

Injury Prevention Strategies That Work



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Navy & Marine Corps Public Health Center

Center for Personal & Professional Development



Objectives

Identify the impact of injuries on readiness.

Identify the structure of DoD governance on efforts to reduce preventable injuries and mishaps.

Discuss available resources for evidence-based injury prevention strategies:

The Recommendations for Prevention of Physical Training (PT)-Related Injuries: Results of a Systematic Evidence-Based Review by the Joint Services Physical Training Injury Prevention Work Group.

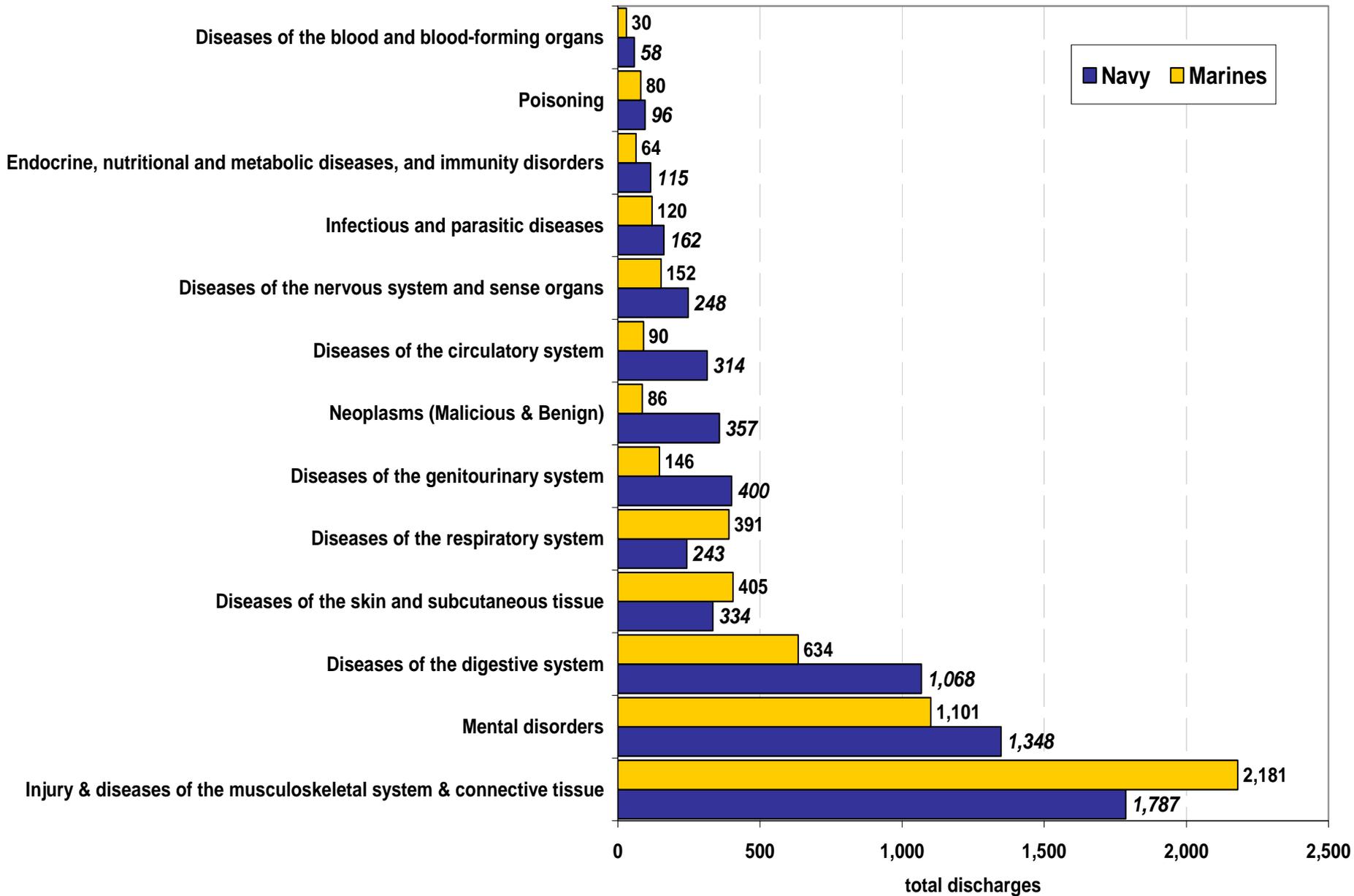
Identify DoD best practices in injury prevention.

Injury Impact

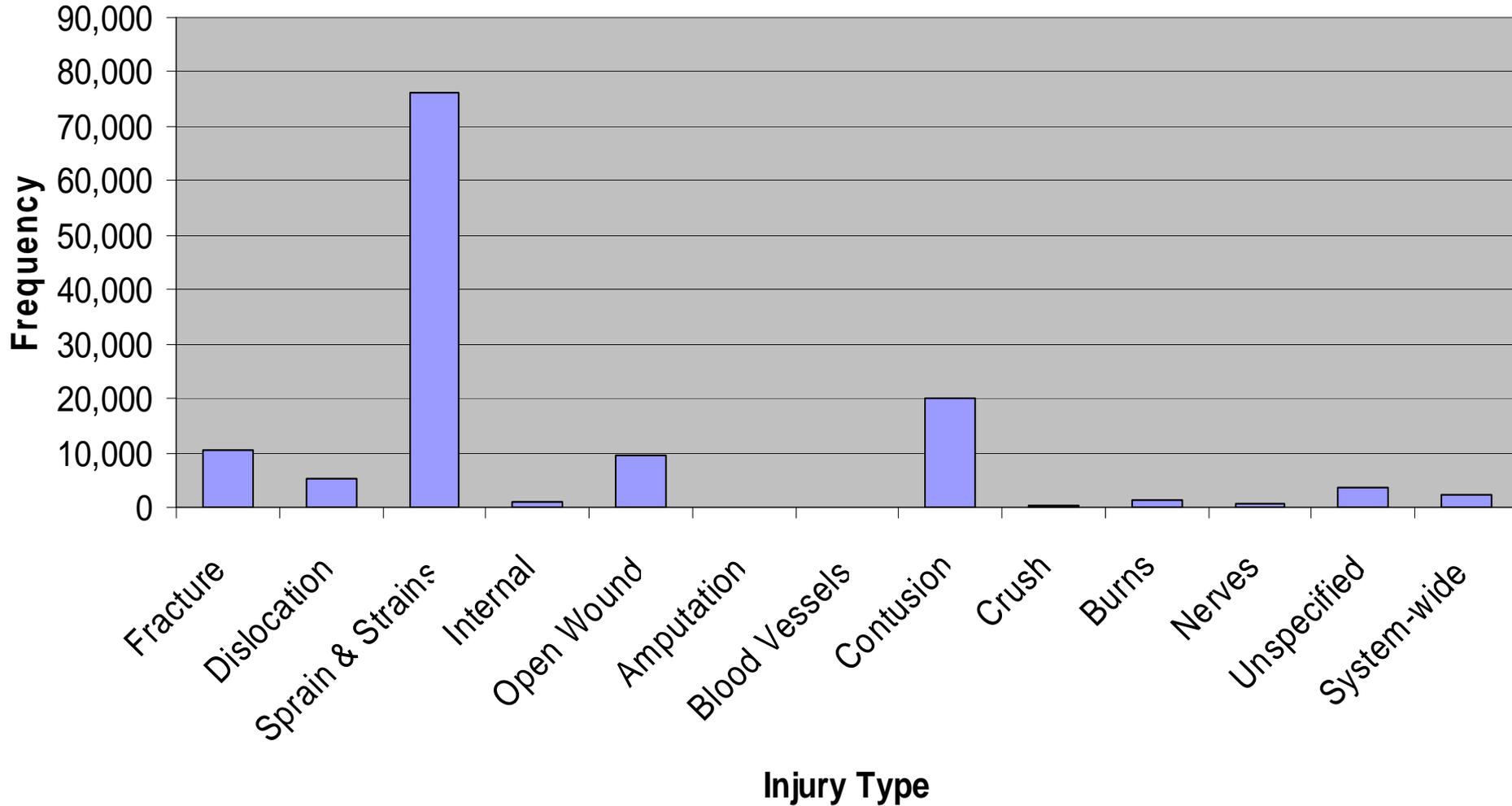
Injuries impose a greater ongoing negative impact on the health and readiness of the U.S. Armed Forces than any other category of medical complaint during peacetime & combat.

*Reference: Jones, B.H. and Hansen, B.C. (2000)
Am J. Prev Med, 18 (3S), p 16.)*

**Number of Hospital Discharges (Inpatient, MTF), SIDR 2007
Major Disease and Injury Categories*, Active Duty - Navy & Marine Corps**



Navy Injuries by Type from Medical Encounter Data (Inpatient and Outpatient) - FY2007 (N = 130,470)



Note: 111,423 of the 130,470 were acute outpatient.

NMCPHC Data Epidemiology Center



The Defense Safety Oversight Council (DSOC)

Provides governance on DoD-wide efforts to reduce preventable injuries and mishaps.

- Established: ALNAV 057/03, 19 May 2003 (Dep.SECDEF)
- Chaired by the Under Secretary of Defense (P&R)
- Navy POC: Mr. Tom Rollow, Safety ASN (I&E)



Military Training Task Force

The DSOC chartered nine task forces to develop recommendations for policies, programs, and other investments to reduce preventable injuries and accidents.

Military Training Task Force (MTTF) was chartered to support the Secretary of Defense's accident and injury prevention mandate with focus in the realm of interventions that relate to aspects of **military training**.

From an operational standpoint, what is hurting us?

MTTF Emphasis:

vehicle, sports, physical training, recreational injury

- break away bases, ankle braces



Evidence-Based Decisions

Integrating individual professional expertise with the best available external evidence from systematic research to determine the most effective course of action.

Literature reviews combined with data collection and analysis are primary ingredients required for making evidence-based decisions.

(Modified / Evidence-based Medicine: How to Practice and Teach EBM, 1997).



DoD Military Injury Prevention Priorities Work Group

Leading Injuries, Causes, & Mitigation Recommendations

- Overseen by the DSOC – 2006.
- Describes the DMIPPWG's process for establishing an evidence-based ranking of DoD prevention priorities.
- Presents a DoD-wide process for analysis.
- Provides recommendations for intervention initiatives.





Injury Impact

The past decade has witnessed growing recognition that injuries are a leading cause of morbidity and mortality for the U.S. Military, eroding combat readiness more than any other single disease or health condition in this generally healthy and physically active population, which is relatively free of competing causes of death and severe illness.

*DSOC: DoD Military Injury Prevention Priorities Work Group
White Paper: Leading Injuries, Causes, & Mitigation Recommendations
February 2006*



Injury Impact: Physical Training/Sports

Physical training and sports injuries are of particular concern. Based on the likelihood of success in decreasing injuries having the greatest impact on military readiness, the Defense Safety Oversight Council (DSOC) recommends that the greatest reduction of lost duty days due to injuries across DoD may be achieved via mitigation efforts focused specifically on **sports-and physical training related injuries.**

*DSOC, DoD Military Injury Prevention Priorities Working Group:
Leading Injuries, Causes,
and Mitigation Recommendations, Feb.2006.*



Joint Services Physical Training Injury Prevention Work Group (JSPTIPWG)

JSPTIPWG established: (Feb 2005)

Subject matter experts in the field of physical performance and surveillance /prevention of musculoskeletal injuries have evaluated military physical training injury prevention **programs, policies, and research** for cross-service recommendations to reduce physical training related injuries in and beyond initial entry training.



USN/USMC / JSPTIPWG

Feb 2005

Navy/USMC Personnel:

PT, ATC, CSCS, Kinesiologist, PhD, epidemiology
NMCPHC, NHRC, NSTC, TECOM, ODU, MCRDPI

- Injury prevention literature was analyzed and prioritized.
- This includes reviewing available literature on intervention studies and risk factors / cause of injury studies.
- The review of literature serves as an evidence-based tool to assist the DSOC in identifying what **REALLY** works to prevent training related injuries throughout the DoD.



JSPTIPWG Published Reports

1. DoD Military Injury Prevention Priorities Working Group: Leading Injuries, Causes, and Mitigation Recommendations & in the Joint Services Physical Training Injury Prevention Work Group's Interventions Evaluated to Make Recommendations for Physical Training-Related Injury Prevention, **May 2007.**
2. Recommendations for Prevention of Physical Training-Related Injuries Results of a Systematic Evidence-Based Process of the Joint Services Physical Training Injury Prevention Work Group
A technical report produced by the United States Army Center for Health Promotion and Preventive Medicine in collaboration with Quad-Service Injury Prevention and Fitness Experts for the Defense Safety Oversight Council, **February 2008.**



JSPTIPWG Report Primary Components

- Essential components of an injury prevention program.
- Recommended interventions (based on sufficient scientific evidence).
- Interventions NOT recommended (due to evidence of ineffectiveness or harm).
- Interventions without a completed review.



JSPTIPWG Recommendations

#1: Prevent overtraining (strongly recommended)

#2: Perform multiaxial, neuromuscular, proprioceptive & agility training.



Naval Health Research Center

Both military and civilian research identifies that high running volume significantly increases the risk for lower extremity injury.

During initial military training about 25 percent of men and about 50 percent of women incur one or more physical training-related injuries.

About 80 percent of these injuries are in the lower extremities and are of the overuse type—a condition brought about by physical training volume overload (generally excessive running).





Running & Injuries

NHRC RESEARCH, MCRD / San Diego 1994 - 1995, Shaffer

Evaluation of mileage, stress fracture incidence, and final fitness among male U.S. Marine Corps Recruits. * Total organized running during basic training.

<u>Mileage</u>	<u>% stress fx</u>	<u>3 mile</u>
55	3.7	20:20
41	2.7	20:44
33	1.7	20:53

(More is not necessarily better.)





USS DEVASTATOR (MCM-6)



**Body
Movement
Skills**

**Balance
Agility
Coordination**

**Kinesthetic
Awareness**



DSOC – Injury Prevention Through Leadership

- Training Module Developed by a DoD working group.
- Background:
 - ❖ Funded by DSOC – 2007 (60k)
 - ❖ Managed by the Army (CHPPM)
 - ❖ Completed FY 09.
 - ❖ Implement? – MAB discussion
- Intended for leaders who are responsible for developing and oversight of training regimens.
- Review CD available.



DoD OUSD(P&R) 2008 Survey Status of the Forces

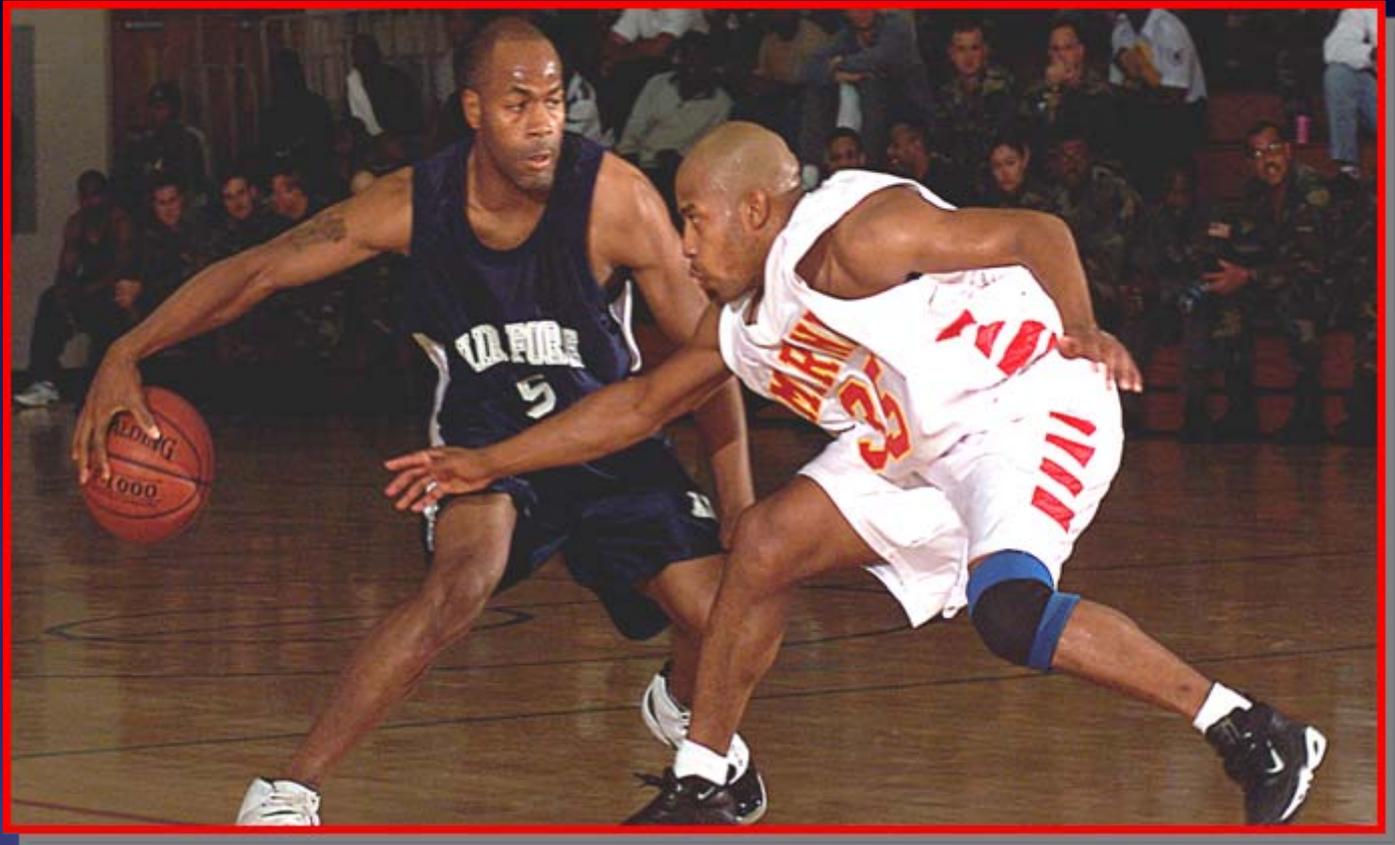
- Survey administered 2008. Report obtained this week.
- NMCPHC/CPPD (NAVY) assisted in question development – Led by Army.
- 2005 sample consisted of **36,567** nonproportional stratified random sampling procedures were used amongst active duty personnel.

INJURIES:

- 137: During past 12 months, how many different injuries did you have for which you sought medical care from military or civilian medical providers?
- 138 – 147: Sports, exercise, recreation injury questions.



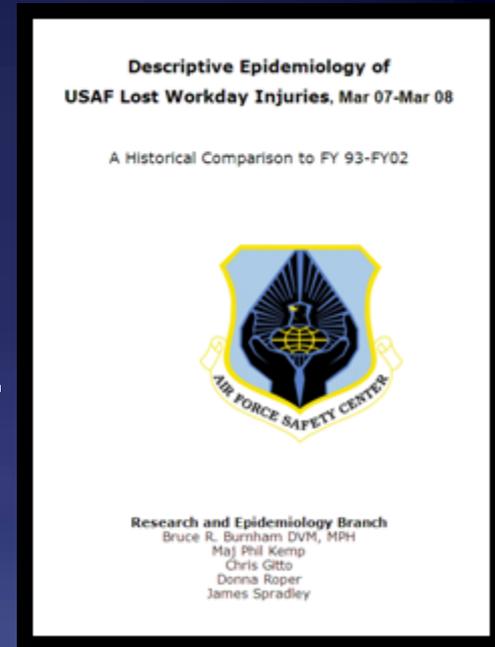
United States Air Force Best Practice





Air Force - Injury Surveillance

- Descriptive Epidemiology of USAF Lost Workday Injuries, 3/07 – 3/08: A historical comparison to FY93 – FY02 – Air Force Safety Center (Air Force Safety Automated System)
- “Golden evidence-based tool” for injury prevention interventionist .
 - ✓ Type of injury: industrial, sports/rec, etc.
 - ✓ On duty (more controllable) v/s off duty
 - ✓ Rank of activity causing injury
 - ✓ Injury location
 - ✓ Specific prevention strategies



www.afhsc.mil

STANAG Reports

Installation level report

All services

Identifies cause category

Drawback: SIDR (hospitalized) injuries
– doesn't capture class C/D mishaps.





Air Force Current Practices

Completed Basketball ankle brace demonstration project at 2 bases – starting 3rd at a deployed location

- First project successful.
- Main lesson learned: provide players with a choice to increase acceptance.

Completed non-slip footwear in Northerly bases to prevent slips, trips, and falls.

- Outcome: Although it did reduce falls, compliance was the issue --- less controlled than in a gym.



Distributing injury prevention course for leaders



United States Army Best Practices





Army Research

Injuries & injury risk factors in

- BCT
- AIT (medic & ordnance)
- Army War College Students
- MPs
- Infantry
- Army band
- Military parachuting
- Marine Corp Officer Basic
- Road Marching

Interventions/ Program Evaluations

- Physical training (3 projects)
- Running Shoes assigned on the basis of foot arch height
- Mouthguards in BCT
- Parachute Ankle Brace
- Preconditioning prior to BCT
- Antiperspirants to reduce blister incidence
- Hydrophobic socks to reduce blister incidence
- Rest from running during BCT to reduce injuries (doesn't work)

Miscellaneous

- Ambulatory activity in BCT (pedometers)
- Risk factors for discharge (injuries are among these)
- Temporal changes in fitness of new Army recruits
- Seasonal variations in injury rates



(Knapik)



Army Current Practices

- Fall related injuries / analysis of Army Safety Center Data – article to be released next month (Michelle Chervak)
- Evaluate whether prescribing a running shoe for basic trainees based on the shape of the plantar foot surface.
- Temporal changes in infantry fitness (important because fitness is an independent injury risk factor).
- Comparative injury rates and injury risk factors across the services (Army, Air Force, Marines)
- Injuries & injury risk factors in FBI new agent trainees. (Interagency)

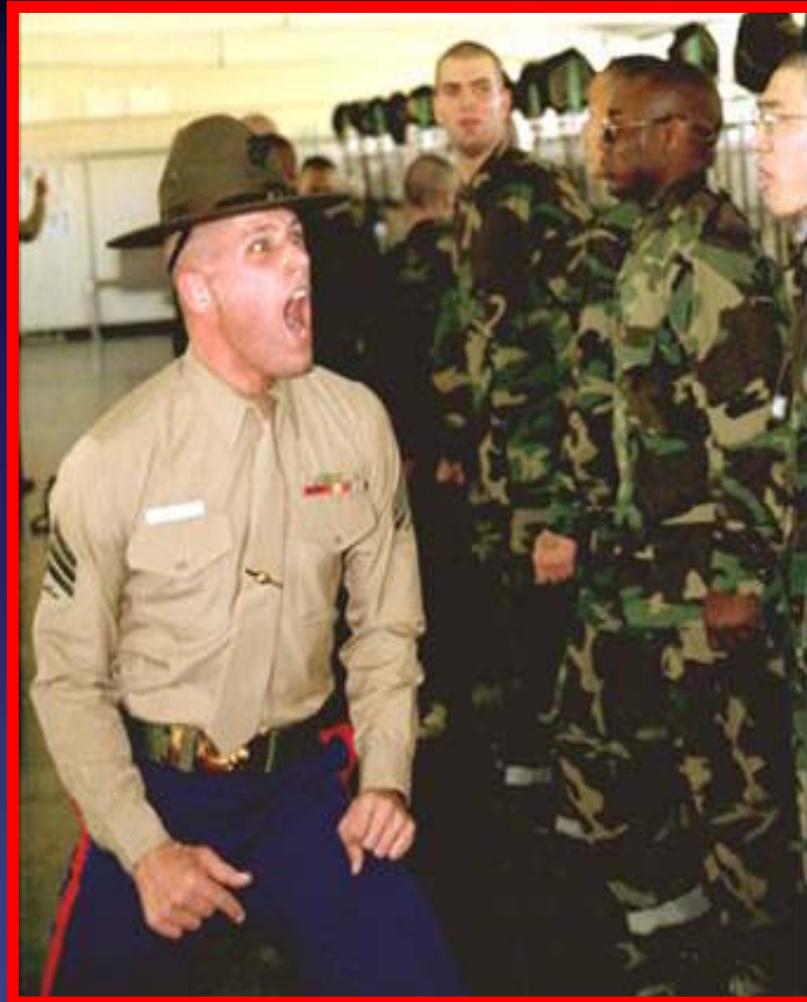


Army Deployment Initiatives

- Interest is focused on Soldiers carrying very heavy loads on patrols in Afghanistan. WRAMC gait lab currently researching the impact of wearing a rucksack on gait both in abled bodied soldier & those w/h limb loss. (LTC Paul Pasquino)
- Causes of injury for non-battle injuries that require air evacuation from theatre. Part of project was DSOC funded and looked at data from the Air Force, Navy, and Marines. (Keith Hauret)
 - Draft report was submitted to the DSOC last month.
- Injuries & fitness before & after deployment. Result: Injuries go up post deployment. (Joe Knapik)



United States Marine Corps Best Practice



Injuries (Sept – Oct 04)

Recruit A (3rd RTBn)



Recruit B (3rd RTBn)



Recruit C
(2^d RTBn)



Recruit D
(1st RTBn)



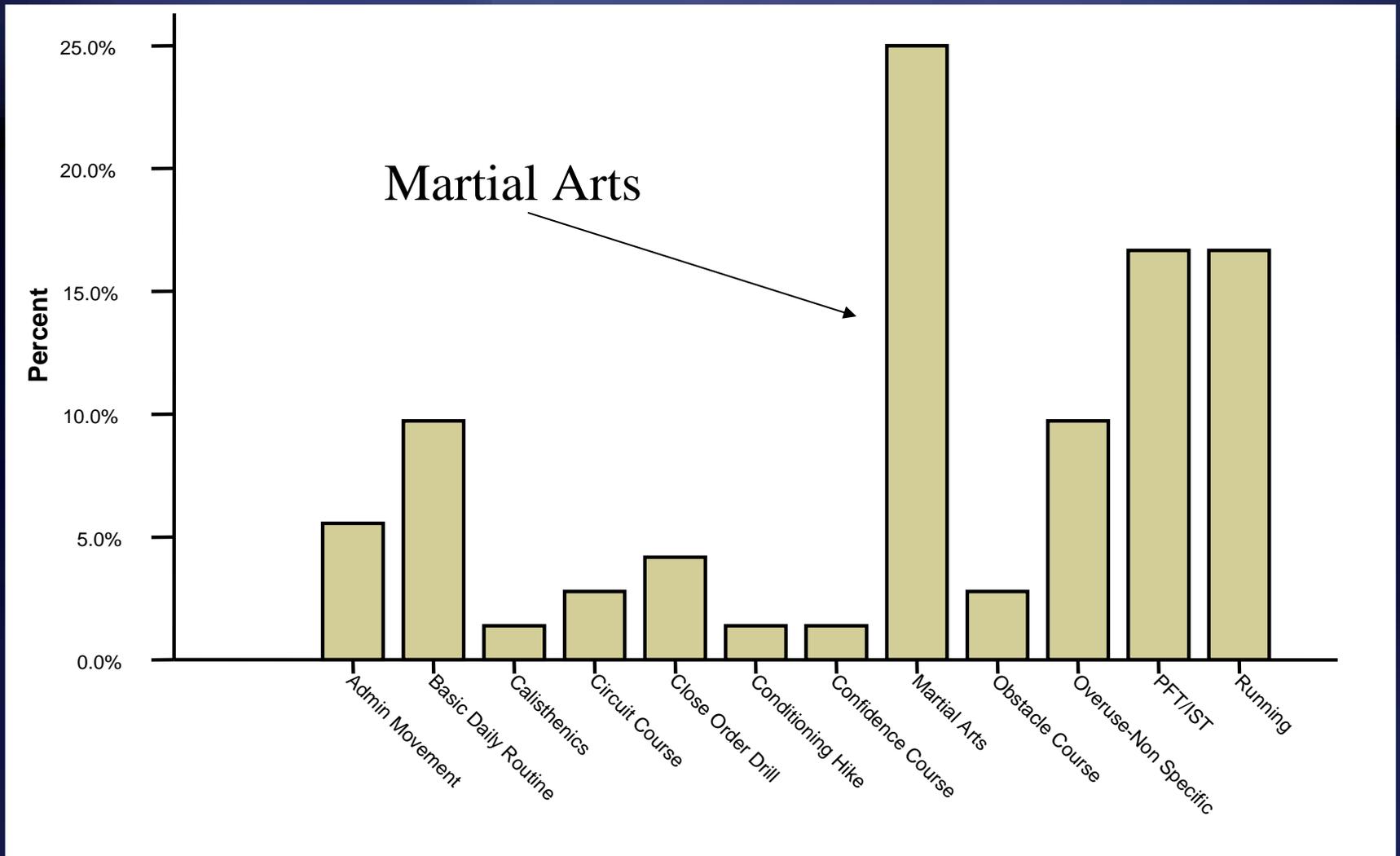
Recruit E
(3rd RTBn)



- 1. Determine the existence and size of the problem*
- 2. Identify causes of the problem*

Proportion of SMIP Reports by Precipitating Event:
MCRD Parris Island, September 2004
(N=72)

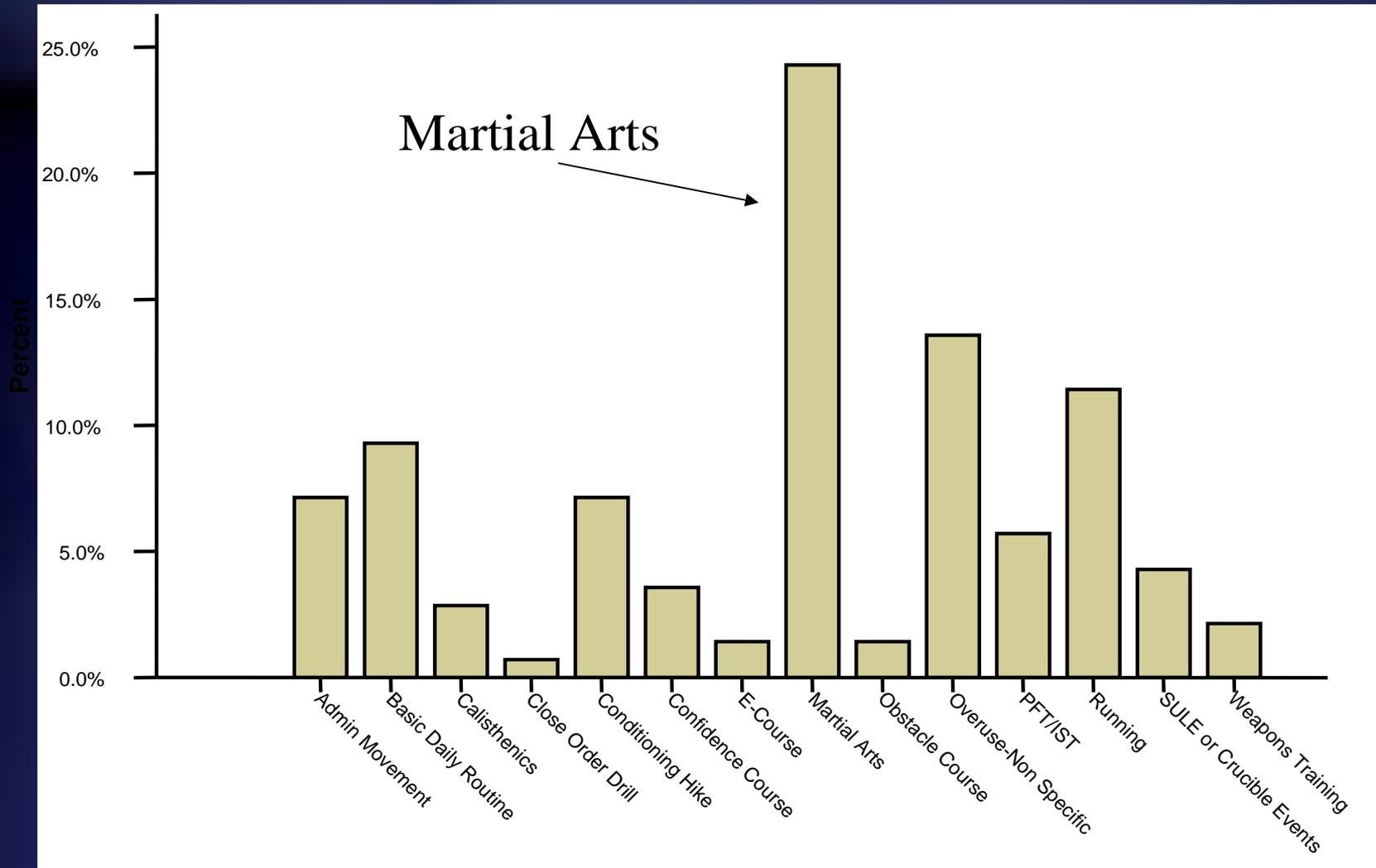
DATA FROM TIMS



1. Determine the existence and size of the problem

Proportion of SMIP Reports by Precipitating Event: MCRD Parris Island, October 2004 (N=140)

DATA FROM TIMS



1. Determine the existence and size of the problem

Body Hardening



Extract of brief
discussing Body
Hardening injuries
at MCRDPI

- What is Body Hardening?
- Correct way to perform technique?
- How are they paired up?
- Level of supervision?
- What is rep count for hitting certain area?
- Strike intensity?
- How is it used throughout their time in the Marine Corps?

3. Determine what prevents the problem

Extract of letter from MCRDPI Chief Martial Arts Instructor Trainer to his instructors:

Ladies and Gentlemen:

I would like your assistance in addressing a new issue regarding the body hardening portions of MCMAP. **I was briefed by the RTR-wide ATCs** that some of our techniques are causing Myositis Osificans and Rhabdomyolysis. Both of these conditions are very bad. These, basically, are the rupturing of muscles to send muscle fiber into the blood stream (not a medical definition, but it is close enough for the discussion).

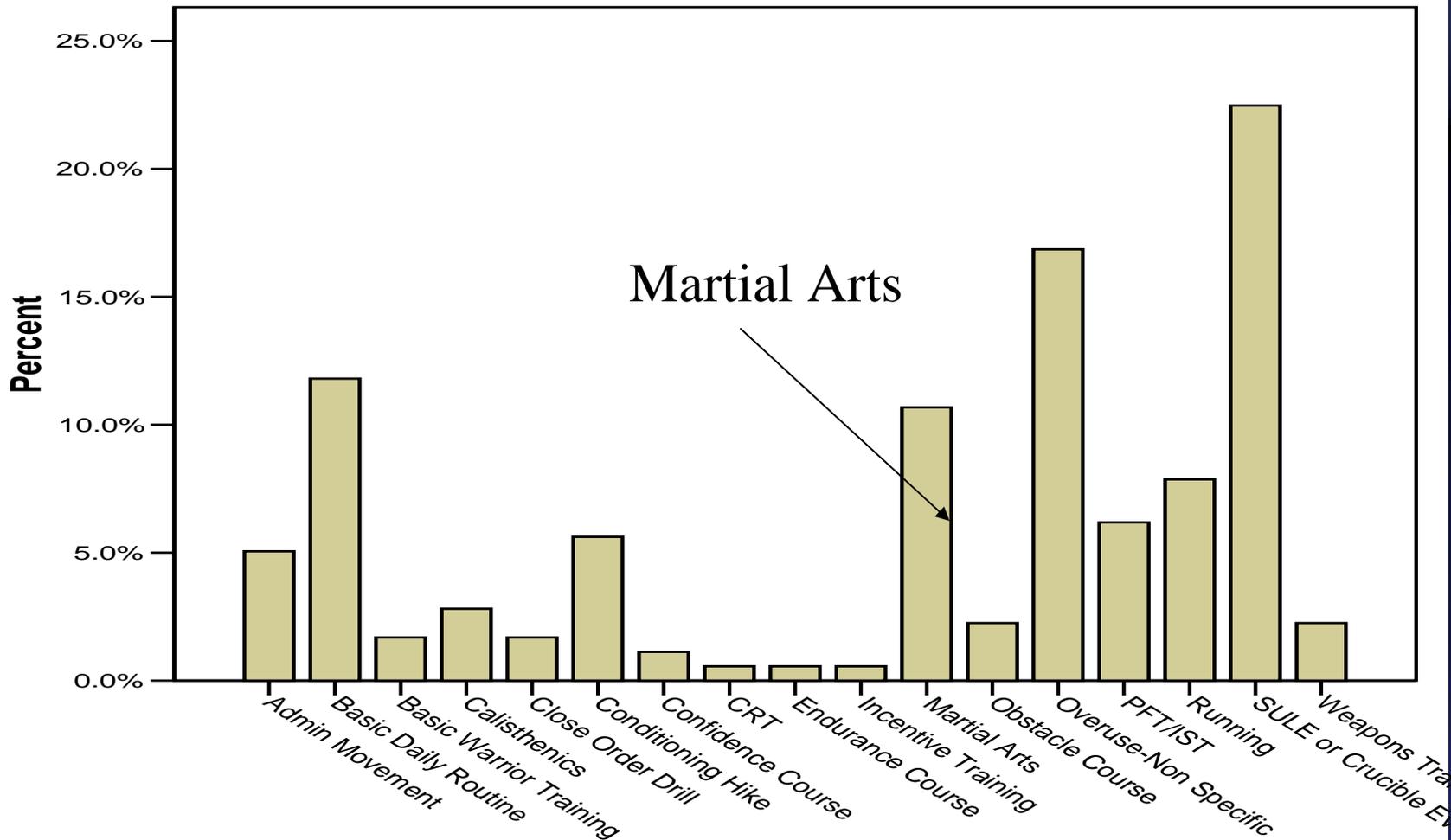
I think some of the problem is caused by the high motivation levels of some of the well-intentioned DIs. They unintentionally get the recruits to pound on each other too hard. I think we can make a minor systemic change that will avoid the problem. If you have any other suggestions, please let me know so I can brief my Battalion Commander and we can continue to march.

I suggest that:

1) Only SDIs and above be allowed in the immediate training area when body hardening is being done. This will give the instructor better control on the "motivation level."

4. Implement prevention strategies and programs

Proportion of SMIP Reports by Precipitating Event:
MCRD Parris Island, November 2004
(N=178)



5. Continue surveillance and monitor effectiveness of prevention efforts



United States Navy Best Practices



Naval Health Research Center

<http://www.nhrc.navy.mil>

- Efficacy Review - SMART Center
- Military training injuries
- Blisters & injuries
- Gender differences in injury rates
- Foot structure and range of motion on injuries
- Epidemiology of injury among females
- Use of physical activity to predict stress fx.
- Epidemiological pattern of injuries and physical training

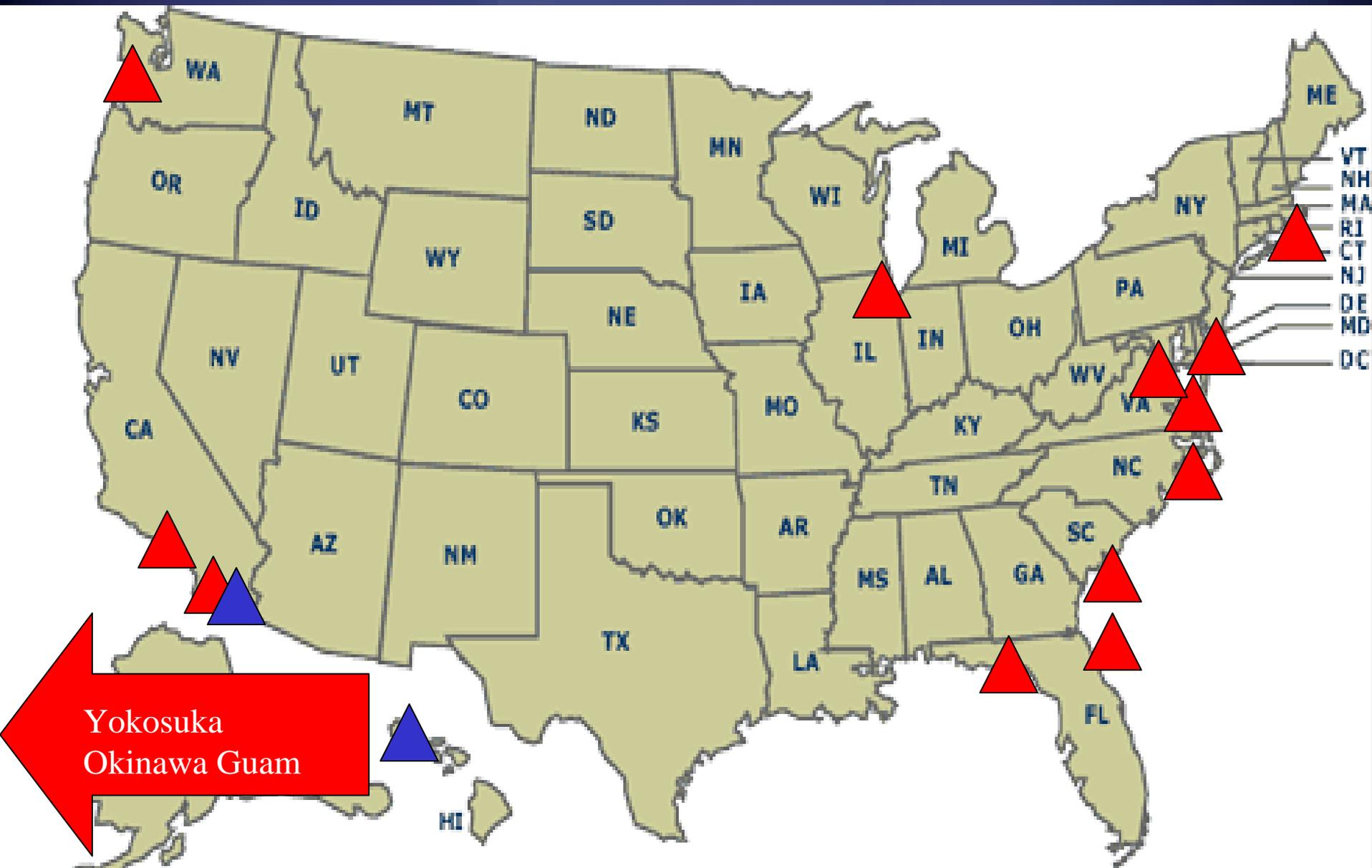


SMART Centers & Musculoskeletal Centers

- Close proximity to Sailor/Marine. Pearl Harbor = 15 yds.
- Accurate and Timely Diagnosis.
- Aggressive Reconditioning & Education.
- Accelerated Return to Duty.



NAVY SMART CENTER LOCATIONS



SMART Proven Impact

- MCRD, SAN DIEGO, 1990-1994
 - **50% reduction** in Medical Rehab Platoon (MRP) Population
- MCRD, PARRIS ISLAND, 1998-2000
 - **49% reduction** in medical attrition over 2 YEARS
- TBS QUANTICO, 1999 - 2001
 - **22% reduction** in lost training days
- PEARL HARBOR, 2002
 - **11% reduction** in LIMDU's, and **28% reduction** in physical evaluation boards (PEBs)

Naval Special Warfare “Best Practice” Model

Assessment of Military Physical Performance and Injury Risk

Naval Special Warfare Development Group

8-week Comparison of Two Physical Training Programs (Cross Fit v/s SPEARED)

Old Dominion University



Assessment of Body Armour on Functional Performance

Office of Naval Research



Modeling & Validation of an Orthotic Knee Brace system for Use on High Speed Boats

ODU Multidisciplinary Seed Funding



Motion Induced Fatigue on High-Speed Boats

Computer Sciences Corporation; Carderock Division Combatant Craft Dept (CCD)



Program Evaluation – NSW Group 2

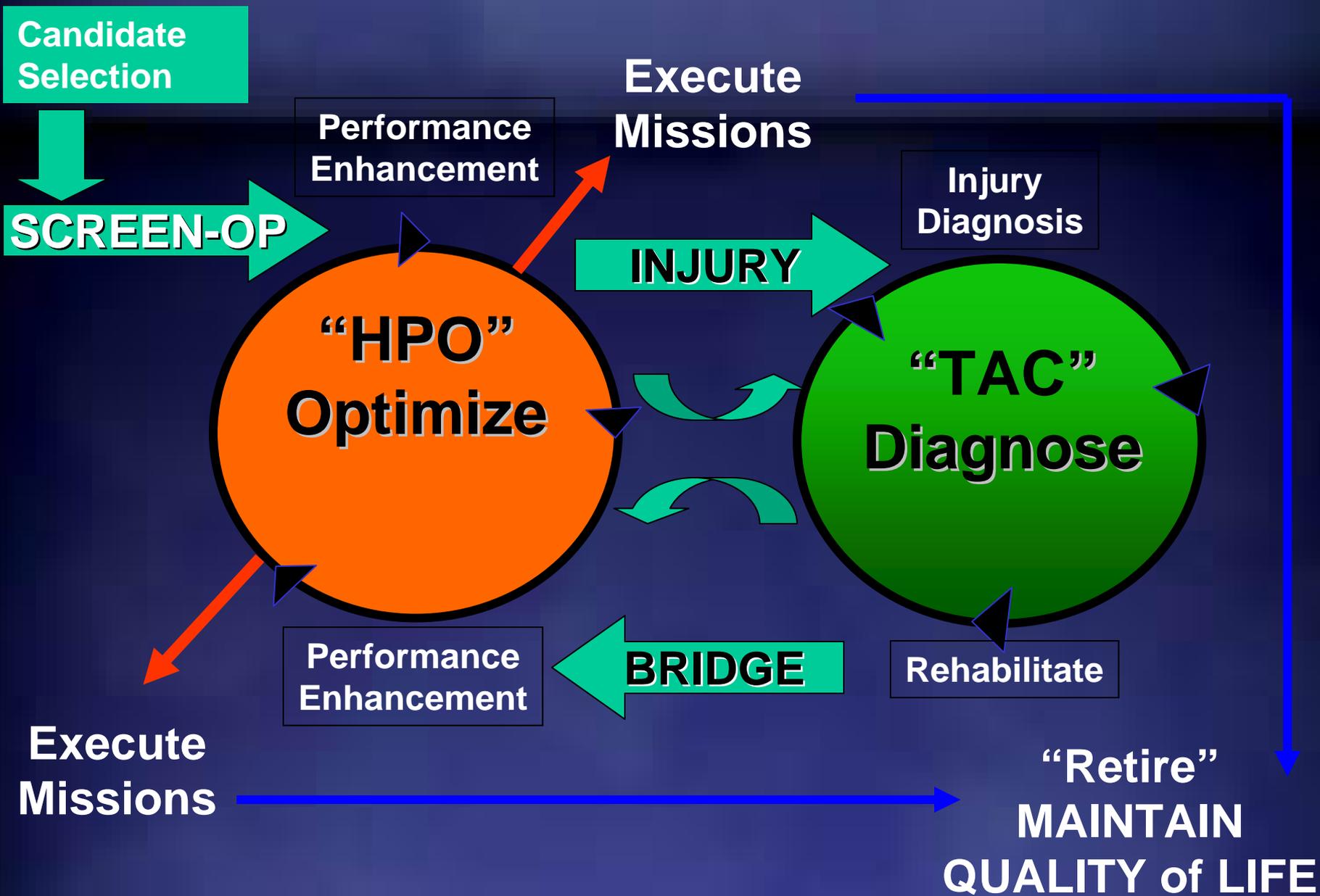
University of Pittsburgh

NSW Advisory Capacity: Old Dominion University; University of Connecticut;
University of North Carolina; University of Delaware; University of Kentucky

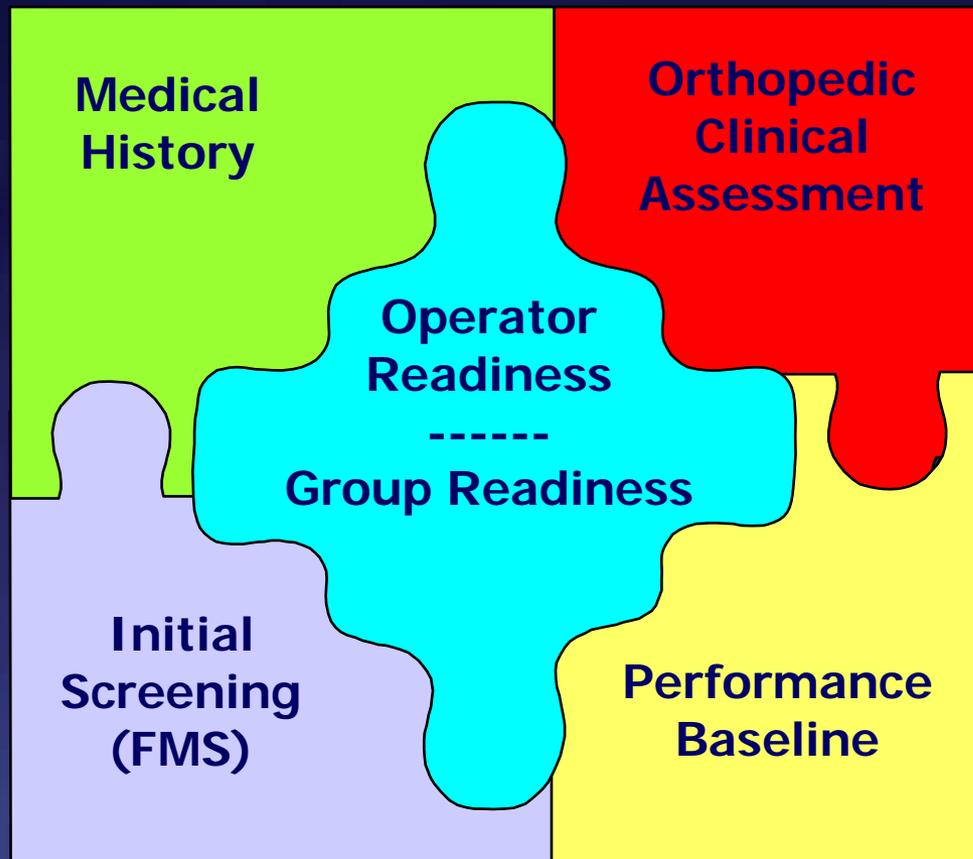
Naval Special Warfare Tactical Athlete Model



NSW Physical Readiness Model



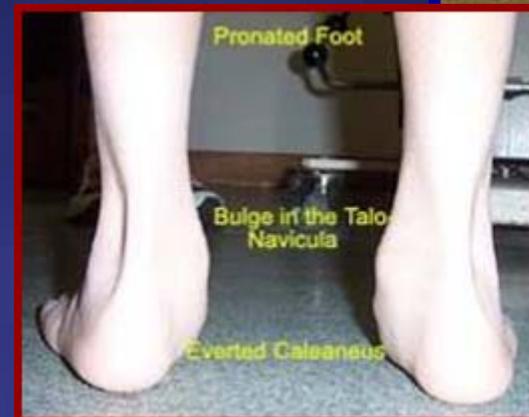
Risk Assessment Components



PREVENTION

Screening and Evaluation

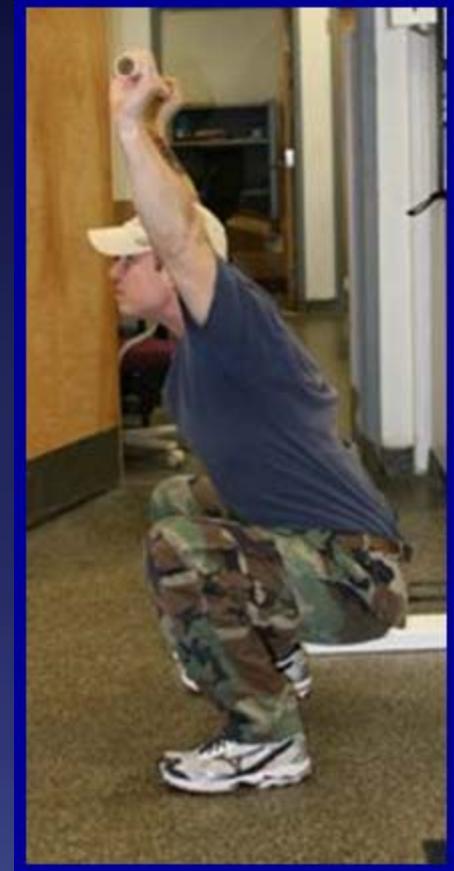
- Identify at risk operators
- Establish Baselines
- Identify “weak links”
- Clinical/Performance
- Prescribe Corrective Strategies
- Risk Factor Classification



PREVENTION: Screening and Evaluation

Clinical Evaluation

- Medical Hx Review
- Orthopedic Assessment
- Functional Movement Screen
- Star Excursion Test
- Body Composition
- Grip Strength
- Postural Assessment



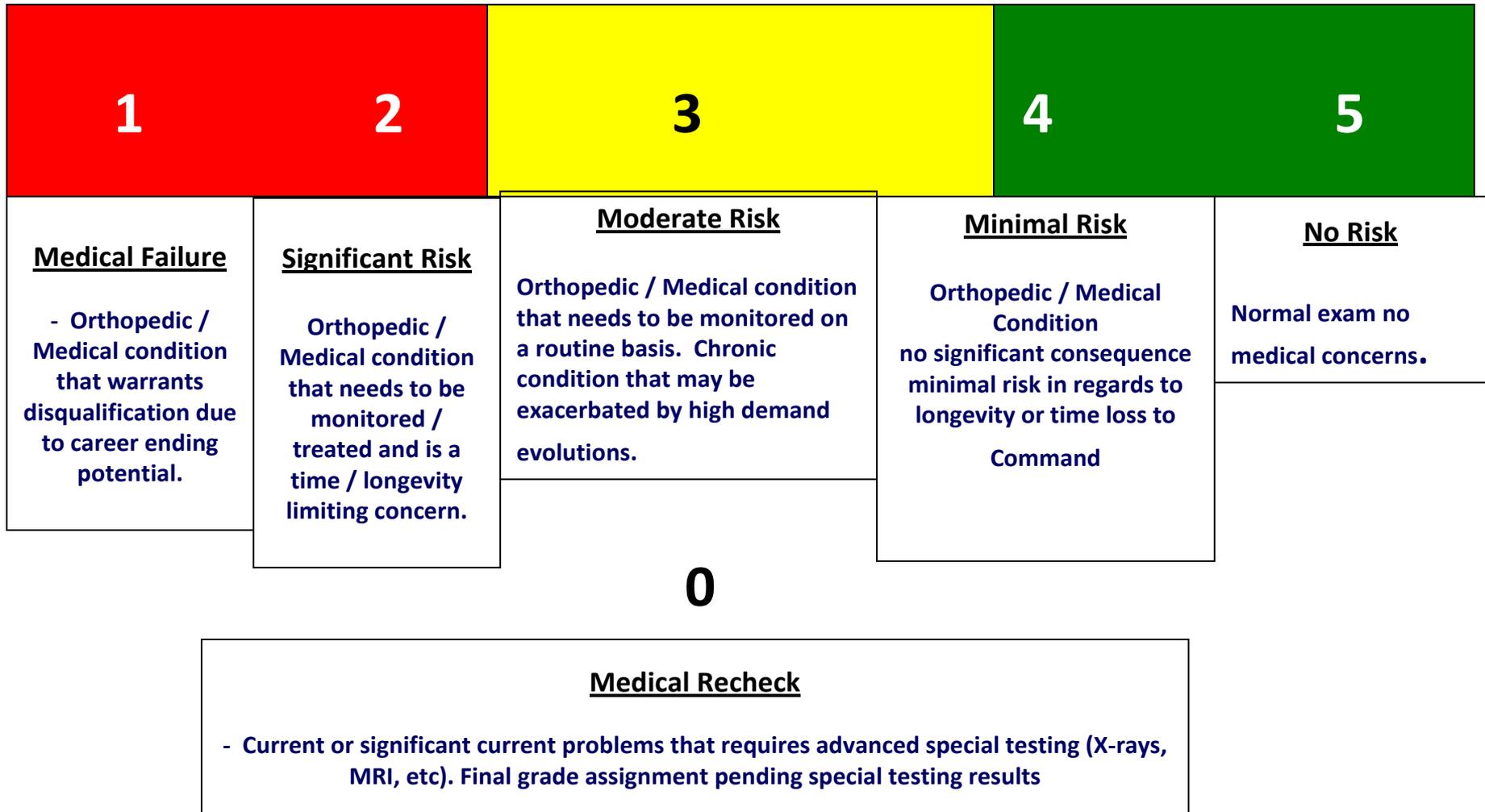
PREVENTION: Screening & Evaluation

Performance Measurements

- Strength Assessment
- VO2 Max
- Agility
- Vertical Jump
- Anaerobic Threshold
- Rope Pull
- Swim/Ladder Climb



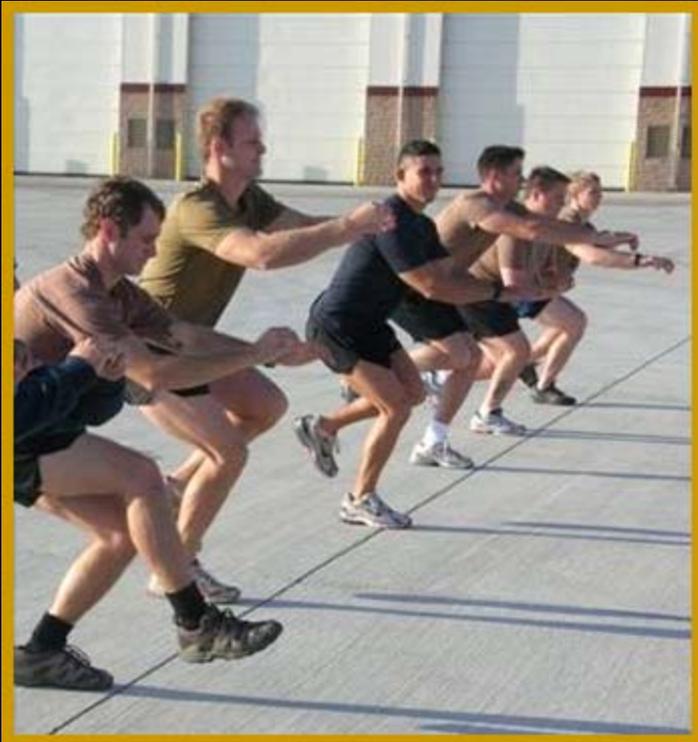
Risk Factor Continuum



Specificity of Training - Resiliency



Functional Movement for Performance & IP



Functional Movement for Performance & IP



“A bad program done well is better than a good program done poorly”

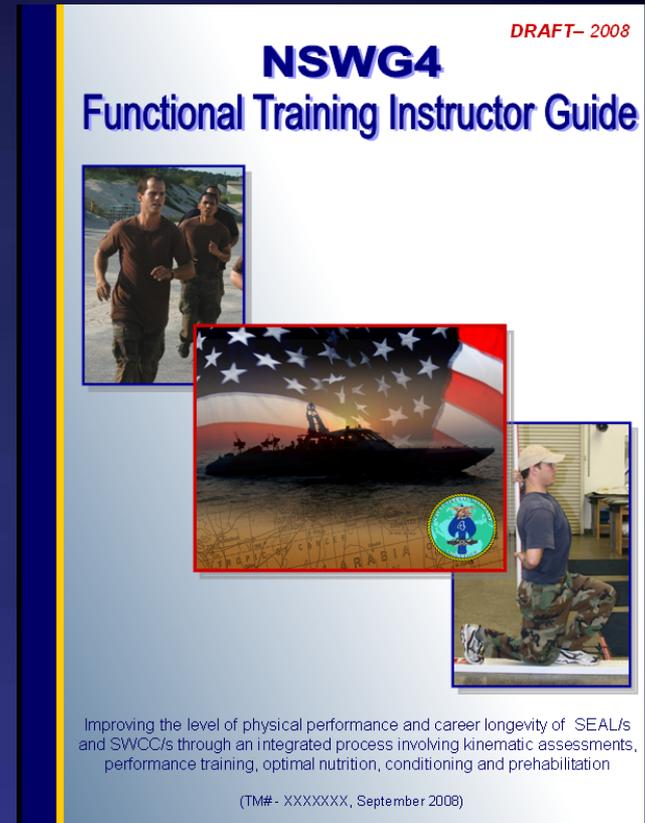
Functional Training Instructor (NSWG-4)

Complete 3 phased Education Process

- 1) National Accredited Certification
- 2) Specialized Training
- 3) In-House Education

Upon Completion of JQR FTI will receive
Letter of Designation from CO

- Liaison between Training and HP
- Daily Coaching and Instruction
- Assist in Program Design
- Education of DET Coaches
- Motivator



Navy Operational Fitness & Fueling Series



Improving the Operational Performance of Sailors

LIFT – PUSH – PULL – CARRY

Movement Preparation, Multidirectional Movement Training,
Strength Training, Cardiovascular Training, Recovery Training
& Nutritional Fueling Strategies

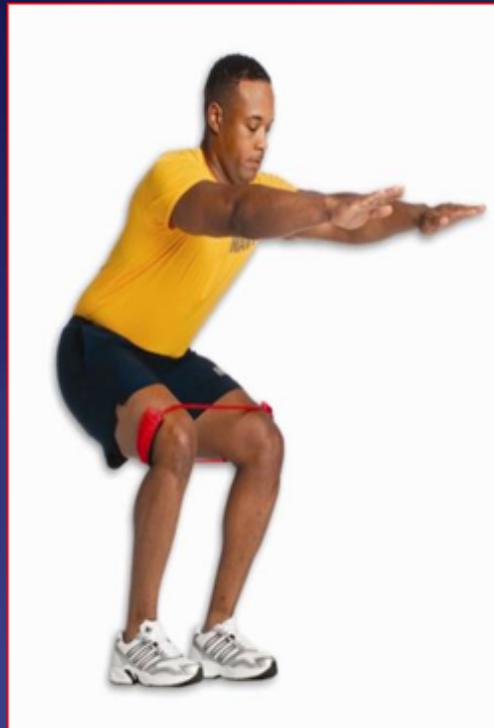


Operational Performance

Does the workout or activity relate to the demands on the job?

SPECIFICITY:

Physical training movements that mimic actual job related movements.





NOFFS: The Product

- Over 750 Sailors from 2nd & 3rd fleet assisted with development.
- Baseline Assessment:
 - Confined space issue
 - Equipment availability
 - Provides a “logic engine” for PT
 - “Eliminates the guesswork”
- Specialized Series For:
 - Submarines
 - Surface Ships
 - Large Decks
 - Group Physical Training

LARGE DECK SERIES
WARM UP & STRENGTH - LEVEL 2

Select 1 Strength Option:
FIT KIT EQUIPMENT or FULL EQUIPMENT

Stage:	A	B	C	D
Reps:	12	10	8	6

Option B: Strength - Full Equipment This strength option takes advantage of FULL EQUIPMENT using dumbbells and body weight as the primary source of resistance. This component designed to strengthen the movement needed to perform on an operational platform. Select a resistance that you feel challenged with and pay close attention to the quality of your movement.

	Circuit 1	Circuit 2
● Short	x2	x1
● Medium	x2	x2
● Long	x3	x2

Circuit 1

1

BENCH PRESS - ALTERNATING DUMBBELL



Keeping one arm straight, lower the other dumbbell until your arm just break parallel with the deck, then push it back up. Keep your nonworking arm straight with feet flat on the deck. Keep hips & shoulders on the bench during the movement. Alternate sides each rep.

Circuit 2

1

SQUAT TO OVERHEAD PRESS - DUMBBELL



Squat hips back & down until thighs are parallel with deck. Return to standing by pushing through your hips. At top of stance, press dumbbells straight overhead. Keep weight on arches and do not let knees collapse during the movement.

2

ROMANIAN DEADLIFT - 1 LEG DUMBBELL



Keep straight line from ear to ankle, hinge at waist & elevate your leg behind you. Return to the standing position by contacting your hamstring & glutes. Keep back flat, shoulder blades back & down during movement & keep the dumbbells close to your shin. Complete reps, repeat on opposite side.

2

LATERAL PILLAR BRIDGE - W/ ABDUCTION



Lie on side with forearm on deck, feet stacked together. Keep elbow under shoulder, push your hip off the deck, straight line from ankle to shoulder. Lift your top leg into the air as if you were doing a lateral jumping jack. Complete reps, repeat on opposite side.

3

SPLIT SQUAT - REAR FOOT ELEVATED DUMBBELLS



Place your back foot up onto a box or bench behind you. Drop hips towards deck by bending your front knee without letting your back knee touch the deck. Return to starting position by pushing up with your front hip. Complete reps on one leg, then switch legs & repeat.

3

CURL - KNEELING DUMBBELL



Start in kneeling position, holding dumbbells with arms at your sides. Keep elbows at your hips, lift dumbbells to shoulders as you rotate your palms to the ceiling. Keep your stomach & the glute muscles of your rear leg tight throughout the movement. Switch forward leg half way through the set.

4

BENT OVER ROW - 1 ARM 1 LEG DUMBBELL



Keep straight line from ear to ankle, hinge at waist & elevate your leg behind you. Slide shoulder blade toward, lift weight to body by driving elbow to ceiling. Keep your back level, stance leg slightly unlocked & shoulders parallel to the deck. Complete reps, repeat on opposite side.

4

CRUNCHES



Lie faceup with knees bent & hands across your chest. Lift chest up until shoulder blades are off the deck & rotate your pelvis towards your belly button. Slowly return to starting position & repeat for prescribed reps.



Purpose

To provide the Navy with a foundational and evidence – based performance training resource:

Focus of the product is

- 1: Improving operational performance (not just the PRT)
- 2: Decreasing the incidence/severity of musculoskeletal injuries
- 3: Foundational nutrition – the basics

Goal is to provide a complete physical training program that will “eliminate the guesswork” for the

- 1: Individual Sailor that is participating in his/her personal exercise and nutrition program
- 2: Tool for the Navy health and fitness professional

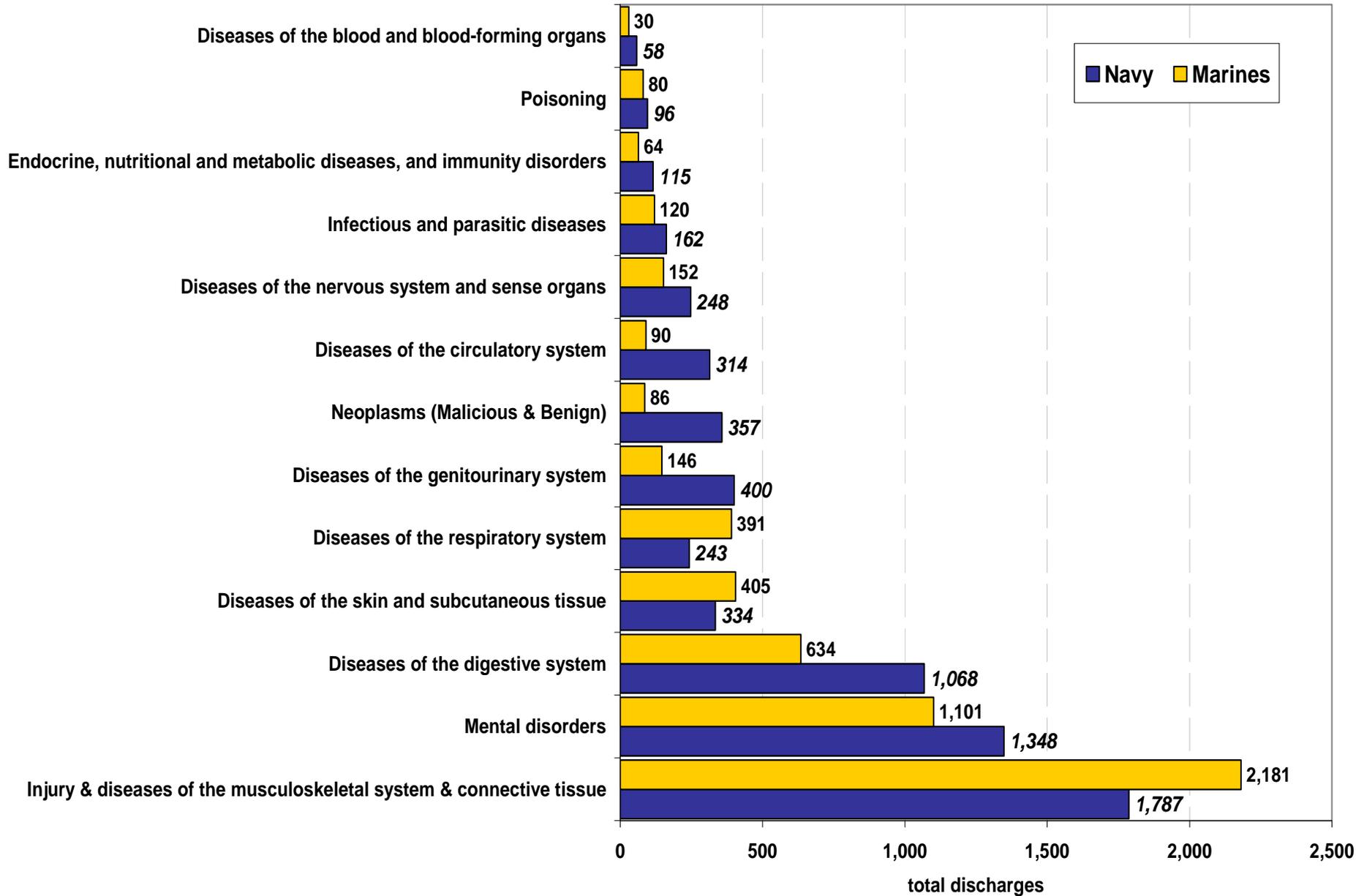


Injuries from Physical Training Affect Readiness

Physical training and sports injuries are of particular concern. Based on the likelihood of success in decreasing injuries having the greatest impact on military readiness, the Defense Safety Oversight Council (DSOC) recommends that the greatest reduction of lost duty days due to injuries across DoD may be achieved via mitigation efforts focused specifically on **sports-and physical training related injuries.**

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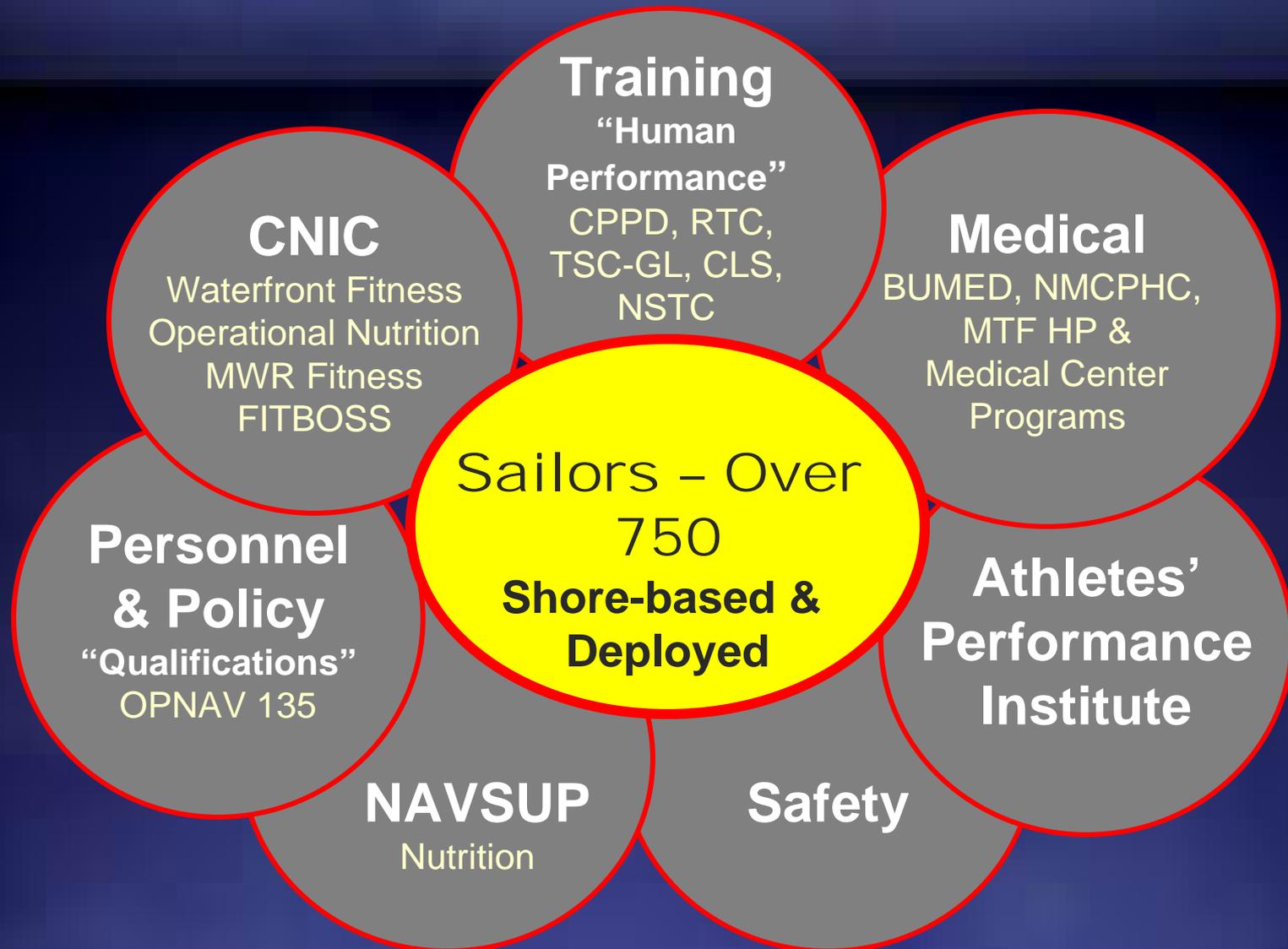


API Partnership

- Athletes Performance Institute (API)
 - = Professional Sports Model
 - = Human Performance & Injury Prevention
 - = **winning record**
- Trains over 1000 professional athletes.
- Trained last 4 NFL #1 draft picks.
- Affiliated with The Andrews Institute – Dr. James Andrews (Ortho for Redskins)
- Working with Navy - over 7 years.



Project Fitness & Nutrition Experts





Human Performance Advisors - TYCOM

Culinary Specialist

Command Fitness Leader

Health Promotion Coordinator

Physical Therapist – large deck

FITBOSS

Fleet Waterfront Fitness

Independent Duty Corpsmen

Leading Chief Petty Officer - Medical

Focus Groups:

- E-3 – E – 6
- E-7 – E-9
- Officer
- FEP

Chief of the Boat
CMDCM

Executive Officer
Commanding Officer

FORCMS – TYCOM
FLTCMS, MCPON



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