicate a systemic or genetic disorder.

(c) Nails

- 1. Inspection
  - a. Inspect the nails for color, length, configuration, symmetry, and cleanliness. The condition of the fingernails can provide important insight to the patient's sense of self as the condition of the hair and nails gives a clue about the patient's level of self-care and some sense of emotional order and social integration. The nails also can demonstrate physical examination signs that may indicate an underlying systemic disease.
  - b. Nail edges should be smooth and rounded. Jagged, broken, or bitten edges or cuticles are indicators of poor care habits and may predispose the patient to localized infection.
  - c. Examine the proximal and lateral nail folds for redness, swelling, pus, warts, cysts, and tumors. Pain usually accompanies ingrown nails and infections.
  - d. The shape and opacity of nails vary considerably among individuals. Nail bed color should be variations of pink. Pigment deposits or bands may be present in the nail beds of persons with dark skin

OUTLINE SHEET SCSC 2.10-1

INTEGUMENTARY SYSTEM (CONT.)

e. The nail plate should appear smooth and flat or slightly convex.

2. Palpation

a. The nail plates should feel hard and smooth with a uniform thickness. Thickening of the nail may occur from tight-fitting shoes, chronic trauma, and some fungal infections. Thinning of the nail plate may also accompany some nail diseases.

b. Gently squeeze the nail between your thumb and the pad of your finger to test for adherence of the nail to the nail bed.

(2) Special Tests

(a) Woods Lamp Test: The Woods lamp can be used to evaluate epidermal or hypopigmented (lighter skin color) or hyperpigmented (darker skin color) lesions, and to distinguish fluorescing lesions.

1. Darken the room and shine the light on to the area to be examined.

2. Look for well-defined hypopigmented edges, or abnormal hyperpigmentation.

3. Any presence of fluorescent pigmentation indicates some form of fungal infection.

6. List signs and symptoms of common dermatological disorders

a. Acne vulgaris

(1) Commonly referred to as "pimples" or "zits".

(2) Disease of sebaceous glands with onset around puberty. Usually begins with excessive sebum (oil) production, which then causes plugging of the sebaceous gland. This forms the "comedones". Continued plugging causes infection, which lead to redness of the plugged up pores (papules, pustules). The infection could get severe and deep-seeded and lead to cystic formations and nodules.

(3) This disease can be persistent and stubborn and form lasting changes on the face (scars and pitting).

OUTLINE SHEET SCSC 2.10-1

INTEGUMENTARY SYSTEM (CONT.)

(4) Acne is not limited to the face, it can also affect the neck, shoulders, chest and back.

(5) Severity ranges from mild to severe.

(6) Exam:

(a) Mild Acne - predominance of open comedones (blackheads), closed comedones (whiteheads) with few erythematous papules

(b) Moderate Acne - predominance of erythematous papules mixed with pustules.

(c) Severe Acne - predominance of cysts and nodules with scarring.

(7) Plan:

(a) Instruct patient not to squeeze lesions.

(b) Keep face clean and dry.

(c) Mild form - Salicylic acid or benzoyl peroxide wash and/or Retin-A

(d) Moderate form - Retin-A, long term use of antibiotics (Tetracycline or Minocycline)

(e) Severe form - Dermatology consultation for Accutane therapy

b. Folliculitis/Furuncles/Carbuncles

(1) Result from infections by tissue invasive bacteria, generally Staphylococcus aureus.

(2) Folliculitis is a localized infection of a hair follicle.

(3) Furuncle (boil) is a worse form of folliculitis. It is larger, involves the tissue surround the affected hair, and deeper into the skin.

(4) Carbuncle is a large coalescence (grouping together) of a few furuncles with several draining points.

(5) Exam/Signs and Symptoms: Lesions vary in size, very tender and erythematous. Initially they are firm, but centers become fluctuant (movable and compressible). Check for inflamed regional lymph nodes.

OUTLINE SHEET SCSC 2.10-1

INTEGUMENTARY SYSTEM (CONT.)

- (a) Folliculitis - erythematous papules/pustules are the base of a hair follicle; can be painful to touch.
- (b) Furuncles - erythematous, painful nodule; usually firm but can be fluctuant.
- (c) Carbuncle - erythematous, painful, cyst/nodule; painful and warm to touch; fluctuant.

(6) Plan:

- (a) Keep hands off the face and avoid squeezing lesions.
- (b) Immobilize area and avoid over manipulation
- (c) Folliculitis
  - 1. antibiotics (oral Keflex or Dicloxacillin with topical Clindamycin)
- (d) Furuncles
  - 1. Hot compress for 20 minutes TID-QID
  - 2. May require incision and drainage (I&D) if fluctuant, antibiotics (Keflex, Dicloxacillin)
- (e) Carbuncles
  - 1. Hot compressed
  - 2. I&D if fluctuant, pack wound, daily dressing changes
  - 3. Oral antibiotics (Keflex, Dicloxacillin); use IV antibiotics (Cefazolin) if severe enough

c. Impetigo

- (1) An infection of the superficial layers of the skin caused by Strep or Staph.
- (2) Exam/Signs and Symptoms: Usually starts as a small papule that progress into eroded vesicles with "honey-colored crusted plaques" with erythematous base.
- (3) Plan:

OUTLINE SHEET SCSC 2.10-1

INTEGUMENTARY SYSTEM (CONT.)

- (a) Keep area clean and dry
- (b) Antibiotic - Keflex/Dicloxacillin (same as above).
- (c) Refer to provider for referral on isolation procedures

d. Cellulitis

- (1) A deep infection of the skin commonly caused by Strep. Generally there is a recognizable port of entry for the bacteria. For example, fungal infection could break the integrity of the skin, which would allow bacteria to come in and cause cellulitis.
- (2) Always check for port of entry. Can be associated with fever and patient may appear ill. Be extra careful for cellulitis in the face that is close to the eye.
- (3) Exam/Signs and Symptoms:
  - (a) Large, well-defined area of erythema with edema and pain with touch.
  - (b) The appearance and texture is that of an orange peel, where skin pores become accentuated. Check for tender, inflamed lymph nodes.
- (4) Plan:
  - (a) Warm soaks, bed rest, keep affected area elevated
  - (b) Oral antibiotics for small, uncomplicated lesions; May require IV antibiotics if enlarged. Antibiotics choice same for diseases discussed above.
  - (c) Facial cellulitis near the eye requires IV antibiotics and referral for hospitalization. Infection could progress to the eye if not treated appropriately and cause blindness.
  - (d) Refer to provider for referral on isolation procedures

e. Pityriasis Rosea

- (1) A self-limiting mild, scaly, erythematous skin eruption occurring primarily in adolescents and young adults, lasting about 5 to 8 weeks.

OUTLINE SHEET SCSC 2.10-1

INTEGUMENTARY SYSTEM (CONT.)

- (2) First lesion is usually an erythematous patch (herald patch) which then progressed into multiple erythematous macules or papules that follow the cleavage lines of the body, usually in a symmetrical pattern like a Christmas tree.
  - (3) Can be very itchy. Can occur after use of public bathing facilities - hotel bathtubs, hot tubs, pools, etc.
  - (4) Exam/Signs and Symptoms: Numerous flesh-colored or mildly erythematous papules and plaques with fine scaling. Look for "herald patch" and bilateral/symmetrical lesions looking like "Christmas tree". Patient does not look ill.
  - (5) Plan:
    - (a) Symptomatic treatment. Anti-histamines if itchy
    - (b) No medications can cure this disease
    - (c) Exposure to sun actually helps. Tell patient to expose affected areas to the sun.
    - (d) Educate patient that lesions sometime take as long as 8 weeks (even longer) to cure.
    - (e) If persistent, start looking for other diagnosis (e.g. secondary syphilis)
- f. Psoriasis
- (1) A chronic disease characterized by over production of new skin.
  - (2) Instead of taking 19 days to replicate it takes only 1.5 days causing the skin to thicken, forming the classic silver scales.
  - (3) The scalp, elbows, knees, groin, and feet are more commonly involved.
  - (4) Can be mildly itchy.
  - (5) Cosmetics is a big issue for these people.
  - (6) Exam: Irregularly shaped, lichenified (thickened) plaques with flaky silver scales. Look for excoriation. Don't just look at obvious areas. May also be present on the buttocks. Do a full body exam. Some patients will have pitting of the nails. Check joints for arthritis

OUTLINE SHEET SCSC 2.10-1

INTEGUMENTARY SYSTEM (CONT.)

(7) Plan:

- (a) Steroid cream & sun bathing for mild cases
- (b) Mild-moderate may require topical steroid, tar and other moisturizer.
- (c) Moderate to severe often require dermatologic consultation for UV therapy
- (d) Severe (full body) forms definitely require dermatology.

g. Tinea Infections

- (1) Fungal infection of the skin, hair and nails.
- (2) Patient usually complains of itching, which then spreads the rash.
- (3) Signs and Symptoms: Generally, the physical exam findings range from mild scaling and erythema to exfoliation, fissuring and maceration. Diagnosis is made by physical examination. However, it is prudent to take samples of the scales and Treatment for skin lesions is topical antifungals (Clotrimazole, Miconazole).
- (4) Hair and nails involve oral medications and should be referred to the medical provider. Keeping areas clean and dry at all times is key to the healing process.
- (5) Below lists the different types of tinea based on which body part is affected:
  - (a) Tinea capitis – scalp
    - 1. Areas of alopecia, scaling
    - 2. Black males tend to have no symptoms
    - 3. Tx: Topical antifungals (Clotrimazole, Miconazole).
  - (b) Tinea Corporis – body
    - 1. Intensely pruritic (itchy)
    - 2. Annular lesions with an advancing serpinginous borders with central clearing
    - 3. Scales, pustules, vesicles may appear

OUTLINE SHEET SCSC 2.10-1

INTEGUMENTARY SYSTEM (CONT.)

4. Tx: Topical antifungals (Clotrimazole, Miconazole).

(c) Tinea Cruris – groin

1. Intertriginous areas on adjacent upper thigh and buttock; scrotum rarely ever involved

2. Intense pruritus

3. Annular lesions with an advancing serpiginous borders with central clearing

4. Tx: Topical antifungals (Clotrimazole, Miconazole).

(d) Tinea Manus – hand

1. Usually in the dominant hand of a patient

2. Resembles tinea corporis

3. Tine unguium – nails

4. Chalky, crumbly, white thickened nails

5. Pitting changes on nail surface

6. Tx: Topical antifungals (Clotrimazole, Miconazole).

(e) Tinea Pedis – feet

1. May be intensely pruritic

2. May look like annular lesions with an advancing serpiginous borders with central clearing

3. Mild form presents with chalky appearance of plantar surface with fine scaling

4. Worst kind usually with fissuring, vesicles, maceration, and at time bleeding, in the toe webs

OUTLINE SHEET SCSC 2.10-1

INTEGUMENTARY SYSTEM (CONT.)

5. Care for the infected feet is critical. Must alternate shoes every day. Keep feet dry with frequent socks change and use of antifungal powder. When washing feet, make sure they are dried properly before wearing shoes/boots. Air out feet frequently, wear slippers when not at work.
6. Plan
  - a. Topical antifungals
  - b. Oral antifungals
  - c. Foot powder
  - d. Avoid tight fitting clothes
  - e. Hygiene practices
- h. Tinea Versicolor
  - (1) Another form of fungal infection resulting in hyper or hypo pigmented irregularly shaped scaly patches noted primarily on the back and chest occurring in hot, humid weather.
  - (2) The patches can be either lighter or darker than the surrounding skin, thus the name "versicolor" or reversal of color.
  - (3) Note that the fungi causing Tinea are different from the fungus that causes Tinea versicolor.
  - (4) Plan:
    - (a) Selsun shampoo, applied 10-15 minutes prior to shower, allow to dry, then rinse. Do for 7-14 days. Repeat as needed for control.
    - (b) Educate patient that this is a very stubborn skin disease that may persist for a long time.
    - (c) If no resolution, refer to MD for oral antifungal.
- i. Eczema
  - (1) The word "eczema" is simply a descriptive term, not a specific disease.

OUTLINE SHEET SCSC 2.10-1

INTEGUMENTARY SYSTEM (CONT.)

(2) Exam/Signs and Symptoms:

- (a) Under eczema are skin problems that have eczematous inflammation consisting of redness, scaling, vesicles and itching.
- (b) Eczema spreads when the patient responds to the itch by scratching. This leads for further irritation, which then allows for a full blown disease.
- (c) Acute eczema itches intensely. Patients scratch the eruption even while sleeping. A hot shower temporarily relieves itching because the pain produced by hot water is better tolerated than the sensation of itching, heat aggravates acute eczema.

(3) Plan:

- (a) Topical and systemic corticosteroids help some patients dramatically.
- (b) Educate patients to avoid anything that irritates the skin.

j. Contact Dermatitis

(1) This is an inflammatory response to a substance that has come into contact with the skin.

(2) Exam/Signs and Symptoms: Contact dermatitis results from the irritating effects of a specific agent on the skin. The agents could be any chemical, solvent, detergent, plant, metal, etc. The classic example is a reaction to "poison ivy". The contacted area becomes intensely pruritic and becomes erythematous. Grouped vesicles/bullae of varying sizes develop. When these lesions erupt, they weep and painful exposed areas develop.

(3) Plan:

- (a) Antihistamines such as Benadryl, Atarax, Allegra or Claritin are good oral medications.
- (b) Washing the exposed area with soap and water helps in removing toxins.
- (c) Topical medications such as corticosteroids (Hydrocortisone, Betamethasone) can be applied directly to the lesion several times a day to cause relief. Instruct patient to avoid irritating agents.

k. Atopic Dermatitis

OUTLINE SHEET SCSC 2.10-1

INTEGUMENTARY SYSTEM (CONT.)

- (1) This is a chronic, pruritic condition of the skin that is genetically determined and associated with a personal or family history of atopic disease (asthma, allergic rhinitis).
  - (2) Pruritus is the most distressing and prominent symptom.
  - (3) Lichenification is the clinical hallmark of atopic dermatitis.
  - (4) Secondary infection is common.
  - (5) In adults, distribution is common in areas where skin folds are common such as the neck, face, antecubital fossa, popliteal fossa and ears.
  - (6) Exam/Signs and Symptoms: Shows erythematous scaling skin which may form blisters and cause oozing and crusting. The involved skin may be markedly dry, thickened (lichenified) and excoriated (scratched).
  - (7) Plan:
    - (a) Topical steroids: Mid- to high-potency steroids are used during acute flares, with tapering to milder potency steroids when control is achieved.
    - (b) Oral antihistamines, such as hydroxyzine or diphenhydramine, may help to decrease itching in selected patients.
    - (c) Oral antibiotics
    - (d) Good skin care is critical to maintenance and includes use of mild soaps, frequent use of emollients, and wet wraps.
    - (e) Avoidance of environmental irritants is recommended. Nail trimming and protective clothing at night to avoid scratching while sleeping is also helpful.
1. Urticaria (Hives)
- (1) An immunologic response to an allergenic stimuli as with drugs, foods, viral infections, dyes, soaps, insect bites, or a response to physical stimuli as with cold, pressure, sunlight, or rubbing/stroking of the skin (dermatographism).
  - (2) Can occur separately or in combination with angioedema. For your purposes, this is a vascular reaction caused by histamine release in response to allergens.

OUTLINE SHEET SCSC 2.10-1

INTEGUMENTARY SYSTEM (CONT.)

(3) Exam/Signs and Symptoms:

- (a) Characterized by a generalized distribution of well circumscribed wheals with red, raised borders. Patient usually experience eruptions of wheals and hives that are intensely pruritic. The wheals may be of several millimeters to severe inches in diameter.
- (b) Remember, urticaria may be the first sign of Anaphylaxis, and death from anaphylactic shock may ensue. Check for other signs of impending anaphylaxis such as swelling of the lips, tongue, eyelids, shortness of breath, and change in voice. Most people who die from anaphylaxis die from respiratory distress

(4) Plan:

- 1. Benadryl, Claritin, Allegra, Atarax. There is a long list of anti-histamines that can be used for simple cases of urticaria.
- 2. For any evidence of anaphylactic reaction, call your medical officer immediately. The patient needs immediate administration of Epinephrine IM and Benadryl IM.

m. Scabies

- (1) An intensely pruritic dermatitis caused by infestation of mites.
- (2) Symptoms may not appear up to a month following the initial infestation. Subsequent infestations produce symptoms with a few days. The patient experiences intense pruritus that is worse at night.

(3) Exam/Signs and Symptoms:

- (a) The primary lesion is the mite's burrow and may be difficult to see. These are gray -brown or skin colored ridges that are a few millimeters in length.
- (b) Secondary lesions are discrete excoriations due to intense pruritus. Papules and vesicles may also be present.
- (c) The location of the lesions are typically in the webs of fingers or along the sides of them, palms, flexures of the wrists, and axillary folds, penis, scrotum, buttocks, nipples, abdominal folds and chest.
- (d) Secondary bacterial infections are not uncommon.

OUTLINE SHEET SCSC 2.10-1

INTEGUMENTARY SYSTEM (CONT.)

- (e) Diagnosis is confirmed by scraping the lesion and adding mineral oil to the slide and identifying the parasite or its eggs under low power.

(4) Plan:

- (a) Topical permethrin or lindane
- (b) Close contacts should also be treated simultaneously, and personal items (e.g., towels, clothing, bedding) should be washed in hot water and dried in a hot drier or isolated (e.g., in a closed plastic bag) for at least 3 days.
- (c) Refer to provider for referral on isolation procedures

n. Pediculosis

- (1) An infestation of lice affecting any part of the body with hair, particularly the scalp and pubis.
- (2) Transmitted easily via close contact.
- (3) The lice live on, rather than in, the body, feeding 5 times a day. They are active and can travel quickly and survive for a week when separated from a host. Lice and eggs (nits) can be found cemented to the bases of hair shafts close to the skin. The patient typically complains of itching in the involved areas.
- (4) Exam/Signs and Symptoms: Check for lice and nits in affected body parts. Check for signs of excoriation.

(5) Plan:

- (a) Good hygiene measures.
- (b) Use Elimite as in scabies.
- (c) Typically, the best way is to remove the lice and nits by shaving hair.

o. Warts (Verrucae vulgaris)

- (1) Benign tumors caused by the human papilloma virus (HPV). Also known as verrucae vulgaris.

OUTLINE SHEET SCSC 2.10-1

INTEGUMENTARY SYSTEM (CONT.)

(2) Patient typically complains of growth of varying size, shape and appearance on any area of the body, but usually on extremities.

(3) Exam/Signs and Symptoms:

- (a) The common wart is flesh colored, dome shaped, firm papule that has a corrugated surface.
- (b) It interrupts the normal skin lines and is studded with black dots which are thrombosed capillaries (a useful diagnostic sign-easily seen after paring or slicing away the surface of the wart).
- (c) The hands are the most common site but warts may be found on any skin surface.
- (d) On the feet they are called plantar warts.
- (e) Some warts are called planar warts because of their flat appearance and are common found on the forehead.
- (f) Subungual and periungual warts, found under and around the nails, are resistant to treatment because much of the wart may be submerged under the nail.

(4) Plan:

- (a) Cryotherapy with liquid nitrogen for warts found in any part of the body except feet.
- (b) Only a medical provider should use cryotherapy on any genital warts. Genital warts are generally treated with Podofilox.
- (c) Salicylic acid plasters work well on plantar warts. Plantar warts aren't generally treated unless they are symptomatic and cause pain/discomfort.

p. Herpes

(1) Characteristic vesicular rash primarily located in oral and genital regions as the result of infection with

- (a) Herpes simplex virus (HSV)-1 blisters mostly on lips, in mouth, face, eyes

OUTLINE SHEET SCSC 2.10-1

INTEGUMENTARY SYSTEM (CONT.)

- (b) HSV-2 primarily genital herpes, although cross-reactivity is common (HSV-1 can cause genital sores through oral-genital contact)
- (2) Many patients are unaware of a known exposure.
- (3) Prodrome of fatigue, low-grade fever, itching, tingling, or hot skin for several days immediately prior to outbreak of characteristic vesicular rash
- (4) Exam/Signs and Symptoms:
  - (a) Vesicles are often clustered and become painful ulcerated lesions, often with erythematous base.
  - (b) Small vesicles develop on pharyngeal and oral mucosa, rapidly ulcerate, and increase in number to involve soft palate, buccal mucosa, tongue, floor of mouth, lips, and cheeks; tender, bleeding gums; cervical adenopathy; fever, general toxicity, poor oral intake, and excess salivation contribute to dehydration; autoinoculation of other sites may occur; resolves in 10 to 14 days
- (5) Plan:
  - (a) Apply cool dressings moistened with aluminum acetate solution
  - (b) Acyclovir (generic)
  - (c) Valacyclovir (Valtrex)
  - (d) If oral lesions are present, avoid salty, acidic, or sharp foods
  - (e) Explain the natural history that timing of exposure is difficult to determine and that the virus will remain in the body indefinitely. Acknowledging and discussing psychological impact of the diagnosis helps to reduce stigmatization.
  - (f) Emphasize personal hygiene to avoid self-spreading to other body areas (autoinoculation) or exposing others. Frequent hand washing; avoid scratching; cover active, moist lesions.
  - (g) Reinforce safe sexual practices.
- q. Shingles (Herpes Zoster)

OUTLINE SHEET SCSC 2.10-1

INTEGUMENTARY SYSTEM (CONT.)

- (1) Usually presents as a painful unilateral vesicular eruption with a dermatomal distribution
- (2) Results from reactivation of latent varicella-zoster virus (human herpes virus type 3) infection
- (3) Patients with active zoster may transmit disease-causing varicella virus (chickenpox) to susceptible persons.
- (4) Acute rash typically resolves within 14 to 21 days.
- (5) Exam/Signs and Symptoms:
  - (a) Prodromal phase (sensory changes over involved dermatome prior to rash)
    1. Tingling, paresthesias
    2. Itching
    3. Boring "knife-like" pain
  - (b) Acute phase
    1. Rash: initially erythematous and maculopapular; evolves rapidly to grouped vesicles
    2. Vesicles become pustular and/or hemorrhagic in 3 to 4 days.
    3. Weakness (1% have weakness in distribution of rash)
    4. Resolution of rash, with crusts separating by 14 to 21 days
- (6) Plan:
  - (a) Acute treatment
  - (b) Antiviral agents initiated within 72 hours of skin lesions help relieve symptoms, speed resolution, and prevent associated symptoms.
  - (c) Valacyclovir
  - (d) Acyclovir

OUTLINE SHEET SCSC 2.10-1

INTEGUMENTARY SYSTEM (CONT.)

- (e) Encourage good hygiene and proper skin care.
  - (f) Warn of potential risk of transmitting illness (chickenpox) to susceptible persons.
- r. Chickenpox (Varicella Zoster)
- (1) Common, highly contagious generalized exanthem characterized by crops of pruritic vesicles on the skin and mucous membranes following exposure to varicella-zoster virus.
  - (2) Outbreaks tend to occur late winter through early spring in temperate climates
  - (3) Usual incubation period is 14 to 16 days (range, 10 to 21). Patients are infectious from ~48 hours before appearance of vesicles until the final lesions have crusted. Historically, most people acquired chickenpox during childhood and developed lifelong immunity. Varicella is now part of recommended primary vaccination schedule.
  - (4) Exam/Signs and Symptoms:
    - (a) Characteristic rash: crops of vesicles on erythematous bases ("dew drops on a rose petal")
    - (b) Progress from macule to papule to vesicle, then begin to crust
    - (c) Pruritic rash is present in various stages of development.
    - (d) Lesions may be present on mucous membranes, both oral and vaginal.
  - (5) Plan:
    - (a) Supportive: antipyretics for fever; avoid aspirin in children
    - (b) Local and/or systemic antipruritic agents for itching
    - (c) Acyclovir: Decreases duration of fever and shortens time of viral shedding; recommended for adolescents, adults, and high-risk patients; most beneficial if initiated early in the disease ( $\leq 24$  hours)
    - (d) A second attack is rare, but subclinical infection can occur; this happens occasionally after vaccination in children.

OUTLINE SHEET SCSC 2.10-1

INTEGUMENTARY SYSTEM (CONT.)

- (e) Latent infection may recur years later as herpes zoster in adults (and sometimes in children).

s. Skin Cancers

- (1) Two distinct types of skin cancer have been identified: Non-melanoma skin cancer (NMSC), which results from neoplastic transformation of epidermal keratinocytes and encompasses Basal Cell Carcinoma (BCC) and Squamous Cell Carcinoma (SCC), and Melanoma, resulting from neoplastic transformation of melanocytes.
- (2) Prime risk factor is intense sun exposure. High risk individuals are fair skinned.
- (3) Use of sunscreen and other form of sun protection (hats/clothing) are highly recommended.
- (4) Basal Cell Carcinoma (BCC) Signs and Symptoms. A slow growing malignant lesion that rarely metastasize. Appears as a pearly dome shaped or ulcerated lesion. Telangiectasia (tiny, red blood vessels) are present and run through the distinct borders of the lesion. Treatment is dermatology referral for surgical excision.
- (5) Squamous Cell Carcinoma (SCC) Signs and Symptoms. A more extensive malignant lesion involving the dermis and epidermis. Often occurs in areas of chronic sun exposure. Lesions tend to develop rapidly. They are usually small, red, conical, hard nodule that ulcerate quickly. Treatment is dermatology referral for surgical excision.
- (6) Malignant Melanoma Signs and Symptoms. Melanomas are the deadliest of all skin cancers. They vary in appearance from macules to nodules. One way to remember how melanomas look like is by remembering the mnemonic "ABCDE of melanoma".
  - (a) Melanomas are usually asymmetrical (A) in shape.
  - (b) The borders (B) are very irregular, spindly and not smooth.
  - (c) There is a great deal of color (C) variation, so that within the lesion there from be colors of black, purple, blue, white and red.
  - (d) The diameter (D) is generally larger than that of a pencil eraser head.
  - (e) Upon palpation, you'll find that that lesion is elevated (E).

OUTLINE SHEET SCSC 2.10-1

INTEGUMENTARY SYSTEM (CONT.)

(f) Treatment for this type of cancer is dermatology referral for wide excision and full work-up.

(7) Plan: Upon positive findings, an Red Flag to Dermatology is required for further testing and positive diagnosis

7. Perform a Cancer Screening Test

- a. Screening and early detection are essential for progress in both the prevention and treatment of cancer.
- b. Screening for skin cancer, in particular for melanoma, is supported by several criteria. Skin cancer is the most common cancer worldwide

c. The three-point checklist

(1) The three-point checklist was initially developed for nonexperts as a skin cancer screening tool with high sensitivity for pigmented skin cancer, including melanoma and basal cell carcinoma (BCC). This method is based upon three dermoscopic criteria:

- (a) Asymmetry of pattern and distribution of dermoscopic structures
- (b) Atypical network
- (c) Blue-white structures

(2) The asymmetric distribution of colors and structures within a lesion is considered the best predictor of malignancy, followed by blue-white structures and atypical network.

(3) One point is assigned to each criterion present in the lesion.

(4) A total score of two points is considered positive and provides sufficient evidence to warrant a biopsy or referral to an expert.

8. Summary and Review

Utilize the knowledge of integumentary system anatomy while assessing a patient with an integumentary complaint

## OUTLINE SHEET SCSC 2.10-1

## INTEGUMENTARY SYSTEM (CONT.)

Utilize the knowledge of integumentary system physiology while assessing a patient with an integumentary complaint

Identify types of lesions

Perform a dermatological examination

State signs and symptoms of common dermatological disorders

State treatments for common dermatological disorder

State Red Flag criteria

## JOB SHEET SCSC 2.10-3

## INTEGUMENTARY SYSTEM

## A. INTRODUCTION

Upon successful completion of this lesson the Trainee will be able to perform an integumentary system examination on a real or simulated patient (a person acting as a patient).

B. EQUIPMENT LIST: The primary instructor is responsible for checking that all of the below equipment is available, functional and in the lab before the lab is scheduled to begin:

1. Real or simulated patient (a person acting as a patient)
2. Examination Gloves
3. Woods Lamp

## C. REFERENCES

1. Seidel's Guide to Physical Examination, 8th Ed., Jane W. Ball, Joyce E. Dains, John A. Flynn, Barry S. Soloman, Rosalyn W. Stewart, Mosby, an imprint of Elsevier Inc., 2015
2. Bates' Guide to Physical Examination and History Taking, 12th Ed., Lynn S. Bickley and Peter G. Szilagyi, Wolters Kluwer, 2017.

## D. SAFETY PRECAUTIONS

1. Instructors, Trainees and visitors must comply with all general safety procedures that are posted in the lab environment or provided in the lesson plan.
2. There are no skill specific safety hazards for this Performance Test.
3. Review TTO procedures in the Safety/Hazard Awareness Notice.
4. Trainees will not practice if an instructor is not present
5. Trainees may not take equipment out of the lab
6. Trainees will follow universal precautions and wear proper PPE.

## E. JOB STEPS

Trainee Instructions:

1. The purpose of this PCL is to evaluate the Trainee's knowledge of the practical application of conducting an integumentary system examination.
2. The Trainee must perform a complete physical examination of the integumentary system and explain each step as it is performed.
3. The Trainee has 20 minutes to complete this examination.

## JOB SHEET SCSC 2.8-3

## INTEGUMENTARY SYSTEM (CONT.)

4. The Trainee is not allowed to use the reference in the performance of this PCL.
5. The Trainee will wear appropriate attire during the practice and actual PCL evaluation.

**AT MEDICAL REPRESENTATIVE DIRECTION, OBTAIN PATIENT HISTORY PERTAINING TO MUSCULOSKELETAL SYSTEM BY COMPLETING THE FOLLOWING STEPS:**

1. \*Ask patient's chief complaint
2. \*Ask patient about onset of symptoms and pain. Specific MOI.
3. \*Ask about pain location, does it radiate or stay in place.
4. Ask about duration, does it come and go or is it constant.
5. Ask about the quality of the pain, what it feels like sharp, dull, ache etc.
6. Ask what makes it worse.
7. Ask what makes it better.
8. Ask if there is a time of day that their symptoms are better or worse.
9. \*Ask about where their pain is on the pain scale of (1-10).
10. Ask about any other symptoms they notice.
11. Ask about affect to activities of daily living
12. Gather patients past medical history, SAMPLE
13. Gather Surgical History
14. Gather Family History
15. Gather Social History
16. Review of systems, minimum of constitutional questions

JOB SHEET SCSC 2.8-3

INTEGUMENTARY SYSTEM (CONT.)

**AT MEDICAL REPRESENTATIVE DIRECTION, OBTAIN A GENERAL IMPRESSION PERTAINING TO MUSCULOSKELETAL SYSTEM BY COMPLETING THE FOLLOWING STEPS:**

1. \*Form General Impression
2. \*Obtain Vital Signs

**AT MEDICAL REPRESENTATIVE DIRECTION, PERFORM A SKIN EXAMINATION BY COMPLETING THE FOLLOWING STEPS:**

1. Inspect Skin for:
  - a. Color
  - b. Uniformity
  - c. Thickness
  - d. Symmetry
  - e. Hygiene
  - f. Lesions
2. Palpate skin for:
  - a. Moisture
  - b. Temperature
  - c. Texture
  - d. Turgor
  - e. Elasticity
3. Assess skin temperature

**AT MEDICAL REPRESENTATIVE DIRECTION, EXAMINE THE HAIR BY COMPLETING THE FOLLOWING STEPS:**

1. Palpate the hair for texture while inspecting it for color, distribution, and quantity

JOB SHEET SCSC 2.8-3

INTEGUMENTARY SYSTEM (CONT.)

2. Palpate the scalp hair for dryness and brittleness that could indicate a systemic or genetic disorder.
3. Note hair loss, which can be either generalized or localized.
4. Inspect the lower legs and feet for hair loss that may indicate poor circulation or nutritional deficit.

**AT MEDICAL REPRESENTATIVE DIRECTION, EXAMINE THE NAILS BY COMPLETING THE FOLLOWING STEPS:**

1. Inspect the nails for color, length, configuration, symmetry, and cleanliness
2. Ensure that nail edges are smooth and rounded.
3. Examine the proximal and lateral nail folds for redness, swelling, pus, warts, cysts, and tumors.
4. Ensure that the nail plate appears smooth and flat or slightly convex.
5. Upon palpation ensure that the nail plates feel hard and smooth, with a uniform thickness
6. Squeeze the nail between your thumb and the pad of your finger to test for adherence of the nail to the nail bed.

**AT MEDICAL REPRESENTATIVE DIRECTION, PERFORM SPECIAL SKIN TESTS BY COMPLETING THE FOLLOWING STEPS:**

1. Perform Woods Lamp Test
2. \*Identify skin irregularities for: (A) Asymmetry
3. \*Identify skin irregularities for: (B) Borders
4. \*Identify skin irregularities for: (C) Color
5. \*Identify skin irregularities for: (D) Diameter
6. \*Identify skin irregularities for: (E) Evolution over time

JOB SHEET SCSC 2.8-3

INTEGUMENTARY SYSTEM (CONT.)

**AT MEDICAL REPRESENTATIVE DIRECTION, PERFORM A CANCER SCREENING TEST BY COMPLETING THE FOLLOWING STEPS:**

1. \*Perform 3 Point cancer Screening Test.
2. \*Check lesions for asymmetry of pattern and distribution of dermoscopic structures
3. \*Check lesions for a-typical network
4. \*Check lesions for blue-white structures
5. \*Score cancer screening test

**AT MEDICAL REPRESENTATIVE DIRECTION, PRESENT FINDINGS BY COMPLETING THE FOLLOWING STEPS:**

1. \*Present findings of focused physical exam to provider
2. \*Document all history, findings interventions and procedures

**AT MEDICAL REPRESENTATIVE DIRECTION, PROVIDE PATIENT EDUCATION AND TREATMENT BY COMPLETING THE FOLLOWING STEPS:**

1. \*Distribute medication per provider's orders and with 5 rights
2. Provides reassurance and answer patient questions
3. Provide patient education and home therapy handouts
4. \*Document and provide duty status determination paperwork
5. Ensure patient understands need to follow up and/or referral procedures

OUTLINE SHEET SCSC 2.11-1

ENDOCRINE SYSTEM

A. INTRODUCTION

B. ENABLING OBJECTIVES

- 1.58 Utilize the knowledge of endocrine system anatomy while assessing a patient with a endocrine complaint
- 1.59 Utilize the knowledge of endocrine system physiology while assessing a patient with a endocrine complaint
- 1.60 Obtain history from patient with common endocrine system disorders
- 1.61 Describe the basic components of a physical examination focused on the endocrine system
- 1.62 State signs and symptoms of common endocrine system disorders
- 1.63 State treatments for common endocrine system disorders
- 1.16 State Red Flag criteria

C. SCSC 2.11-1 ENDOCRINE SYSTEM TOPIC OUTLINE

1. Introduction: The endocrine system regulates the body’s activities by releasing hormones that act as chemical messengers transported through the blood from endocrine glands or tissues to their intended target organ. A working knowledge of how the endocrine system works and the chemicals that are responsible for physiological actions will allow you to make sound judgements as a Sick Call Screener.
2. Identify the anatomy and physiology of the endocrine system
  - a. The anatomy and physiology of the endocrine system functions to maintain homeostasis of the body's internal environment.
  - b. It maintains a fine balance between too much glucose, too little glucose or not enough thyroid hormone. The endocrine system secretes chemical substances called hormones directly into the bloodstream. Hormones are the main regulators of metabolism, growth and development, reproduction and stress response.
  - c. The main endocrine glands are the pituitary, thyroid, parathyroids, pancreas, adrenals and gonads: testes and ovaries. These glands synthesize hormones which are released into the circulation and act at distant sites. Disease may result from excessive or

OUTLINE SHEET SCSC 2.11-1

ENDOCRINE SYSTEM (CONT.)

- inadequate production of hormones, or target organ hypersensitivity or resistance to the hormone.
- d. All endocrine disorders are caused by either excess or deficiency of the hormones.
  - e. Hormones are a mediator molecule that is released in one part of the body but regulates the activity of cells in one part of the body. Most hormones enter interstitial fluid and then the bloodstream.
  - f. The body contains two kinds of glands: exocrine glands and endocrine glands.
  - g. Exocrine glands secrete their products into ducts that carry the secretions into the body cavities, into the lumen of an organ or to the outer surface of the body. Exocrine glands include sudoriferous (sweat), sebaceous (oil), mucous, and digestive glands.
  - h. Endocrine glands secrete their products (hormones) into the interstitial fluid surrounding the secretory cells rather than into ducts.
    - (1) From the interstitial fluid, hormones diffuse into blood capillaries and blood carries them to target cells throughout the body.
    - (2) The endocrine glands include the: pituitary, thyroid, parathyroid, adrenal, and pineal glands.
  - i. Although a given hormone travels throughout the body in the blood, it affects only specific target cells.
  - j. Hormones, like neurotransmitters, influence their target cells by chemically binding to specific protein receptors. Only the target cells for a given hormone have receptors that bind and recognize that hormone.
  - k. For example, thyroid-stimulating hormone (TSH) binds to receptors on cells of the thyroid gland, but it does not bind to cells of the ovaries because ovarian cells do not have TSH receptors.
  - l. Chemically, hormones can be divided into two broad classes: those that are soluble in lipids, and those that are soluble in water.
  - m. The lipid-soluble hormones include steroid hormones, thyroid hormones, and nitric oxide.

OUTLINE SHEET SCSC 2.11-1

ENDOCRINE SYSTEM (CONT.)

- n. The water-soluble hormones include amine hormones, peptide and protein hormones, and eicosanoid hormones.
- o. The response to a hormone depends on both the hormone itself and the target cell. Various target cells respond differently to the same hormone. Insulin, for example, stimulates synthesis of glycogen in liver cells and synthesis of triglycerides in adipose cells.
- p. The pituitary gland or hypophysis is also known as the “master” endocrine gland because it secretes several hormones that control other endocrine glands. The hypothalamus is the small region of the brain below the thalamus that controls the pituitary gland and is the major link between the nervous and endocrine systems.
- q. Anterior: Secretes several hormones (adrenocorticotrophic hormone (ACTH), prolactin, growth hormone (GH), thyroid-stimulating hormone and gonadotrophins (luteinising hormone (LH) and follicle-stimulating hormone (FSH)).
- r. Posterior: an extension of the hypothalamus, which secretes vasopressin (antidiuretic hormone) and oxytocin.
- s. The Thyroid is located in the neck and has an "H" shaped appearance. The hormones formed are T3 and T4. Iodine is necessary for the formation of T3 and T4. The hypothalamus secretes TRH Thyroid Releasing hormone which stimulates the pituitary to secrete TSH-Thyroid Stimulating Hormone which stimulates the thyroid to produce T3 and T4. The blood level of T3 and T4 functions as the feedback control mechanism for pituitary and hypothalamus.
  - (1) Normally when T3 and T4 levels fall, TRH and TSH levels should be increased to stimulate the thyroid.
  - (2) Normally when T3 and T4 levels rise, TRH and TSH levels should be decreased to inhibit the thyroid.
  - (3) Thyroid hormones regulate (1) oxygen use and basal metabolic rate, (2) cellular metabolism, and (3) growth and development.
- t. The parathyroid glands are partially embedded in the posterior surface of the lateral lobes of the thyroid.
- u. Parathyroid hormone is the major regulator of the levels of calcium (Ca<sup>2</sup>), magnesium (Mg<sup>2</sup>), and phosphate (HPO<sub>4</sub>) ions in the blood.

OUTLINE SHEET SCSC 2.11-1

ENDOCRINE SYSTEM (CONT.)

- v. The paired adrenal glands or suprarenal glands, one of which lies superior to each kidney in the retroperitoneal space have a flattened pyramidal shape. During embryonic development, the adrenal glands differentiate into two structurally and functionally distinct regions: a large, peripherally located adrenal cortex, comprising 80–90% of the gland, and a small, centrally located adrenal medulla.
  - (1) If iodine is lacking in the diet, the thyroid fails to make the hormone and gets very large, increasing tissue in an effort to compensate resulting in a goiter.
  - (2) The adrenal cortex produces steroid hormones that are essential for life. Complete loss of adrenocortical hormones can lead to death in a few days to a week, unless hormone replacement therapy begins promptly.
  - (3) The adrenal medulla produces three catecholamine hormones norepinephrine, epinephrine, and a small amount of dopamine.
- w. Gonads are the organs that produce gametes, sperm in males and oocytes in females.
  - (2) The ovaries are paired oval bodies located in the female pelvic cavity, produce several steroid hormones, including two estrogens (estradiol and estrone) and progesterone
  - (3) The testes are oval glands that lie in the scrotum. The main hormone produced and secreted by the testes is testosterone, an androgen or male sex hormone.
- x. The pineal gland (pinecone shape) is a small endocrine gland attached to the roof of the third ventricle of the brain at the midline
- y. The pineal gland secretes melatonin. Melatonin appears to contribute to the setting of the body's biological clock, which is controlled by the suprachiasmatic nucleus of the hypothalamus.
- z. The pancreas is located behind the stomach horizontally. Its head is attached to the duodenum and its tail reaches to the spleen. Scattered throughout the spleen are groups of cells referred to as the islets of Langerhans that secrete insulin. Insulin lowers the blood glucose by assisting the movement of glucose into the cells. The blood glucose level rises because glucose cannot enter the cells where it is used for energy.
- aa. Without insulin the serum glucose level rises because the glucose cannot enter the cells, it then spills over into the urine. How much insulin is released into the body is normally determined by the level of sugar in the blood which works as a feedback system.

OUTLINE SHEET SCSC 2.11-1

ENDOCRINE SYSTEM (CONT.)

3. Obtain history from patient with common endocrine system disorders
  - v. For each of the patients symptoms, targeted topics to include in the history of the present illness. Responses to questions about these topics provide clues for focusing the physical examination and the development of an appropriate diagnostic evaluation. Questions regarding medication use (prescription and over-the-counter preparations) as well as complementary and alternative therapies are relevant for each.
  - w. First, the identifiers: name, date, time, age, gender identity, race, source of information, and referral source
  - x. Chief Complaint (CC)
  - y. History of present illness or problem (HPI)
  - z. Past medical history (PMH). Tuberculosis and HIV infection are associated with adrenal insufficiency.
  - aa. Drug History. Excessive corticosteroid exposure causes Cushing features and dopamine antagonist drugs such as haloperidol and domperidone cause hyperprolactinemia.
  - bb. Family history (FH). Thyroid disease and diabetes mellitus may run in families. Multiple endocrine neoplasia syndromes are rare autosomal dominant conditions characterized by hyperplasia, adenoma formation and malignant change in multiple endocrine glands.
  - cc. Personal and social history (SH)
  - dd. Review of systems (ROS)
  
5. Perform an endocrine system examination
  - a. The endocrine examination begins with HEENT and Neurological examinations. While performing the HEENT examination, pay special attention to the patient's eyes, mouth, neck and overall body shape as explained below:
  - b. Perform a HEENT exam:
    - (1) Test visual acuity

OUTLINE SHEET SCSC 2.11-1

ENDOCRINE SYSTEM (CONT.)

- (2) Examine the eyes and optic fundi
- (3) Smell the patient's breathe for the sweet smell of ketones (diabetic ketoacidosis)
- (4) Look at the patient's neck from the front and note the presence of old surgical scars, distended veins, or redness
- (5) Examine the head and neck distal to the thyroid; observe the position of the trachea.
- (6) Then examine the thyroid. Examination of the thyroid gland involves inspection, palpation, and occasionally auscultation.
- (7) Inspection and Palpation: One widely recommended method is to palpate the patient's neck with the fingertips of both hands while standing behind the seated patient.
- (8) Locate the cricoid cartilage.
  - (a) When your index fingers rest just under the lower rim of the cricoid, the remaining fingers are over the top of the thyroid.
  - (b) Rotate your second and third fingers over the rest of the gland, evaluating its size, contour, consistency, and freedom of movement.
  - (c) Watch the movement of the thyroid gland as the patient swallows
  - (d) The thyroid gland moves with swallowing; \*subcutaneous fat that mimics a goiter does not.\*
  - (e) Normal thyroid lobes, if felt, should be small, smooth, and free of nodules. The gland should rise freely with swallowing. The thyroid at its broadest dimension is approximately 4 cm, and the right lobe is often 25% larger than the left. The consistency of the thyroid tissue should be firm yet pliable.
  - (f) Abnormal thyroid lobes: coarse tissue or a gritty sensation suggests an inflammatory process. If nodules are present, they should be characterized by number, whether they are smooth or irregular, and whether they are soft or hard. An enlarged, tender thyroid may indicate thyroiditis.

OUTLINE SHEET SCSC 2.11-1

ENDOCRINE SYSTEM (CONT.)

- (g) Auscultation: If the thyroid gland is enlarged, auscultate for vascular sounds with the bell of the stethoscope. In a hypermetabolic state, the blood supply is dramatically increased and a vascular bruit (a soft rushing sound) may be heard.
  - (9) Look for evidence of weight loss, weight gain and dehydration.
  - (10) Examine the skin: look for signs of infection and rashes.
    - (a) Look for xanthelasma and xanthomata.
    - (b) Examine insulin injection sites for evidence of lipohypertrophy (which may cause unpredictable insulin release), lipoatrophy (rare) or signs of infection (very rare)
    - (c) Note any hair distribution patterns, for loss of hair or areas with new growth
  - (11) Examine the cardiovascular and peripheral vascular systems.
  - (12) Examine the respiratory and gastrointestinal systems
  - (13) Perform neurological exam
  - (14) Perform urinalysis
  - (15) Obtain labs as required. Labs a provider may order for common endocrine disorders, measure serum hormone levels to assess over- or underactivity. Suppression tests can determine whether hormonal secretion is autonomous. Stimulation tests assess hormonal reserve (or lack of it in deficiency states).
  - (16) Modern imaging enables visualization of small endocrine tumors, sometimes only millimeters in diameter.
5. List signs and symptoms of common endocrine system disorders
- a. Hypothyroidism
    - (1) Results from inadequate production of the thyroid hormone, causing a hypometabolic state. If very severe it is also called Myxedema.
    - (2) The diagnosis of hypothyroidism is commonly delayed or missed because symptoms and signs develop insidiously over years.

OUTLINE SHEET SCSC 2.11-1

ENDOCRINE SYSTEM (CONT.)

- (a) S: Weakness, fatigue, cold intolerance, constipation, and weight gain
- (b) O: Dry hair and skin, brittle nails, diminished muscle strength and reflexes.  
May have a puffy face and eyelids, thick tongue and bradycardia.
- (c) A: Hypothyroidism/Myxedema
- (d) P: Refer to the MD/PA
- (e) Treatment is to replace the T4 with oral thyroid medication

b. Hyperthyroidism

(1) The result of excessive production of thyroid hormone. The most common cause is Graves' disease. This is an autoimmune disorder. Abnormal antibodies are made that stimulate the thyroid by binding at the same site as the TSH. With the increased T3 and T4 production, TSH stimulation is stopped by the feedback mechanism, but the hormone production continues. This is due to the antibodies taking over the function of stimulating the thyroid and all control is lost.

- (a) Hyperthyroidism may also be caused by a tumor in the thyroid or by a tumor in the pituitary that secretes excessive TSH
- (b) S: Weakness, sweating, weight loss, increased appetite, fatigue, nervousness, diarrhea, and heat intolerance
- (c) O: Tachycardia, warm this moist skin, tumors, hyperactive reflexes, exophthalmos (Bug Eyes), palpable thyroid or goiter. If long standing, wasting of muscle may occur.
- (d) A: Hyperthyroidism
- (e) P: Refer to the MD/PA

(2) Note: Exophthalmos is caused by deposition of fat in back of the globe causing forward protrusion.

c. Diabetes Mellitus

(1) A disorder of carbohydrates (glucose) metabolism, characterized by hyperglycemia (elevated level of glucose in the blood) and glycosuria (glucose in the urine). This is the result of inadequate production or utilization of insulin. There are two types.

OUTLINE SHEET SCSC 2.11-1

ENDOCRINE SYSTEM (CONT.)

(a) Type I Diabetes-occurs abruptly with an absence of insulin due to a decline in the insulin producing cell (autoimmune destruction?). Because of the periodic administration of insulin it is called insulin dependent diabetes.

1. Diabetic ketoacidosis (DKA) is the hallmark of type 1 diabetes. It is usually seen in the following circumstances: previously undiagnosed diabetes, interruption of insulin therapy the stress of intercurrent illness. The majority of cases reaching hospital could have been prevented by earlier diagnosis, better communication between patient and doctor, and better patient education. The most common error of management is for patients to reduce or omit insulin because they feel unable to eat, owing to nausea or vomiting. This is a factor in at least 25% of all hospital admissions. Insulin may need adjusting up or down but should never be stopped.
2. Ketoacidosis is a state of uncontrolled catabolism associated with insulin deficiency. Insulin deficiency is a necessary precondition since only a modest elevation in insulin levels is sufficient to inhibit hepatic ketogenesis, and stable patients do not readily develop ketoacidosis when insulin is withdrawn. In the absence of insulin, hepatic glucose production accelerates and peripheral uptake by tissues such as muscle is reduced. Rising glucose levels lead to an osmotic diuresis, loss of fluid and electrolytes, and dehydration. Plasma osmolality rises and renal perfusion falls. In parallel, rapid lipolysis occurs, leading to elevated circulating free fatty-acid levels. The free fatty acids are broken down to acetyl-coenzyme A (CoA) within the liver cells, and this, in turn, is converted to ketone bodies within the mitochondria.
3. Other factors include counter-regulatory hormone excess and fluid depletion. Accumulation of ketone bodies produces a metabolic acidosis. Vomiting leads to further loss of fluid and electrolytes. The excess ketones are excreted in the urine but also appear in the breath, producing a distinctive smell similar to that of acetone. Respiratory compensation for the acidosis leads to hyperventilation, graphically described as 'air hunger'. Progressive dehydration impairs renal excretion of hydrogen ions and ketones, aggravating the acidosis. As the pH falls below 7.0 ( $[H^+] > 100 \text{ nmol/L}$ ), pH-dependent enzyme systems in many cells function less effectively. Untreated, severe ketoacidosis is invariably fatal.

(b) Type II Diabetes: most common type (90%), affects people who are over 40 years of age, and overweight. It is usually controlled by a diet, exercise, and oral antidiabetic drugs.

OUTLINE SHEET SCSC 2.11-1

ENDOCRINE SYSTEM (CONT.)

1. S: Three classic symptoms- polyuria, polydipsia, and polyphagia, or urinates, drinks, and eats very often. Weight loss, fatigue, recurrent infections, pruritus, or may be asymptomatic.
2. O: Variable physical findings, only reliable findings is an elevated blood glucose on a fasting specimen. U/A may have glucose.
3. A: Diabetes I/II
4. P: Referred to MD/PA and therapy should be augmented with additional agents (including early initiation of insulin therapy) to achieve adequate glycemic control.

6. Summary and Review

- 1.63 Utilize the knowledge of endocrine system anatomy while assessing a patient with a endocrine complaint
- 1.64 Utilize the knowledge of endocrine system physiology while assessing a patient with a endocrine complaint
- 1.65 Obtain history from patient with common endocrine system disorders
- 1.66 Describe the basic components of a physical examination focused on the endocrine system
- 1.67 State signs and symptoms of common endocrine system disorders
- 1.63 State treatments for common endocrine system disorders
- 1.16 State Red Flag criteria

ASSIGNMENT SHEET SCSC 2.11-3

ENDOCRINE SYSTEM

A. INTRODUCTION:

This assignment is to be completed after the material has been covered in class.

B. ENABLING OBJECTIVES:

1.58 Utilize the knowledge of endocrine system anatomy while assessing a patient with a endocrine complaint

1.59 Utilize the knowledge of endocrine system physiology while assessing a patient with a endocrine complaint

1.60 Obtain history from patient with common endocrine system disorders

1.61 Describe the basic components of a physical examination focused on the endocrine system

1.62 State signs and symptoms of common endocrine system disorders

1.63 State treatments for common endocrine system disorders

1.16 State Red Flag criteria

C. STUDY ASSIGNMENT:

1. Read Endocrine System, Outline Sheet SCSC 2.11-1

D. STUDY QUESTIONS:

1. What disorders are caused by either excess or deficiency of hormones?
  
2. When the endocrine gland secretes hormones into the interstitial spaces, what carries them to the targets?
  
3. When examining the patients thyroid, which of the following is the preferred patient position?
  
4. What is the result of inadequate production of thyroid hormone?

## ASSIGNMENT SHEET SCSC 2.11-3

## ENDOCRINE SYSTEM (CONT.)

5. Cushing syndrome type symptoms can be caused by excessive exposure to which drugs?
6. What is a state of uncontrolled catabolism associated with insulin deficiency?
7. What do thyroid hormones regulate?
8. Where in relation to the Thalamus is the Hypothalamus located?
9. Diabetes Type II is often controllable by what means?

OUTLINE SHEET SCSC 2.12-1

ENVIRONMENTAL ILLNESS AND INJURIES

A. INTRODUCTION:

This assignment is to be completed prior to the material being covered in class.

B. ENABLING OBJECTIVES:

1.64 Discuss risk factors related to environmental injuries while assisting in the development of a patient treatment plan

1.65 Discuss types of environmental injuries while assisting in the development of a patient treatment plan

1.66 Perform an examination for signs of environmental injuries

1.67 Discuss measures that help prevent environmental injuries while assisting in the development of a patient treatment plan

1.68 Discuss treatment protocols used for environmental injuries while assisting in the development of a patient treatment plan

1.69 Discuss the heat condition flag warning system while assisting in the development of a patient treatment plan

1.16 State Red Flag criteria

C. SCSC 2.12-1 ENVIRONMENTAL ILLNESSES AND INJURIES TOPIC OUTLINE

1. Introduction: Environmental emergencies can occur in any setting—wilderness, rural, suburban, and urban areas. They include exposure to both heat and cold; drownings and other water-related injuries; and bites and stings from insects, spiders, snakes, and marine life. The keys to effective management are recognizing the patient’s signs and symptoms and providing prompt and proper emergency care.

2. Identify risk factors related to heat illnesses

a. Who's at Risk for Injury?

(1) Risk factors for heat injuries include dehydration, cardiovascular disease, extreme age (the old and the frail are at highest risk), obesity, improper or heavy clothing, skin diseases and drugs.

OUTLINE SHEET SCSC 2.12-1

ENVIRONMENTAL ILLNESS AND INJURIES (CONT.)

- (2) Military personnel are at higher risk for heat injuries simply because they are involved with more physically strenuous exercises. Un-acclimated military personnel such as recruits are at increased risk.
- (3) Those with prior heat injuries, taking supplementary medications (such as ephedra, caffeine-based) and engage in activities that dehydrate the body (drinking alcohol before a hike) are also at risk for heat exhaustion or stroke.

3. Identify types of heat illnesses

- a. The hypothalamus also functions as the body's thermostat, which senses body temperature so that it is maintained at a desired point. If the temperature of blood flowing through the hypothalamus is above normal, the hypothalamus directs the autonomic nervous system to stimulate activities that promote heat loss. When blood temperature is below normal, by contrast, the hypothalamus generates impulses that promote heat production and retention. When an individual is exposed to extreme environments the hypothalamus can become damaged which greatly increases the patient's likelihood of severe injury.
- b. Environmental extremes of heat and cold have a common outcome of injuries and potential death that can affect many individuals during peak summer and winter months.
- c. Heat Injuries. There are different types of heat injuries ranging from mild case to life-threatening.

(1) Sunburn

(a) Results from overexposure to the sun's UV rays

- 1. 1st degree burns cause redness on exposed areas. These are generally painful, but generally heal after a few days.
- 2. 2nd degree burns involve blistering of the skin. The skin is very red and blisters are found throughout exposed areas.
- 3. These can be complicated with secondary infection when the blisters shed or pop.

(b) Limit skin exposure

(c) Wear hat, sunglasses, and sleeves down

OUTLINE SHEET SCSC 2.12-1

ENVIRONMENTAL ILLNESS AND INJURIES (CONT.)

- (d) Apply sunblock: SPF 30-45 recommended
  - (e) 1st degree burns are generally not treated unless they are painful. Aloe-based lotions helps sooth the dryness and pain.
  - (f) 2nd degree burns are treated with topical or oral corticosteroids, Silvadene. Refer these patients to a medical provider for treatment.
- (2) Heat Edema
- (a) Mild hand and foot swelling
  - (b) Appears within first few days of heat exposure. Resolves spontaneously
  - (c) Self-limiting
  - (d) Elevate affected areas
- (3) Prickly Heat (aka "heat rash" or "miliaria")
- (a) Acute inflammation of sweat ducts, resulting in partial inhibition of the body's ability to release sweat.
  - (b) Itching is the predominant early symptom
  - (c) Itching may be treated with antihistamine (Atarax, Allegra, and Claritin)
  - (d) If left untreated, may become infected
  - (e) May be self-limiting
  - (f) Advise patient to avoid strenuous activities
  - (g) Preventive measures include wearing clean, light, loose-fitting clothing
- (4) Heat Syncope
- (a) Due to low blood pressure
  - (b) Un-acclimated persons may experience this when exposed to a high temperature environment.
  - (c) May not be due to hypovolemic state

OUTLINE SHEET SCSC 2.12-1

ENVIRONMENTAL ILLNESS AND INJURIES (CONT.)

- (d) Remove victim from heat source
- (e) Give fluids
- (5) Heat Cramps
  - (a) Painful, involuntary spasms of muscles, usually calves, thighs and shoulders; may involve the abdominal muscles
  - (b) Results from excessive salt & electrolyte loss
  - (c) Treatment includes: Stopping activity and resting in cool, shaded area
  - (d) Fluid and electrolyte replacement with IV NS or LR
- (6) Heat Exhaustion
  - (a) Results from excessive water and salt/electrolyte loss
  - (b) Symptoms are non-specific and include:
    1. Profuse sweating
    2. Cool/clammy skin
    3. Dizziness
    4. Severe fatigue
    5. Nausea
    6. Vomiting
    7. Headaches
  - (c) Patient may or may not lose consciousness, however, once patient awakes mental status remains normal.
  - (d) Core temp variable, but generally less than 104 F
  - (e) Treatment

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ENVIRONMENTAL ILLNESS AND INJURIES (CONT.)

1. Remove patient from heat
2. Rest in cool place
3. Loosen or remove clothes
4. Cool body
5. Fluid replacement with two 18g IV lines, one in each arm; use NS or LR and keep IV wide open as long as patient is known to be otherwise healthy.
6. Restriction of activities for minimum of two weeks.
7. Evaluate for risk factors, educate for prevention.

(7) Heat Stroke

- (a) Results from collapse of body's thermal regulatory or failure of the body's cooling system
- (b) Hyperpyrexia, with body temperature exceeding 104 F
- (c) True medical emergency!!
- (d) Early symptoms similar to heat exhaustion:
- (e) Then progresses to worse constellation of symptoms:
  1. Skin is hot, dry, flushed (red), unable to sweat
  2. Neurologic impairment - this is what differentiates heat exhaustion from heat stroke
  3. Irritability, bizarre behavior, hallucinations
  4. Combativeness
  5. Coma
- (f) Rapid assessment and initial resuscitation is critical
- (g) Follow these steps to treat patient:

## OUTLINE SHEET SCSC 2.12-1

## ENVIRONMENTAL ILLNESS AND INJURIES (CONT.)

1. Activate EMS immediately
2. Get others to assist you
3. Remove patient from heat exposure
4. You, the corpsman, should do the following:
  - a. Maintain airway
  - b. Oxygen by face mask
  - c. Put two 18g IV lines, one on each arm
  - d. Start rapid IV resuscitation with NS and LR
  - e. Do not give anything to drink, if the patient is awake
  - f. Serial vital signs - rectal temperature, BP, HR, RR, lung exam
5. Your helpers should do the following:
  - a. Help maintain airway
  - b. Cool the patient rapidly
  - c. Remove clothing
  - d. Spray cool water and fan
  - e. Ice bags to arm pits, groin, scalp, neck
6. Transfer to hospital ASAP for further care
7. Aggressive cooling measures should cease when temp is less than 102 F.
8. Prevent shivering.
9. Post-heat stroke measures:
  - a. Patient education on preventive measures



## OUTLINE SHEET SCSC 2.12-1

## ENVIRONMENTAL ILLNESS AND INJURIES (CONT.)

- a. Symptoms of trench foot are:
    - (1) Cold
    - (2) Numbness
    - (3) Paresthesia
    - (4) Itching
    - (5) Painful weight bearing
    - (6) Progressing to anesthesia ("walking on blocks of wood")
    - (7) Painful blisters
    - (8) Local hemorrhage
  - b. Signs include:
    - (1) Pallor
    - (2) Mottled purple coloration
    - (3) Swelling
    - (4) Edema
  - c. After re-warming, sensation returns with paresthesia, pain, and increased heat sensitivity.
  - d. Blisters, circulatory compromise, local hemorrhage, and ecchymosis may characterize severe cases, which may have a prolonged post inflammatory phase involving compromised blood supply.
  - e. Trench foot may result in peripheral neuropathy.
2. Chilblain (chilblains):
- a. A red or purple discoloration of the distal extremity skin (including ears and nose) occurring after exposure to the cold (generally moist cold).

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ENVIRONMENTAL ILLNESS AND INJURIES (CONT.)

- b. It is most common in young women although it can happen at every age, and relapses characteristically in autumn and winter.
- c. It also may be associated with underlying connective tissue disorders (specifically lupus erythematosus).
- d. Symptoms include:
  - (1) Pruritic
  - (2) Painful (especially burning) red patches on the fingers and/or toes, generally bi laterally
  - (3) Sunlight may aggravate the lesions
  - (4) Significant scarring may result
  - (5) Keeping clothing and exposed extremities dry is the primary preventive measure against non-freezing cold injury.

(c) Freezing Injuries:

- 1. Frostbite:
  - a. Only occurs at environmental temperatures below freezing
  - b. The extent of tissue destruction depends primarily on the environmental temperature and length of exposure.
  - c. Frostbite symptoms include a cold or burning sensation, progressing to numbness.
  - d. Frostbite is classified as:
    - (1) First (superficial)
    - (2) Second (full-thickness, usually with clear blisters)
    - (3) Third (skin and subcutaneous tissue, sometimes with hemorrhagic blisters)
    - (4) Fourth degree (deeper structures, including tendons, muscles, and bone)

OUTLINE SHEET SCSC 2.12-1

ENVIRONMENTAL ILLNESS AND INJURIES (CONT.)

e. Signs of frostbite vary and include:

- (1) White patches
- (2) Diffuse redness
- (3) Hardening or waxy appearance of the skin
- (4) Mottled gray coloration
- (5) Tenderness
- (6) Diminished light touch
- (7) Anesthesia (no sensation)

(d) Hypothermia:

1. A general cooling of the body's core temperature. Estimating body core temperature:

a. Mild - 94-97 degrees

- (1) Conscious, but mild to moderate clouding
- (2) Shivering is present, but diminished

b. Moderate - 86-94 degrees

- (1) Severe clouding, may be unconscious
- (2) Shivering replaced by muscle rigidity

c. Severe - 82.4 – 86 degrees

- (1) Unconscious
- (2) Diminished respiration and pulse rate

OUTLINE SHEET SCSC 2.12-1

ENVIRONMENTAL ILLNESS AND INJURIES (CONT.)

d. Life Threatening - Below 82.4 degrees

(1) Barely detectable or undetectable respirations

(2) Barely detectable or undetectable pulse

2. Whole body exposure to cold temperatures, wind, wet clothing, or cold water immersion are the primary contributing factors.

3. Victims of severe hypothermia should be immediately evacuated to a medical treatment facility.

(e) Cold stress injuries may also exacerbate or unmask underlying conditions, such as:

1. Rosacea

2. Cold agglutinin disease

3. Cold panniculitis

4. Neurosis

5. Cold-induced Urticaria

6. Vibration white finger

7. Raynaud's phenomenon

8. Paroxysmal cold hemoglobinuria

9. Persons with those conditions should take extra precautions to wear adequate clothing and equipment, or avoid cold stress exposure entirely.

(4) Treatment of Freezing Injuries

(a) Takes standard precautions

(b) Remove patient from environment

(c) Remove wet or restrictive clothing and all jewelry, cover with blanket.

(d) Avoid rough handling of casualty.

## OUTLINE SHEET SCSC 2.12-1

## ENVIRONMENTAL ILLNESS AND INJURIES (CONT.)

- (e) Do not allow casualty to walk or exert energy.
- (f) Assess patient's vital signs.
- (g) Administer O2
- (h) Add warming blankets or additional blankets if available.
- (i) Place heat to groin, axillary and cervical areas.
- (j) As rewarming begins assess casualty for tingling sensation
- (k) Assess for swelling
- (l) Assess for blistering (Do not break blisters)
- (m) Assess for flushing, mottling and/or cyanosis
- (n) Splint extremity
- (o) Cover Extremity
- (p) Do not rub or massage area
- (q) Do not re-expose
- (r) Apply heat
- (s) Do not allow patient to use extremity
- (t) Transport patient to a higher echelon, If transport is delayed then:
- (u) Immerse effected part in warm water, 100-105 degrees F
- (v) Maintain water at that temp
- (w) Continuously stir water
- (x) Continue until that part is soft and color and sensation return
- (y) Dress the area with a dry sterile dressing

OUTLINE SHEET SCSC 2.12-1

ENVIRONMENTAL ILLNESS AND INJURIES (CONT.)

- (z) Protect from refreezing
- (5) Treatment of hypothermia:
  - (a) Hypothermia is a serious condition that must be treated quickly to ensure there is no long term damage
  - (b) Take standard precautions
  - (c) Remove from environment
  - (d) Remove wet clothing, cover with blanket
  - (e) Avoid rough handling of casualty
  - (f) Do not allow casualty to walk or exert energy
  - (g) Administer O2
  - (h) Add warming blankets or additional blankets if available
  - (i) Place heat to groin, axillary and cervical areas
  - (j) Turn up heat in treatment area or transport vehicle
  - (k) Do not provide anything by mouth
  - (l) Do not massage extremities
  - (m) Monitor vital signs
  - (n) Treat for shock
  - (o) Transport
- 4. Identify measures that help prevent environmental injury
  - a. Preventive Measures. How can heat injuries be prevented? Refer to list of risk factors above. Knowing this will help you prevent heat injuries. A great deal has to do with educating the troops. Train members assigned to your location on the dangers of heat injuries and how to prevent them.
  - b. Discuss the following issues:

OUTLINE SHEET SCSC 2.12-1

ENVIRONMENTAL ILLNESS AND INJURIES (CONT.)

- (1) Conditioning and acclimatization - slow, gradual progressive exercises for a period of three weeks.
  - (2) Adequate fluid intake - sports drinks (Gatorade), keep hydrating even if you are not thirsty. Thirst is a late indicator of dehydration. Use urine color as a way to gauge your level of hydration. You want urine to be clear in color, especially days before the activity
  - (3) Hydrate throughout the strenuous activity - keep drinking, don't wait until the end of an exercise to drink
  - (4) Avoid activity in peak hours of hot, humid weather - exercises should happen either early in the morning or late in the afternoon.
  - (5) Sick people should not be subjective to strenuous activities - fever, illness are major risk factors
  - (6) Avoid medications/drinks that can put you at risk - anti-histamines, anti-hypertensives, caffeine, alcohol, ephedra, supplements
  - (7) Clothing awareness (layers, MOPP, etc.) - heavier, layered clothing should be avoided. Wearing MOPP clothing
  - (8) Learn the heat condition flag warning system and enforce proper work-rest cycles.
5. Identify the heat condition flag warning system
- a. Heat Condition Flag Warning System. Based on the Wet Bulb Globe Temperature (WBGT). These numbers are not all inclusive. Add 10 degrees F for full MOPP clothing, body armor and helmet. Beware of microclimates in training areas.
  - b. The following are the flag conditions:
    - (1) White Flag
      - (a) WBGT less than 80 F
      - (b) Extremely intense exertion may precipitate heat illness
      - (c) Use caution

OUTLINE SHEET SCSC 2.12-1

ENVIRONMENTAL ILLNESS AND INJURIES (CONT.)

(2) Green Flag

- (a) WBGT of 80 to 84.9 F
- (b) Heavy exercise for un-acclimated personnel will be conducted with caution and constant supervision

(3) Yellow Flag

- (a) WBGT of 85 to 87.9 F
- (b) Strenuous exercises will be suspended for un-acclimated troops in their first 2-3 weeks
- (c) Avoid outdoor classes in the sun

(4) Red Flag

- (a) WBGT of 88 to 89.9 F
- (b) All PT will be halted for those troops who have not become thoroughly acclimatized by at least 12 weeks of living and working in the area.
- (c) Acclimatized troops may carry on limited activity not to exceed six hours per day

(5) Black Flag

- (a) WBGT of 90 F and above
- (b) All strenuous outdoor activity will be halted for all troops.

6. Anaphylactic reactions

- a. A natural response of the human body's immune system is to react to any foreign substance in order to get rid of it.
- b. An allergic reaction is an exaggerated immune response.
- c. An allergen is something that causes an allergic reaction.
- d. Anaphylaxis, or anaphylactic shock, is a severe, life-threatening reaction.

OUTLINE SHEET SCSC 2.12-1

ENVIRONMENTAL ILLNESS AND INJURIES (CONT.)

- (1) Blood pressure drops (hypotension).
- (2) Tissues swell, including those in the respiratory system, and can lead to respiratory failure.
- e. Causes of allergic reactions (in some individuals)
  - (1) Insects (e.g., stings of bees, yellow jackets, wasps, and hornets)
  - (2) Foods (e.g., nuts, egg, milk, and shellfish)
  - (3) Plants (e.g., poison ivy, poison sumac, and poison oak)
  - (4) Medications (e.g., penicillin)
  - (5) Latex (can be developed either by patient or health care professional)
  - (6) Others (e.g., dust, chemicals, soaps, makeup)
  - (7) One particular product HMs should be aware of as a possible allergen is latex.
- f. Remember that severe reactions can be delayed, and mild allergic reactions can turn into more serious anaphylactic shock quickly; closely monitor the patient.
- g. Signs and symptoms of allergic reaction and anaphylactic shock
  - (1) Skin
    - (a) Itching
    - (b) Hives
    - (c) Flushing
    - (d) Swelling of face, neck, hands, feet, or tongue
    - (e) Warm, tingling feeling in the face, mouth, chest, feet, and hands
  - (2) Respiratory
    - (a) Feeling of tightness in throat or chest
    - (b) Cough

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ENVIRONMENTAL ILLNESS AND INJURIES (CONT.)

- (c) Rapid breathing
- (d) Labored, noisy breathing
- (e) Hoarseness, muffled voice, or loss of voice entirely
- (f) Stridor
- (g) Wheezing (audible without stethoscope)
- (3) Cardiac
  - (a) Increased heart rate
  - (b) Decreased blood pressure
- (4) Generalized findings
  - (a) Itchy, watery eyes
  - (b) Headache
  - (c) Runny nose
  - (d) Sense of impending doom
- (5) Signs and symptoms of shock
  - (a) Altered mental status
  - (b) Flushed, dry skin or pale, cool, clammy skin
  - (c) Nausea or vomiting
  - (d) Changes in vital signs: increased pulse, increased respirations, decreased blood pressure
- h. To be considered a severe allergic reaction, or anaphylaxis, patient must have either respiratory distress or signs and symptoms of shock.

OUTLINE SHEET SCSC 2.12-1

ENVIRONMENTAL ILLNESS AND INJURIES (CONT.)

- i. Patient assessment:
  - (1) Take standard precautions
  - (2) Perform the primary assessment; care for any immediately life-threatening problems (ABCs).
  - (3) Perform a secondary assessment. Inquire about:
    - (a) History of allergies
    - (b) What patient was exposed to
    - (c) How patient was exposed
    - (d) Signs and symptoms
    - (e) Progression
    - (f) Interventions
  - (4) Assess baseline vital signs and get the remainder of the past medical history.
  
- j. Treating Anaphylactic Shock
  - (1) Take standard precautions
  - (2) Perform patient assessment
  - (3) Obtain vital signs
  - (4) Assess airway and breathing
    - (a) Apply high-concentration oxygen through a nonrebreather mask
    - (b) If the patient has or develops an altered mental status, open and maintain the patient's airway.
    - (c) Provide artificial ventilation if breathing is inadequate
  - (5) Determine if assisting the patient with administering an epinephrine auto-injector is appropriate.

OUTLINE SHEET SCSC 2.12-1

ENVIRONMENTAL ILLNESS AND INJURIES (CONT.)

- (a) To find out if use of an auto-injector is appropriate, consider each of the following:
  - 1. Patient has come into contact with a substance which caused an allergic reaction in the past the patient has respiratory distress or exhibits signs and symptoms of shock. Contact medical direction and if ordered, assist the patient with his prescribed auto-injector or administer epinephrine. Record the administration, transport, and reassess 2 minutes after administration.
  - 2. Patient has come in contact with a substance which caused an allergic reaction in the past, but the patient is not wheezing or showing signs of respiratory distress or shock. Continue with assessment and consult medical direction; if the patient has an epinephrine auto-injector and if medication direction so orders, administer epinephrine.
  - 3. Patient has come in contact with a substance which caused an allergic reaction in the past, and the patient complains of respiratory distress or exhibits signs and symptoms of shock, but the patient does not have a prescribed epinephrine auto-injector available or has never had one prescribed. If protocols do not allow you to carry and use epinephrine auto-injectors, then perform care for shock and transport the patient immediately.
  - 4. Patient has prescribed epinephrine auto-injector (or protocol allows you to carry and use epinephrine auto-injector).
- (b) Administering epinephrine auto-injector: Ensure Liquid is clear, Remove the cap and press firmly against patient's thigh (outside of thigh midway between waist and knee), Hold in place until the entire dose is injected, reassess after 2 minutes.
- (c) Monitor the patient's vitals
- (6) Transport, if patient's conditions deteriorate, additional doses of epinephrine may be administered.

7. Common Venomous Animals

- a. Injury produced by venomous arthropods is more common than generally realized. Millions of people in the United States are affected by these arthropods each year. About 25,000 of these envenomizations result in severe injury and about 30 result in death. This mortality contrasts markedly to the usual 14 deaths per year that are caused by poisonous reptiles. Clinical manifestations associated with

## OUTLINE SHEET SCSC 2.12-1

## ENVIRONMENTAL ILLNESS AND INJURIES (CONT.)

envenomization include anaphylactic shock, hemolysis, necrosis, paralysis, cardiopulmonary dysfunction, allergenic asthma, and antigen induced dermatologic manifestations.

## b. Venoms

(1) Venoms produced by arthropods are mixtures of four toxic types:

- (a) Vesicating (blister beetles)
- (b) Neurotoxic (black widow spiders)
- (c) Cytolytic (brown recluse spider)
- (d) Hemolytic (horse flies)

## c. Assessing Insect Bites and Stings

(1) Gather information from the patient, bystanders, and the scene

(2) Gather information about the insect or other possible source of envenomation

(3) Assess for these common signs and symptoms of envenomation:

- (a) Altered states of awareness
- (b) Noticeable stings or bites on the skin
- (c) Puncture marks (especially note the fingers, forearms, toes, and legs)
- (d) Blotchy (mottled) skin
- (e) Localized pain or itching
- (f) Numbness in a limb or body part
- (g) Burning sensations at the site followed by pain spreading throughout the limb
- (h) Redness
- (i) Swelling or blistering at the site
- (j) Weakness or collapse

OUTLINE SHEET SCSC 2.12-1

ENVIRONMENTAL ILLNESS AND INJURIES (CONT.)

- (k) Difficult breathing and abnormal pulse rate
- (l) Headache and dizziness
- (m) Chills
- (n) Fever
- (o) Nausea and vomiting
- (p) Muscle cramps, chest tightening, and joint pains
- (q) Excessive saliva formation and profuse sweating
- (r) Anaphylaxis

d. Treating Insect Bites and Stings

- (1) First aid for envenomation depends upon the nature of the venom, but the following general procedures are recommended:
  - (a) Treat for anaphylactic shock
  - (b) Treat for shock, even if patient does not present any of the signs of shock
  - (c) Call medical direction. Skip this only if the organism is known and there is a specific protocol for care.
  - (d) Remove the stinger or venom sac
  - (e) Remove jewelry from the patient's affected limb in case the limb swells
  - (f) If local protocol permits and if the wound is on an extremity (not a joint) place constricting bands above and below the sting or bite site.
  - (g) Keep the limb immobilized and the patient still to prevent distribution of the venom to other parts of the body

e. Assessing Snakebites

- (1) Gather information from the patient, bystanders, and the scene

OUTLINE SHEET SCSC 2.12-1

ENVIRONMENTAL ILLNESS AND INJURIES (CONT.)

- (2) Gather information about the possible type of snake
- (3) Assess for common signs and symptoms of snakebites:
  - (a) Noticeable bite on the skin, which may appear as nothing more than a discoloration
  - (b) Pain and swelling in the area of the bite, which may be slow to develop, taking from thirty minutes to several hours
  - (c) Rapid pulse and labored breathing
  - (d) Progressive general weakness
  - (e) Vision problems (dim or blurred)
  - (f) Nausea and vomiting
  - (g) Seizures
  - (h) Drowsiness or unconsciousness
- f. Treating Snakebites
  - (1) Call medical direction to determine the best receiving facility where antivenom will most readily be available to treat the patient.
  - (2) Treat for shock and conserve body heat
  - (3) Keep the patient calm
  - (4) Locate the fang marks
  - (5) There may only be one fang mark
  - (6) Remove any rings, bracelets, or other constricting items on the bitten extremity
  - (7) Keep any bitten extremities immobilized – the application of a splint will help
  - (8) Do not elevate the limb above the level of the heart
  - (9) Transport the patient

OUTLINE SHEET SCSC 2.12-1

ENVIRONMENTAL ILLNESS AND INJURIES (CONT.)

(10) Monitor vital signs

(11) Treat for anaphylactic shock

g. Assessing Scorpion Stings

(1) Graded on a scale of I-IV based on level of involvement

(a) Grade I- Local pain/ paresthesias and positive tap test

(b) Grade II- Grade I pain/ paresthesias remote from site

(c) Grade III- Somatic Skeletal Neuromuscular Dysfunction **OR** Cranial Nerve Dysfunction

(d) Grade IV- Somatic Skeletal Neuromuscular Dysfunction **AND** Cranial Nerve Dysfunction

(e) Signs and Symptoms:

1. Pain

2. Numbness

3. Urticaria

4. Abdominal Pain

5. Dyspnea

6. Possible Hypertensive Crisis

h. Treating Scorpion Stings

(1) Monitor ABC's

(2) Supportive Therapy

(3) Ice

(4) Tetanus

(5) Severe reactions require hospitalization and possibly antivenom

## OUTLINE SHEET SCSC 2.12-1

## ENVIRONMENTAL ILLNESS AND INJURIES (CONT.)

## 8. Summary and Review

Discuss risk factors related to environmental injuries while assisting in the development of a patient treatment plan

Discuss types of environmental injuries while assisting in the development of a patient treatment plan

Perform an examination for signs of environmental injuries

Discuss measures that help prevent environmental injuries while assisting in the development of a patient treatment plan

Discuss treatment protocols used for environmental injuries while assisting in the development of a patient treatment plan

Discuss the heat condition flag warning system while assisting in the development of a patient treatment plan

State Red Flag criteria

JOB SHEET SCSC 2.12-3

ENVIRONMENTAL BITES AND STINGS

A. INTRODUCTION

Upon successful completion of this lesson the Trainee will be able to assess and treat insect bites and stings, snakebites, and anaphylactic shock on a real or simulated patient (a person acting as a patient).

B. EQUIPMENT LIST: The primary instructor is responsible for checking that all of the below equipment is available in the lab before the lab is scheduled to begin:

1. Real or simulated patient (a person acting as a patient)
2. Epinephrine Auto-Injector
3. Constricting Bands
4. Thermometer
5. Stethoscope
6. Sphygmomanometer
7. Pulse Oximeter
8. Gloves
9. Oxygen Tank
10. Oxygen Mask and Tubing
11. Material to remove stinger “blade or a card”
12. Black permanent Marker
13. Materials needed to open and maintain airway
14. Splints
15. Dry Sterile Dressings
16. Water

C. REFERENCES

1. Emergency Care, 13<sup>th</sup> Edition, Limmer, Chapter 31, Environmental Emergencies
2. Seidel’s Guide to Physical Examination, 8th Ed., Jane W. Ball, Joyce E. Dains, John A. Flynn, Barry S. Soloman, Rosalyn W. Stewart, Mosby, an imprint of Elsevier Inc., 2015

D. SAFETY PRECAUTIONS

1. Instructors, Trainees and visitors must comply with all general safety procedures that are posted in the lab environment or provided in the lesson plan.
2. There are no skill specific safety hazards for this performance test.
3. Review TTO procedures in the Safety/Hazard Awareness Notice

JOB SHEET SCSC 2.12-3

ENVIRONMENTAL BITES AND STINGS (CONT.)

4. Trainees will not practice if an instructor is not present
5. Trainees may not take equipment out of the lab

E. JOB STEPS

1. Trainee Instructions:
  - a. The purpose of this performance test is to evaluate the Trainee’s knowledge of assessing and treating insect bites and stings, snakebites and anaphylactic shock.
  - b. The Trainee must provide assessment & treatment of insect bites and stings, snakebites, anaphylactic shock, heat and cold injuries.
  - c. The Trainee has 20 minutes to complete this examination.
  - d. The Trainee is not allowed to use the reference in the performance of this performance test.
  - e. The Trainee will wear appropriate attire during the practice and actual performance test evaluation.

**AT MEDICAL REPRESENTATIVE DIRECTION, ASSESS PATIENT FOR ANAPHYLACTIC SHOCK BY COMPLETING THE FOLLOWING STEPS:**

1. \*Takes standard precautions
2. Perform Patient Assessment
3. \*Assess patient’s vital signs
4. \*Assess airway and breathing
5. Apply high-concentration oxygen
6. \*If the patient has or develops an altered mental status, open and maintain the patient’s airway
7. \*Provide artificial ventilations if breathing is inadequate
8. \*Determine if administering epinephrine auto-injector is appropriate
9. \*Administering epinephrine auto-injector: Ensure Liquid is clear, Remove the cap and

JOB SHEET SCSC 2.12-3

ENVIRONMENTAL BITES AND STINGS (CONT.)

press firmly against patient's thigh (outside of thigh midway between waist and knee),  
Hold in place until the entire dose is injected, Reassess after 2 min

10. \*Monitor patient's vitals
11. Transport, if patient's condition deteriorate, additional doses of epinephrine may be administered

**AT MEDICAL REPRESENTATIVE DIRECTION, ASSESS PATIENT FOR INSECT BITE AND STING BY COMPLETING THE FOLLOWING STEPS:**

1. Gather information from the patient, bystanders, and the scene
2. Gather information about the insect or other possible source of the envenomation
3. \*Assess patient's vital signs
4. Assess for common signs and symptoms of injected envenomation

**AT MEDICAL REPRESENTATIVE DIRECTION, PROVIDE EMERGENCY CARE FOR INSECT BITES AND STINGS BY COMPLETING THE FOLLOWING STEPS:**

1. \*Treat for shock, even if patient does not present any of the signs of shock
2. Call medical direction. Skip this only if the organism is known and there is a specific protocol for care
3. Remove the stinger or venom sac
4. \*Remove jewelry from the patient's affected limb in case the limb swells
5. If local protocol permits and if the wound is on an extremity (not a joint) place constricting bands above and below the sting or bite site
6. Keep the limb immobilized and the patient still to prevent distribution of the venom to other parts of the body
7. \*Treat for anaphylactic shock.

JOB SHEET SCSC 2.12-3

ENVIRONMENTAL BITES AND STINGS (CONT.)

**AT MEDICAL REPRESENTATIVE DIRECTION, PERFORM A SNAKEBITE ASSESSMENT BY COMPLETING THE FOLLOWING STEPS:**

1. Gather information from the patient, bystanders, and the scene
2. Gather information about the possible type of snake
3. \*Assess patient’s vital signs
4. Assess for common signs and symptoms of snakebites

**AT MEDICAL REPRESENTATIVE DIRECTION, PERFORM EMERGENCY CARE FOR SNAKEBITES BY COMPLETING THE FOLLOWING STEPS:**

1. Call medical direction to determine the best receiving facility where antivenom will most readily be available to treat the patient
2. \*Treat for shock and conserve body heat
3. Keep the patient calm
4. Locate the fang marks. There may only be one fang mark
5. \*Remove any rings, bracelets, or other constricting items on the bitten extremity
6. Keep any bitten extremities immobilized – the application of a splint will help
7. Do not elevate the limb above the level of the heart
8. Transport the patient
9. \*Monitor vital signs
10. \*Treat for anaphylactic shock

**AT MEDICAL REPRESENTATIVE DIRECTION, PRESENT A PATIENT BY COMPLETING THE FOLLOWING STEPS:**

1. \*Present findings of focused physical exam to provider
2. \*Document all history, findings interventions and procedures

## JOB SHEET SCSC 2.12-4

## ENVIRONMENTAL COLD AND HEAT INJURIES

## A. INTRODUCTION

Upon successful completion of this lesson the Trainee will be able to assess and treat cold and heat injuries on a real or simulated patient (a person acting as a patient).

B. EQUIPMENT LIST: The primary instructor is responsible for checking that all of the below equipment is available in the lab before the lab is scheduled to begin:

1. Real or simulated patient (a person acting as a patient)
2. Thermometer
3. Stethoscope
4. Sphygmomanometer
5. Pulse Oximeter
6. Gloves
7. Oxygen Tank
8. Oxygen Mask and Tubing
9. Black permanent Marker
10. Materials needed to open and maintain airway
11. Heat Source
12. Warming Blankets
13. Moist Towels
14. Heating Pads

## C. REFERENCES

1. Emergency Care, 13<sup>th</sup> Edition, Limmer, Chapter 31, Environmental Emergencies
2. Seidel's Guide to Physical Examination, 8th Ed., Jane W. Ball, Joyce E. Dains, John A. Flynn, Barry S. Soloman, Rosalyn W. Stewart, Mosby, an imprint of Elsevier Inc., 2015

## D. SAFETY PRECAUTIONS

1. Instructors, Trainees and visitors must comply with all general safety procedures that are posted in the lab environment or provided in the lesson plan.
2. There are no skill specific safety hazards for this performance test.

## E. JOB STEPS

## JOB SHEET SCSC 2.12-4

## ENVIRONMENTAL COLD AND HEAT INJURIES (CONT.)

Trainee Instructions:

1. The purpose of this performance test is to evaluate the Trainee's knowledge of assessing and treating heat and cold injuries.
2. The Trainee must provide assessment & treatment of heat and cold injuries.
3. The Trainee has 20 minutes to complete this examination.
4. The Trainee is not allowed to use the reference in the performance of this performance test.
5. The Trainee will wear appropriate attire during the practice and actual performance test evaluation.

**AT MEDICAL REPRESENTATIVE DIRECTION, TREAT A PATIENT WITH A LOCAL COLD INJURY BY COMPLETING THE FOLLOWING STEPS:**

1. \*Takes standard precautions
2. \*Remove patient from environment
3. \*Remove wet or restrictive clothing and all jewelry, cover with blanket
4. Avoid rough handling of casualty
5. Do not allow casualty to walk or exert energy
6. \*Assess patient's vital signs
7. Administer O2
8. \*Add warming blankets or additional blankets if available
9. Place heat to groin, axillary and cervical areas
10. As rewarming begins, assess casualty for tingling sensation
11. \*Assess for swelling
12. \*Assess for blistering (Do not break blisters)
13. \*Assess for flushing, mottling and/or cyanosis

## JOB SHEET SCSC 2.12-4

## ENVIRONMENTAL COLD AND HEAT INJURIES (CONT.)

14. Splint extremity
15. Cover Extremity
16. \*Do not rub or massage area
17. \*Do not re-expose
18. Apply heat
19. Do not allow patient to use extremity
20. Transport patient to a higher echelon
21. If transport is delayed, Immerse effected part in warm water, 100-105 degrees Fahrenheit
22. Maintain water at that temperature
23. Continuously stir water
24. Continue until that part is soft and color and sensation return
25. Dress the area with a dry sterile dressing
26. Protect from refreezing

**AT MEDICAL REPRESENTATIVE DIRECTION, TREAT A PATIENT WITH COLD RELATED HYPOTHERMIA BY COMPLETING THE FOLLOWING STEPS:**

1. \*Takes standard precautions
2. \*Remove from environment
3. \*Remove wet or restrictive clothing and all jewelry, cover with blanket
4. Avoid rough handling of casualty
5. Do not allow casualty to walk or exert energy
6. \*Assess patient's vital signs
7. Administer O2

## JOB SHEET SCSC 2.12-4

## ENVIRONMENTAL COLD AND HEAT INJURIES (CONT.)

8. \*Add warming blankets or additional blankets if available
9. Place heat to groin, axillary and cervical areas
10. Turn up heat in treatment area or transport vehicle
11. Do not provide anything by mouth
12. Do not massage extremities
13. \*Monitor vital signs
14. \*Treat for shock
15. Transport

**AT MEDICAL REPRESENTATIVE DIRECTION, TREAT A PATIENT WITH A HEAT RELATED INJURY BY COMPLETING THE FOLLOWING STEPS:**

1. \*Remove from hot environment
2. \*Assess patient's vital signs
3. Administer O2
4. \*Loosen, remove clothing
5. \*Cool by fanning
6. \*Apply cool packs to neck, groin, and axillary regions
7. Keep skin wet
8. If responsive, give cool water
9. Apply moist towels to cramps
10. \*If unresponsive, place on left side
11. Assess for muscular cramps
12. Assess for weakness or exhaustion

## JOB SHEET SCSC 2.12-4

## ENVIRONMENTAL COLD AND HEAT INJURIES (CONT.)

13. \*Assess for rapid shallow breathing
14. \*Assess for weak pulse
15. Assess moist pale skin, normal to cool
16. Assess for heavy perspiration or little to none
17. \*Assess for level of consciousness
18. Assess for dilated or pinpoint pupils
19. Place in supine position
20. \*Treat for shock
21. Transport patient

**AT MEDICAL REPRESENTATIVE DIRECTION, PRESENT A PATIENT BY COMPLETING THE FOLLOWING STEPS:**

1. \*Present findings of focused physical exam to provider
2. \*Document all history, findings interventions and procedures

## ASSIGNMENT SHEET SCSC 2.12-5

## ENVIRONMENTAL ILLNESSES AND INJURIES

## A. INTRODUCTION:

This assignment is to be completed prior to the material being covered in class.

## B. ENABLING OBJECTIVES:

1.64 Discuss risk factors related to environmental injuries while assisting in the development of a patient treatment plan

1.65 Discuss types of environmental injuries while assisting in the development of a patient treatment plan

1.66 Perform an examination for signs of environmental injuries

1.67 Discuss measures that help prevent environmental injuries while assisting in the development of a patient treatment plan

1.68 Discuss treatment protocols used for environmental injuries while assisting in the development of a patient treatment plan

1.69 Discuss the heat condition flag warning system while assisting in the development of a patient treatment plan

1.16 State Red Flag criteria

## C. STUDY ASSIGNMENT:

1. Read Environmental Illnesses and Injuries, Outline Sheet SCSC 2.12-1

## D. STUDY QUESTIONS:

1. Explain how you differentiate between “Heat Exhaustion” and “Heat Stroke”.

2. What are the four common types of cold stress injuries?

## ASSIGNMENT SHEET SCSC 2.12-5

## ENVIRONMENTAL ILLNESSES AND INJURIES (CONT.)

3. Which Non-Freezing cold injury may present as a red or purple discoloration of the distal extremity skin (including ears and nose) occurring after exposure to the cold (generally moist cold)?
  
  
  
  
  
  
  
  
  
  
4. List 4 of the preventative measures that can be taken in order to minimize environmental injuries.
  
  
  
  
  
  
  
  
  
  
5. Concerning the Heat Condition Flag Warning System, what color flag should be flown then the WBGT reads 88F?
  
  
  
  
  
  
  
  
  
  
6. When providing first aid for envenomation, what is the first step that you should take?
  
  
  
  
  
  
  
  
  
  
7. Scorpion Stings are graded on a scale of how many levels?
  - a. I
  - b. II
  - c. III
  - d. IV

OUTLINE SHEET SCSC 2.13-1

PHARMACOLOGY/MEDICAL THERAPEUTICS

A. INTRODUCTION:

B. ENABLING OBJECTIVES:

1.70 State generic and trade names of common sick call medications while assisting in the development of a patient treatment plan

1.71 State indications and contraindications of common sick call medications while assisting in the development of a patient treatment plan

1.72 Discuss side effects of common sick call medications while assisting in the development of a patient treatment plan

1.73 Explain medication administration procedures and principles while assisting in the development of a patient treatment plan

C. SCSC 2.13-1 PHARMACOLOGY/MEDICAL THERAPEUTICS TOPIC OUTLINE

1. Introduction

- a. Medication administration is one of the most important jobs as an HM in the inpatient setting. You will be responsible for not only executing the Doctor’s Orders when administering medications, but you will also play a vital role in the continuum of care. As an HM you are a member of the multidisciplinary team that ensures patients are receiving optimum care. In this lesson we will review medication administration procedures and proper documentation.

2. Common Forms used with Pharmacology:

- a. All forms must be written in black INK.
- b. NAVMED 6710/6 – Poly Prescription
- c. DD 1289 – DoD Single Prescription

3. Pharmacokinetics

- a. Described as what the body does to a drug, refers to the movement of drug into, through and out of the body – the time course of its absorption, bioavailability, distribution, metabolism, and excretion.
- b. Drug Absorption

## OUTLINE SHEET SCSC 2.13-1

## PHARMACOLOGY/MEDICAL THERAPEUTICS (CONT.)

- (1) Determined by the drug's physicochemical properties, formulation, and route of administration.
  - (2) Dosage forms (e.g., tablets, capsules, solutions), consisting of the drug plus other ingredients, are formulated to be given by various routes (e.g., oral, buccal, sublingual, rectal, parenteral, topical, inhalational).
  - (3) Regardless of the route of administration, drugs must be in solution to be absorbed.
  - (4) Solid forms (e.g., tablets) must be able to disintegrate and deaggregate.
- c. Drug Bioavailability
- (1) Bioavailability refers to the extent and rate at which the active part (drug or metabolite) enters systemic circulation, thereby accessing the site of action.
  - (2) Bioavailability of a drug is largely determined by the properties of the dosage form, which depend partly on its design and manufacture.
  - (3) Differences in bioavailability among formulations of a given drug can have clinical significance; thus, knowing whether drug formulations are equivalent is essential.
- d. Drug Distribution to tissues
- (1) After a drug enters the systemic circulation, it is distributed to the body's tissues.
  - (2) Distribution is generally uneven because of differences in blood perfusion, tissue binding (e.g., because of lipid content), regional pH, and permeability of cell membranes.
  - (3) The entry rate of a drug into a tissue depends on the rate of blood flow to the tissue, tissue mass, and partition characteristics between blood and tissue.
  - (4) Distribution equilibrium (when entry and exit rates are the same) between blood and tissue is reached more rapidly in richly vascularized areas, unless diffusion across cell membranes is the rate-limiting step.
  - (5) After a drug has entered tissues, drug distribution to the interstitial fluid is determined primarily by perfusion.

OUTLINE SHEET SCSC 2.13-1

PHARMACOLOGY/MEDICAL THERAPEUTICS (CONT.)

- (6) For poorly perfused tissues (e.g., muscle, fat), distribution is very slow, especially if the tissue has a high affinity for the drug

e. Drug Metabolism

- (1) The liver is the principal site of drug metabolism.
- (2) Although metabolism typically inactivates drugs, some drug metabolites are pharmacologically active – sometimes even more so than the parent compound.
- (3) Drugs can be metabolized by oxidation, reduction, hydrolysis, hydration, conjugation, condensation, or isomerization; whatever the process, the goal is to make the drug easier to excrete.
- (4) The enzymes involved in metabolism are present in many tissues but generally are more concentrated in the liver.
- (5) Drug metabolism rates vary among patients.
- (6) Some patients metabolize a drug so rapidly that therapeutically effective blood and tissue concentrations are not reached; in others, metabolism may be so slow that usual doses have toxic effects.
- (7) Individual drug metabolism rates are influenced by genetic factors, coexisting disorders (particularly chronic liver disorders and advanced heart failure), and drug interactions (especially those involving induction or inhibition of metabolism).

f. Drug Excretion

- (1) Two ways to excretion:
  - (a) Renal- accounts for most drug excretion. The kidneys are the principal organs for excreting water-soluble substances.
  - (b) Biliary- Some drugs and their metabolites are extensively excreted in bile. The biliary system contributes to excretion to the degree that the drug is not reabsorbed from the GI tract.
- (2) Generally, the contribution of intestine, saliva, sweat, breast milk, and lungs to excretion is small, except for exhalation of volatile anesthetics.

OUTLINE SHEET SCSC 2.13-1

PHARMACOLOGY/MEDICAL THERAPEUTICS (CONT.)

4. Common medications

a. Key Formatting

(1) Words in ALL CAPS are a significant or life threatening condition

(2) Words in *italics* are the most common condition

b. Antibiotics

(1) Penicillin V-K

(a) Indications

1. Treatment of a wide variety of infections including:

a. Pneumococcal pneumonia

b. Streptococcal pharyngitis

c. Syphilis

d. Gonorrhea strains

2. Prevention of rheumatic fever.

3. Should not be used as a single agent to treat anthrax.

(b) Route/Dosage

1. 250 mg = 400,000 units.

2. PO: Most infections – 124-500 mg q 6-8 hr. Rheumatic fever prevention – 125-250 mg q 12 hr.

(c) Adverse Reactions/Side Effects

1. CNS: SEIZURES.

2. GI: *diarrhea, epigastric distress, nausea, vomiting*

3. GU: interstitial nephritis.

OUTLINE SHEET SCSC 2.13-1

PHARMACOLOGY/MEDICAL THERAPEUTICS (CONT.)

4. Derm: rash, Urticaria.
5. Hemat: eosinophilia, leukopenia.
6. Misc: ALLERGIC REACTIONS INCLUDING ANAPHYLAXIS AND SERUM SICKNESS, superinfection.

(2) Azithromycin/Zmax/Zithromax

(a) Indications

1. Treatment of the following infections due to susceptible organisms:
  - a. Upper respiratory tract infections, including streptococcal pharyngitis, acute bacterial exacerbations of chronic bronchitis and tonsillitis.
  - b. Lower respiratory tract infections, including bronchitis and pneumonia.
  - c. Acute otitis media.
  - d. Skin and skin structure infections.
  - e. Non-gonococcal urethritis, cervicitis, gonorrhea, and chancroid.
2. Extended-release suspension (Zmax) Acute bacterial sinusitis and community-acquired pneumonia in adults.

(b) Route/Dosage

1. Most respiratory and skin infections
  - a. 500 mg on 1st day, then 250 mg/day for 4 more days (total dose of 1.5 g)
  - b. Acute bacterial sinusitis – 500 mg once daily for 3 days or single 2-g dose of extended-release suspension (Zmax)
2. Acute Bacterial Exacerbations of Chronic Bronchitis
  - a. 500 mg on 1st day, then 250 mg/day for 4 more days (total dose of 1.5 g)

OUTLINE SHEET SCSC 2.13-1

PHARMACOLOGY/MEDICAL THERAPEUTICS (CONT.)

b. 500 mg daily for 3 days

3. Community-Acquired Pneumonia

a. Adults severe cases – 500 mg IV q 24 hr. for at least 2 doses then PO 500 mg PO q 24 hr. for a total of 7-10 days

b. Adults less severe – 500 mg PO, then 250 mg/day PO for 4 more days

c. 2 g single dose as extended-release suspension (Zmax)

4. Pelvic Inflammatory Disease: 500 mg IV q 24 hr. for 1-2 days, then 250 mg PO q 24 hr. for a total of 7 days

5. Nongonococcal Urethritis, Cervicitis, Chancroid, Chlamydia

a. Single 1-g PO dose

6. Gonorrhea Adults: Single 2-g dose PO

(c) Adverse Reactions/Side Effects

1. CNS: dizziness, seizures, drowsiness, fatigue, headache

2. CV: Chest pain, hypotension, palpitations

3. GI: Hepatotoxicity, abdominal pain, diarrhea, nausea, cholestatic jaundice, liver enzymes, dyspepsia, flatulence, melena

4. GU: nephritis, vaginitis

5. Hemat: anemia, leukopenia, thrombocytopenia

6. Derm: photosensitivity, rash

(3) Trimethoprim (TMP)/Sulfamethoxazole (SMX)/Septra DS

(a) Indications

1. Treatment for:

a. Bronchitis

OUTLINE SHEET SCSC 2.13-1

PHARMACOLOGY/MEDICAL THERAPEUTICS (CONT.)

- b. Otitis media
- c. Urinary tract infections
- d. Traveler's diarrhea

(b) Route/Dosage

1. Bacterial Infections

a. PO, IV (Adults):

(1) Mild-moderate infections – 6-12 mg TMP/kg/day divided q 12 hr.

(2) Serious infection/Pneumocystis – 15-20 mg TMP/kg /day/divided q 6-8 hr.

b. Adults PO: Urinary tract infection/chronic bronchitis – 1 double strength tablet (160 mg TMP/800 mg SMX) q 12 hr. for 10-14 days

(c) Adverse Reactions/Side Effects

- 1. CV: hypotension
- 2. CNS: fatigue, hallucinations, headache, insomnia, mental depression
- 3. GI: nausea, vomiting, diarrhea, stomatitis, hepatitis, cholestatic jaundice, pancreatitis
- 4. Derm: rash, photosensitivity
- 5. Endo: hypoglycemia
- 6. Hemat: hemolytic anemia, leukopenia
- 7. Local: phlebitis at IV site
- 8. Misc: fever

c. Antiemetics

- (1) Promethazine/Phenergan

OUTLINE SHEET SCSC 2.13-1

PHARMACOLOGY/MEDICAL THERAPEUTICS (CONT.)

(a) Indications

1. Treatment of various allergic conditions and motion sickness
2. Preoperative sedation
3. Treatment and prevention of nausea and vomiting
4. Adjunct to anesthesia and analgesia

(b) Route/Dosage

1. Allergies

a. PO:

(1) Adults: 6.25-12.5 mg 3 times/day and 25 mg at bedtime

b. IM (Adults): 25 mg; may repeat in 2 hr.

2. Anti-vertigo (Motion Sickness)

a. PO:

(1) Adults: 25 mg 30-60 min before departure; may be repeated in 8-12 hr.

3. Sedation

a. PO, Rectal, IM, and IV

(1) Adults: 24-50 mg; may repeat q 4-6 hr. if needed

4. Sedation during labor - IM, IV (Adults): 50 mg in early labor; when labor is established, additional doses of 25-75 mg may be given 1-2 times at 4-hr intervals (should not exceed 100 mg/24 hr.)

5. Antiemetic

a. PO, Rectal, IM, and IV:

(1) Adults: 12.5-25 mg q 4 hr. as needed; initial PO dose should be 25 mg

OUTLINE SHEET SCSC 2.13-1

PHARMACOLOGY/MEDICAL THERAPEUTICS (CONT.)

(c) Adverse Reactions/Side Effects

1. CNS: *confusion, disorientation, sedation*, dizziness, fatigue, insomnia, nervousness.
2. EENT: blurred vision and tinnitus.
3. CV: bradycardia, hypertension, hypotension, tachycardia.
4. GI: constipation, drug-induced hepatitis, dry mouth.
5. Derm: photosensitivity, severe tissue necrosis upon infiltration at IV site, rashes.

d. Antihistamines

(1) Diphenhydramine HCL/Benadryl

(a) Indications

1. Relief of allergic symptoms caused by histamine release including:
  - a. Anaphylaxis
  - b. Seasonal and perennial allergic rhinitis
2. Mild nighttime sedation
3. Prevention of motion sickness
4. Antitussive (syrup only)

(b) Route/Dosage

1. Adults– PO:
  - a. Antihistaminic/antiemetic – 24-50 mg q 4-6 hr.
  - b. Antitussive – 25 mg q 4 hr. as needed
  - c. Sedative/hypnotic – 50 mg 20-30 min before bedtime

OUTLINE SHEET SCSC 2.13-1

PHARMACOLOGY/MEDICAL THERAPEUTICS (CONT.)

2. IM, IV

a. Adults: 24-50 mg q 4 hr. as needed

3. Topical (Adults): Apply to affected area up to 3-4 times daily

(c) Adverse Reactions/Side Effects

1. CNS: drowsiness, dizziness, headache

2. EENT: blurred vision, tinnitus

3. CV: hypotension, palpitations

4. GI: *anorexia, dry mouth*, constipation, nausea

5. GU: dysuria, urinary retention

6. Derm: photosensitivity

7. Resp: chest tightness, thickened bronchial secretions, wheezing

8. Local: pain at IM site

e. Antihypertensive

(1) Hydrochlorothiazide/HCT

(a) Indications

1. Management of mild to moderate hypertension

2. Treatment of edema associated with:

a. Renal dysfunction

b. Cirrhosis

c. Estrogen therapy

OUTLINE SHEET SCSC 2.13-1

PHARMACOLOGY/MEDICAL THERAPEUTICS (CONT.)

(b) Route/Dosage

1. When used as a diuretic in adults, generally given daily, but may be given every other day or 2-3 days/week.
2. PO:
  - a. Adults - 12.5-100 mg/day in 1-2 doses (up to 200 mg/day; not to exceed 50 mg/day for hypertension)

(c) Adverse Reactions/Side Effects

1. CNS: dizziness, drowsiness, lethargy, weakness
2. CV: hypotension
3. GI: anorexia, cramping, hepatitis, nausea, vomiting
4. Derm: photosensitivity, rash
5. Endo: hyperglycemia
6. MS: muscle cramps
7. Misc: pancreatitis

f. Local Anesthetic

(1) Lidocaine/Xylocaine

(a) Indications

1. Local:
  - a. Infiltration/mucosal/topical anesthetic
  - b. Transdermal: Pain due to post-herpetic neuralgia

(b) Route/Dosage

1. Local
  - a. Infiltration (Adults): Infiltrate affected area as needed

OUTLINE SHEET SCSC 2.13-1

PHARMACOLOGY/MEDICAL THERAPEUTICS (CONT.)

b. Topical (Adults): Apply to affected area 2-3 times daily

c. Patch (Adults): Up to 3 patches may be applied once for up to 12 hr. in any 24-hr period

(c) Adverse Reactions/Side Effects

1. CNS: SEIZURES, confusion, drowsiness, blurred vision, dizziness, nervousness, slurred speech, and tremor

2. CV: CARDIAC ARREST, arrhythmias, bradycardia, hypotension

3. Local: *stinging*, burning, contact dermatitis, erythema

4. Misc: allergic reactions, including anaphylaxis

g. Mild Analgesics

(1) Aspirin/Acetylsalicylic Acid

(a) Indications

1. Inflammatory disorders including:

a. Rheumatoid arthritis

b. Osteoarthritis

2. Mild to moderate pain

3. Fever

(b) Route/Dosage

1. Pain/Fever

a. PO, Rectal

(1) Adults:

(a) 325-1000 mg q 4-6 hr. (not to exceed 4 g/day). Extended-release tablets – 650 mg q 8 hr.

OUTLINE SHEET SCSC 2.13-1

PHARMACOLOGY/MEDICAL THERAPEUTICS (CONT.)

(b) 800 mg q 12 hr.

2. Inflammation

a. Adults: 2.4 g/day initially; increased to maintenance dose of 3.6-5.4 g/day in divided

(c) Adverse Reactions/Side Effects

1. EENT: tinnitus

2. GI: **GI BLEEDING**, *dyspepsia, epigastric distress, nausea*, abdominal pain, anorexia, hepatotoxicity, vomiting

3. Hemat: anemia, hemolysis

4. Derm: rash, Urticaria

5. Misc: **ALLERGIC REACTIONS INCLUDING ANAPHYLAXIS AND LARYNGEAL EDEMA**

(2) Acetaminophen/Tylenol

(a) Indications

1. PO, Rectal:

a. Mild pain

b. Fever

2. IV:

a. Mild to moderate pain

b. Moderate to severe pain with opioid analgesics

c. Fever

(b) Route/Dosage

1. PO

OUTLINE SHEET SCSC 2.13-1

PHARMACOLOGY/MEDICAL THERAPEUTICS (CONT.)

a. Adults:

(1) 325-650 mg q 6 hr.

(2) 1 g 3-4 times daily

2. Rectal

a. Adults: 325-650 mg q 4-6 hr. as needed or 1 g 3-4 times/day

(c) Adverse Reactions/Side Effects

1. GU: renal failure (high doses/chronic use)

h. Non-Steroidal Anti-Inflammatories (NSAIDs)

(1) Ibuprofen/Motrin/Advil

(a) Indications

1. PO, IV:

a. Mild to moderate pain

b. Fever

2. PO:

a. Inflammatory disorders including rheumatoid arthritis (including juvenile) and osteoarthritis

b. Dysmenorrhea

(b) Route/Dosage

1. PO

a. Adults

(1) Anti-inflammatory – 400-800 mg 3-4 times daily

(2) Analgesic/antipyretic – 200-400 mg q 4-6 hr.

OUTLINE SHEET SCSC 2.13-1

PHARMACOLOGY/MEDICAL THERAPEUTICS (CONT.)

(c) Adverse Reactions/Side Effects

1. CNS: *headache*, dizziness, drowsiness, intraventricular hemorrhage (ibuprofen lysine), psychic disturbances.
2. CV: MYOCARDIAL INFARCTION, STROKE, arrhythmias, edema, hypertension.
3. GI: GI BLEEDING, HEPATITIS, *constipation*, *nausea*, vomiting, and abdominal discomfort.
4. GU: cystitis, hematuria, renal failure.
5. Hemat: anemia, blood dyscrasias, prolonged bleeding time.
6. Misc: ALLERGIC REACTIONS INCLUDING ANAPHYLAXIS.

(2) Naproxen/Aleve/Naprosyn

(a) Indications

1. Mild to moderate pain
2. Dysmenorrhea
3. Fever
4. Inflammatory disorders, including:
  - a. Rheumatoid arthritis (adults)
  - b. Osteoarthritis

(b) Route/Dosage

1. 275 mg naproxen sodium is equivalent to 250 mg naproxen
2. Anti-Inflammatory/Analgesic
  - a. PO

(1) Adults

OUTLINE SHEET SCSC 2.13-1

PHARMACOLOGY/MEDICAL THERAPEUTICS (CONT.)

(a) Naproxen – 250-500 mg twice daily

(b) Delayed-release naproxen – 374-500 mg twice daily

(c) Naproxen sodium – 274-550 mg twice daily

(2) Inflammatory disease: 10-15 mg/kg/day divided q 12 hr.,  
maximum: 1000 mg/day

3. OTC Use (naproxen sodium) – PO:

a. Adults - : 200 mg q 8-12 hr. or 400 mg followed by 200 mg q 12 hr.

(c) Adverse Reactions/Side Effects

1. CNS: dizziness, drowsiness, headache

2. Resp: dyspnea

3. CV: MYOCARDIAL INFARCTION, STROKE, edema, hypertension, palpitations, tachycardia

4. GI: DRUG-INDUCED HEPATITIS, GI BLEEDING, *constipation, dyspepsia, nausea*, anorexia, diarrhea, discomfort, flatulence, vomiting

5. GU: cystitis, hematuria, renal failure

6. Derm: photosensitivity, rashes, sweating

(3) Meloxicam/Mobic

(a) Indications

1. Relief of signs and symptoms of osteoarthritis and rheumatoid arthritis (including juvenile rheumatoid arthritis)

(b) Route/Dosage

1. PO

a. Adults: 7.5 mg once daily; some patients may require 15 mg/day

OUTLINE SHEET SCSC 2.13-1

PHARMACOLOGY/MEDICAL THERAPEUTICS (CONT.)

(c) Adverse Reactions/Side Effects

1. CV: MYOCARDIAL INFARCTION, STROKE, edema, hypertension
2. GI: GI BLEEDING, ↑ liver enzymes, diarrhea, dyspepsia, nausea
3. Hemat: anemia, leukopenia

i. Muscle Relaxants

(1) Cyclobenzaprine/Flexeril:

(a) Indication for management of acute painful musculoskeletal conditions associated with muscle spasm

(b) Route/Dosage

1. PO (Adults): Acute painful musculoskeletal conditions
  - a. Immediate-release: 10 mg 3 times daily (range 20-40 mg/day in 2-4 divided doses; not to exceed 60 mg/day)
  - b. Extended-release: 15-30 mg once daily. Fibromyalgia – 5-40 mg at bedtime (unlabeled)

(c) Adverse Reaction/Side Effects

1. CNS: *dizziness, drowsiness*, confusion, fatigue, headache, nervousness
2. EENT: *dry mouth*, blurred vision
3. CV: arrhythmias
4. GI: constipation, dyspepsia, nausea, unpleasant taste
5. GU: urinary retention

(2) Methocarbamol/Robaxin

(a) Indications

1. Adjunctive treatment of muscle spasm associated with acute painful musculoskeletal conditions (with rest and physical therapy)

OUTLINE SHEET SCSC 2.13-1

PHARMACOLOGY/MEDICAL THERAPEUTICS (CONT.)

(b) Route/Dosage

1. PO (Adults): 1.5 g 4 times daily initially (up to 8 g/day) for 2-3 days, then 4-4.5 g/day in 3-6 divided doses
2. IM (Adults): 1-3 g/day for not more than 3 days; course may be repeated after a 48-hr rest

(c) Adverse Reaction/Side Effects

1. CNS: SEIZURES (IV, IM ONLY), dizziness, drowsiness, light-headedness
2. EENT: blurred vision, nasal congestion
3. GI: anorexia, GI upset, nausea
4. GU: brown, black, or green urine
5. Derm: pruritus, rashes, and Urticarial
6. Local: pain at IM site
7. Misc: ALLERGIC REACTIONS INCLUDING ANAPHYLAXIS (IM, USE ONLY), fever

j. Burn Treatment

(1) Silver Sulfadiazine/Silvadene

(a) Indications

1. Prevention and treatment of wound sepsis in patients with 2nd- and 3rd-degree burns
2. Management of minor skin infections and dermal ulcers

(b) Route/Dosage

1. Topical (Adults): Apply 1% cream 1-2 times daily in layer 1.5-mm thick

(c) Adverse Reaction/Side Effects

OUTLINE SHEET SCSC 2.13-1

PHARMACOLOGY/MEDICAL THERAPEUTICS (CONT.)

1. Derm: burning, itching, pain, rash, skin discoloration, skin necrosis
  2. Hemat: leukopenia
  
5. Documentation
  - a. Oral Medication
    - (1) Six rights – Ensure correct patient, medication name, dose, route, time, and date of administration (with MAR correctly signed)
    - (2) Patient's response to medication, including any adverse effects
    - (3) Patient and family education
    - (4) Withheld medication, reason for withholding, and practitioner notification, if appropriate
    - (5) Patient's refusal of medication administration, if applicable
    - (6) Patient's weight in kilograms per the organization's practice
    - (7) Unexpected outcomes and related nursing interventions
  
  - b. Parenteral
    - (1) Six rights – Ensure correct patient, medication name, dose, site, time, and date of administration (with MAR correctly signed)
    - (2) Patient's response to medication, including any adverse effects
    - (3) Unexpected outcomes and related nursing interventions
    - (4) Patient and family education
    - (5) Comfort assessment and any interventions provided
  
  - c. Topical
    - (1) Actual time of administration
    - (2) Type of agent applied and strength

OUTLINE SHEET SCSC 2.13-1

PHARMACOLOGY/MEDICAL THERAPEUTICS (CONT.)

- (3) Site of application
  - (4) Description of skin condition before topical agent application
  - (5) Patient's response to medication, including any adverse reactions
  - (6) Withheld medications
  - (7) Abnormalities in condition of skin
  - (8) Date and time of dressing change per the organization's practice
  - (9) Patient and family education
  - (10) Unexpected outcomes and related nursing interventions
- d. Rectal
- (1) Six rights- Medication name, dose, route, time and date of administration,(with MAR correctly signed)
  - (2) Patient's weight in kilograms per the organization's practice
  - (3) Patient's response to medication, including any adverse reactions
  - (4) Reason medication was withheld (if applicable)
  - (5) Patient and family education
  - (6) Unexpected outcomes and related nursing interventions

6. Summary and Review

State generic and trade names of common sick call medications while assisting in the development of a patient treatment plan

State indications and contraindications of common sick call medications while assisting in the development of a patient treatment plan

## OUTLINE SHEET SCSC 2.13-1

## PHARMACOLOGY/MEDICAL THERAPEUTICS (CONT.)

Discuss side effects of common sick call medications while assisting in the development of a patient treatment plan

Explain medication administration procedures and principles while assisting in the development of a patient treatment plan



## ASSIGNMENT SHEET SCSC 2.13-3

## PHARMACOLOGY/MEDICAL THERAPEUTICS (CONT.)

3. What pharmacokinetic process is determined by the drug's physicochemical properties, formulation, and route of administration?
  
  
  
  
  
  
  
  
  
  
4. What is the principal organ for excreting water-soluble substances?
  
  
  
  
  
  
  
  
  
  
5. A 23 y/o male patient presents to medical, complaining of nausea and vomiting. Following an appropriate patient history and examination, the medical provider's diagnosis is gastroenteritis. What type of medications may be prescribed to them?
  
  
  
  
  
  
  
  
  
  
6. Aside from being used to treat nausea and motion sickness, what other condition may promethazine be used to treat?