Defense Health Agency ®

Defense Centers for Public Health – Portsmouth

Methods: Influenza Situation Report 2023–2024

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Contents

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Purpose

This document details the methods and limitations relevant to the Weekly Influenza Situation Report (SITREP) produced by the EpiData Center (EDC) at the Defense Centers for Public Health – Portsmouth (DCPH-P). SITREP methods are reviewed and updated annually to reflect current influenza trends, customer needs, and surveillance capabilities.

Background

Since 2008, the EDC has monitored influenza activity among the DON beneficiary population at routine intervals throughout the influenza season. Surveillance data sources include Composite Health Care System (CHCS) laboratory results, pharmacy transactions, Comprehensive Ambulatory/Professional Encounter Record (CAPER) outpatient records, and Standard Inpatient Data Record (SIDR) admission records, Military Health System (MHS) GENESIS inpatient admission records, outpatient medical encounters, laboratory results, and pharmacy transactions. Influenza vaccination and immunization records are obtained from the Immunization Tracking System (ITS) and the Medical Readiness Reporting System (MRRS). Theater Medical Data Store: Patient Encounter File (TMDS-PEM) is used to determine theater and shipboard burden. Timely surveillance of influenza activity is disseminated to stakeholders within the military health care community, thus ensuring ongoing situational awareness of ever-evolving influenza trends throughout the influenza season, as well as during the off-season.

The EDC has enhanced influenza surveillance efforts over time, resulting in a robust surveilling of DON beneficiaries seeking care at Military Treatment Facilities (MTFs) depicted in the weekly SITREP. During March 2021, the MHS GENESIS laboratory data was integrated into the weekly influenza surveillance process from participating fixed MTFs. For the 2023-2024 Influenza Season, the EDC has added TMDS-PEM data and all MHS GENESIS data – pharmacy transactions, inpatient admissions, and outpatient medical encounters.

Influenza surveillance data is aggregated according to the week of the encounter. The SITREP reflects the sequential numbering of weeks that align with the Centers for Disease Control and Prevention (CDC) *Morbidity and Mortality Weekly Report* (MMWR) epidemiological weeks.[1] The SITREP is distributed to the military public health community and published to the EDC website (https://www.med.navy.mil/Navy-and-Marine-Corps-Force-Health-Protection-Command/Population-Health/Epi-Data-Center/Diseases-Conditions-and-Infections/Influenza/).

Data Sources and Availability

Data sources in the weekly SITREP include laboratory, pharmacy, encounter, vaccination, immunization, and TMDS-PEMS data. Table 1 describes the timeliness and historical availability of data sources.

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Table 1. Data Sources for DON Influenza SITREP

Data Source	Timeliness of Data	EDC Historical Data Availability
Composite Health Care System (CHCS) Microbiology and Chemistry Data	Within 2 days of record generation	2004 - Present
CHCS Pharmacy Data: Outpatient (OP), Unit-Dose (UD) and Intravenous (IV)	Within 2 days of record generation	2006 – Present (OP) 2009 – Present (UD and IV)
Comprehensive Ambulatory/Professional Encounter Record (CAPER) and Standard Ambulatory Data Record (SADR)	Weekly[a]	2001 - Present
Immunization Tracking System (ITS)	Weekly	2001 - Present
Medical Readiness Reporting System (MRRS)	Real-time	Present
Military Health System (MHS) GENESIS Ambulatory	Weekly[a]	2019 - Present
MHS GENESIS Inpatient	Weekly	2019 – Present
MHS GENESIS Laboratory and Microbiology Data	Weekly[b]	2017 - Present
MHS GENESIS Pharmacy	Weekly	2019 - Present
Standard Inpatient Data Record (SIDR)	Weekly[b]	2001 - Present
Theater Medical Data Store: Patient Encounter File (TMDS-PEM)	Weekly[c]	2008 – Present

[a]Data is lagged approximately one week due to encounter data availability.
[b]MHS GENESIS data is delayed about two weeks; previous data are updated as received. This may cause underreporting within graphs and tables using this data.
[c]For the purpose of this analysis only shipboard data is considered. The quality and completeness of TMDS-PEM data may be inconsistent and dependent on availability of uploads by the ships.
Prepared by the EpiData Center at the Defense Centers for Public Health – Portsmouth, October 2023.

Select MTFs began testing and transitioning to MHS GENESIS during July 2017. Remaining CHCS sites, are scheduled to transition to MHS GENESIS by the end of the 2023-2024 season. The transition is anticipated to impact data availability from several data sources. All MHS GENESIS data is experiencing a lag from when the records are created to when the data is processed and delivered to the EDC. The EDC is still investigating how to best differentiate between active duty (AD) and recruit Service members (SMs) in the MHS GENESIS data, as well as, properly categorizing antivirals as treatment and prophylaxis in MHS GENESIS pharmacy data.

Case Definitions

An influenza case is defined by 1) a laboratory-positive influenza test result, 2) an inpatient or outpatient medical encounter with a specific influenza diagnosis, *or* 3) a dispensed antiviral (AV) prescription. A case may be identified from one or more data sources. A 14-day gap-in-care rule is

used to define cases for laboratory and pharmacy indicators; multiple cases can occur in the same patient if more than 14-days have elapsed since the prior occurrence.

Baselines, Thresholds, and Trends

Comparisons use historical baselines and thresholds as a benchmark for current season trends with respect to laboratory-positive results, dispensed influenza AV medications, and influenza-like illness (ILI). Weekly baselines are calculated using a three-year, unweighted average to compare results with those from the same week in selected seasons. Bands for one and two standard deviations above seasonal baseline estimates may be displayed to indicate when timing or volume trends diverge from those of past seasons. An unusually low influenza burden was observed during the 2020-2021 and 2021-2022 seasons due to the COVID-19 pandemic that resulted in the CDC and Armed Forces Health Surveillance Division (AFHSD) of the Defense Health Agency (DHA) recommending not to include these seasons in baseline calculations. Therefore, these years are not used in baseline calculations. The EDC calculates baselines from weekly averages in the 2018-2019, 2019-2020, and 2022-2023 seasons.

Surveillance thresholds are used to signal influenza activity that exceeds expected values; these are established for:

- the percentage of ILI encounters.
- the number of inpatient laboratory-positive cases.
- the number of inpatient dispensed AV cases.
- the number of AD and recruit laboratory-positive cases.
- the number of AD and recruit dispensed AV cases.

Surveillance thresholds are calculated by adding one standard deviation to the overall unweighted average for in-season weeks. The ILI threshold is calculated by adding two standard deviations to the off-season average. Off-season weeks are determined by adapting the CDC's definition of non-influenza weeks.[2] Any week representing at least 2% of the total season's laboratory-positive influenza cases for at least two consecutive weeks is considered to be "in-season" or influenza weeks; all other weeks are considered to be "off-season" or non-influenza weeks.

The SITREP includes a dashboard-style summary table that highlights important trends among the key influenza indicators. Trend comparisons for laboratory-positive cases, dispensed AVs, and the outpatient ILI percentage are based on the trends over the previous two weeks to determine if they are increasing, decreasing, or remaining the same. These trends are not tested for statistical significance. Activity levels for the current week are highlighted, plotted against seasonal baselines, and compared to these baselines on a weekly basis. Table 2 details the baseline comparison used for each indicator.

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Table 2. Trend Comparisons in the DON Weekly Influenza SITREP

Indicator(s)	Purpose/Description	Comparison	Values and Interpretations
Dispensed Antivirals Laboratory Cases	This may indicate either the timing of the season (early or late) or an increased/decreased volume of cases. Compares influenza activity to seasonal baseline/threshold levels based on timing and volume.	Seasonal baseline (3 - year average [avg]) and seasonal threshold (off-season avg + 2 standard [std] deviation)	**Low** (< 1 std. deviation below baseline or below seasonal threshold): Activity is significantly below expected levels. **Normal** (+/- 1 std. deviation from baseline and above seasonal threshold): Influenza activity is within expected levels. **Elevated** (≥ 1 std. deviation above baseline): Activity is above expected levels.
Influenza-like illness (ILI) Outpatient Visits The percent of ILI reflects the relative burden of ILI visits on the healthcare system.	Signals the start and end of increased influenza activity based on percent of ILI outpatient encounters.	Surveillance threshold (off-season avg + 2 std. deviation)	**Low** (< off - season avg): ILI visits are very low. **Normal** (off-season avg to < surveillance threshold): ILI visits are within expected levels for the off-season. **Elevated** (≥ surveillance threshold): ILI visits are significantly above off-season expected levels; passing or moving below the surveillance threshold should correspond with the start and end of the influenza season. *Note:* During the holidays the total number of outpatient visits may be considerably lower, resulting in a spike in the percentage of ILI visits. This typically occurs around Week 52.
Inpatient Dispensed Antivirals Inpatient Laboratory Cases	A maximum line, which shows the maximum weekly count of inpatient cases during any week from the past three seasons adds further perspective. Indicates the impact of influenza cases on hospitalizations; the number of inpatient cases is used to assess severity in comparison to recent seasons.	Surveillance threshold (in-season avg + 1 std. deviation)	**Low** (< 1 std. deviation below threshold): Inpatient cases are below in-season expected levels. **Normal** (+/- 1 std. deviation from the in-season avg): Inpatient cases are within expected levels for the influenza season. **Elevated** (≥ threshold): Inpatient cases are exceeding in-season expected levels. *Note* : The total number of weeks with a given activity level should also be considered when interpreting severity.
Active Duty Dispensed Antivirals Active Duty Laboratory Cases Recruit Dispensed Antivirals Recruit Laboratory Cases	Indicates elevated levels of DON active duty and recruit influenza cases	Surveillance threshold (3-year average + 1 std. dev)	**Low** (< 1 std. deviation below avg): Activity is below in-season expected levels **Normal** (+/- 1 std. deviation from in-season avg): Activity is within expected levels for the influenza season **Elevated** (≥ 1 std. deviation above in-season avg): Activity is exceeding in-season expected levels.

Vaccination Coverage

Vaccination coverage among DON AD and recruit SMs is assessed weekly to monitor progress toward the DON instruction requiring 100% of all eligible Navy active and reserve component personnel receive the influenza vaccine by 31 December 2023.[3] The Marine Corps active component shall ensure 100% of personnel are compliant with the Department of Defense (DoD) policy no later than 15 December 2023, and 90% of reserve component no later than 15 January 2024.[4] Vaccination coverage is calculated using weekly data extracted from the MRRS, which provides an aggregate number of vaccinated AD and recruit SMs, total number of vaccination-eligible personnel, and the total number of vaccination-exempt personnel in each component. The percentage of personnel immunized is calculated by dividing the number of vaccinated personnel by the number of vaccination-eligible personnel. Results are reported for Navy and Marine Corps AD and recruit personnel, and for US Fleet Forces Commands.

AD personnel and recruits with a positive influenza laboratory result are matched to patient-specific data within the ITS to determine their immunization status. Documented exemption records or waivers are also indicated for SMs without a vaccine. SMs who received the vaccine at least 14-days before the specimen collection date of a positive laboratory result are considered fully immune. Additionally, the type of influenza vaccine is described using the common vaccine code (CVX) in the ITS: live attenuated (LAIV), inactivated (IIV), recombinant (RIV), or unknown.

Estimation of Overall Burden

The overall burden of influenza in the DON is estimated by assessing the total number of influenza cases identified from medical encounters (outpatient visits and inpatient admissions), laboratory records, and pharmacy transactions. Encounters are those with an influenza-specific diagnosis, as opposed to a broad syndromic ILI definition. The case definition is applied to records aggregated from all three data sources to identify unique cases. A baseline is displayed along with the overall burden of influenza cases.

Laboratory Indicators

CHCS and MHS GENESIS chemistry and microbiology data are used to identify laboratory-positive influenza specimens and cases. Each specimen is evaluated by the test type (rapid, polymerase chain reaction [PCR], direct fluorescent antibody [DFA], or cultures), as well as the influenza type (A, B, A and B, or nonspecific). Percent positivity is calculated by dividing the number of influenza-positive specimens by the total number of specimens. Inconclusive results are excluded from the calculation. The 14-day gap-in-care case definition is applied to all laboratory-positive specimens. The Medical Expense and Performance Reporting System (MEPRS) code or the MHS GENESIS inpatient flag within the record is used to classify cases as inpatient or outpatient. MHS Management Analysis and

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Portsmouth, VA 23708-2103

Reporting Tool (M2) eligibility data denominators from June 2023 are used to calculate age group rates for laboratory-positive cases.

Pharmacy Transactions for Antiviral Prescriptions

CHCS and MHS GENESIS pharmacy transactions are used to assess the number of dispensed influenza AV prescriptions. Four Food and Drug Administration (FDA)-approved antiviral medications are recommended for use during the 2023-2024 flu season according to the CDC: oseltamivir (available in generic versions and under the trade name Tamiflu®), zanamivir (Relenza®), peramivir (Rapivab®), and baloxavir marboxil (Xofluza®).[5] Similar to recent seasons, amantadine (Symmetrel®) and rimantadine (Flumadine®) are not recommended for influenza treatment or chemoprophylaxis due to widespread antiviral resistance in circulating influenza A viruses.[6] As of November 2017, weekly influenza surveillance excludes amantadine and rimantadine; however, the FDA-recommended antivirals are tracked. The 14-day gap-in-care case definition is applied to dispensed AVs to account for multiple transactions. Dispensed AV cases are classified as inpatient or outpatient based on the MEPRS code within the record. A seasonal baseline is displayed with dispensed AV cases. Surveillance thresholds are displayed with the count of inpatient dispensed AV cases. The EDC is working to investigate how to properly categorize antivirals as treatment and prophylaxis in MHS GENESIS pharmacy data.

Clinical Encounters for Influenza-like Illness

CAPER and MHS GENESIS Ambulatory data are used to monitor ILI trends using diagnosis codes matching the ILI case definition outlined in the AFHSD surveillance case definitions.[7] Seasons prior to the 2018-2019 season used DoD Electronic Surveillance System for the Early Notification of Community-based Epidemics (ESSENCE) case definition. As a result of the ILI definition change, comparison should not be made to past seasons. Furthermore, the ILI indicator should not be compared to the CDC's ILI indicator due to differing methodologies. The percentage of outpatient medical encounters containing at least one ILI diagnosis in any diagnostic field is calculated to evaluate the number of ILI diagnoses in relation to health care utilization; denominators are established by aggregating the total number of unique appointment identifiers. The weekly percentage of ILI is presented in the SITREP along with the seasonal baseline and surveillance threshold.

Active Duty and Recruit Surveillance

Influenza surveillance trends are described for AD and recruit populations. Although included, the EDC is still investigating how to accurately identify SMs in the MHS GENESIS data. CHCS and MHS GENESIS laboratory-positive cases are shown as rates per 100,000 persons; the total population used to calculate rates are from MHS M2 June 2023 eligibility data. Additionally, the number of laboratory-positive cases and dispensed AVs are tracked by service for the current reporting week and cumulatively for the season.

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Conclusions

Comprehensive influenza surveillance of DON beneficiaries is achieved using multiple data sources. Multiple data sources increase the validity of the findings and provides a thorough overview of influenza trends among DON beneficiaries. The information contained in the SITREP may assist the Navy Bureau of Medicine and Surgery (BUMED), Navy Public Health, and DHA Public Health stakeholders in determining the overall burden of influenza in the DON community, its impact on mission readiness, and may assist in policy planning and preparation for upcoming seasons.

Limitations

Weekly SITREP analyses are subject to certain limitations that should be considered when interpreting results. Medical data considered in this report were generated within CHCS or MHS GENESIS at fixed MTFs. Purchased care, shipboard, battalion aid station, and in-theater data is not included in this analysis, except for the SITREP graph specific to TMDS data. All metrics measuring burden, recruits, etc. do not include shipboard data.

The microbiology database primarily consists of results for culture testing. Microbiology testing results show only the organism(s) that was (were) identified, not what the test was intended for (e.g., if a physician suspects an organism different from the one that was identified, the record will not show the organism that the physician suspected). Microbiology data are useful for identifying laboratory-positive cases of illness. However, cases where a physician chooses to treat presumptively without laboratory confirmation will not be captured. Clinical practice with regards to culturing varies between providers and facilities. Examples of situations where cultures may not be performed include confirmatory tests for patients with ILI symptoms, or patients with superficial infections who are treated presumptively. Classifying microbiology tests involves extensive searching of free-text test result fields.

The chemistry databases generally consist of non-culture laboratory test results (e.g., PCR and antigen testing). Providers may order a group of tests, called panels, when patients present with non-specific symptoms. If the test name or test results within a panel are not disease-specific, these results may not be captured in search terms used to query the chemistry data.

Classifying chemistry tests involves extensive searching of free-text test result fields. It is possible that some test results could be misclassified, though validation steps are included to reduce error.

The pharmacy databases consist of outpatient non-intravenous prescriptions, inpatient non-intravenous prescriptions (unit-dose), and intravenous prescriptions. Though treatment compliance in the inpatient setting can be assumed, outpatient pharmacy records indicate that a patient received a prescription and subsequent compliance is unknown. Due to near real-time data feeds, analysts are able to determine if a prescription was edited or canceled; however, the time difference between these events may allow for a short period of treatment not considered in this analysis. During ongoing surveillance efforts, patient treatment status may change as edited or canceled prescription records are received.

Data for medical surveillance are considered provisional and medical case counts may change if the discharge record is edited after the patient is discharged from the MTF, and case counts may change between the time the report is created and distributed. Records of medical encounters depend on correct International Classification of Diseases, Nineth Revision, Clinical Modification (ICD-9-CM) and International Classification of Diseases, Tenth Revision, Clinical Modification (ICD-10-CM) coding practices. Additionally, because records are submitted into the system at different times, there may be patients who have had an inpatient or outpatient encounter but were not captured in the current data. Inpatient records are created at discharge or transfer from an inpatient medical treatment facility. For AD personnel only, non-MTF (purchased care) hospitalizations generate a record upon discharge.

The EDC weekly extract of ITS data are limited to AD DON and recruit SMs, and includes vaccinations recorded within the MHS and Shipboard Non-tactical Automatic Data Process (SNAP) Automated Medical System (SAMS) for shipboard and Marine Corps personnel. SAMS updates to ITS may be delayed due to internet and server connection requirements. Family member vaccination status cannot be assessed in ITS. Routine vaccinations for recruit SMs may not be captured in ITS data if recruits do not routinely seek care/vaccinations within the MHS. Furthermore, exemption or waiver records for members are generated only once, at the time they are granted. Any extended exemption provided prior to EDC extract initiation (2007) will not be present in the EDC ITS data.

MRRS is a web-based application that tracks a variety of individual medical readiness indicators, including immunizations for the Coast Guard, Navy, and Marine Corps. MRRS access requires an account to enter information or view reports. Information for AD and recruit SMs is entered by authorized users but delay of record entry may be due to connectivity from fleet units and medical support. MRRS data come from multiple sources, including the Defense Manpower Data Center (DMDC). Data gaps in the sources that feed MRRS may impact the completeness and timeliness of the system.

Service affiliation and AD and recruit status is unreliable or missing in MHS GENESIS data sources and the EDC is still exploring how to best differentiate between AD and recruit SMs within the data. Therefore, reported DON influenza trends may differ from actual trends due to the absence of this data. The reliability and understanding of MHS GENESIS data, its capture, content, and structure are still being investigated. The impact(s) on the accuracy of results for facilities transitioned to MHS GENESIS are unclear. Please reach out for a full list of MTFs that have transitioned, if interested.

The Theater Medical Data Store (TMDS) provides daily updates of SMs' medical treatment information recorded in-theater. Data are provided to TMDS by electronic uploads from a variety of sources including AHLTA-Mobile, AHLTA-Theater, SAMS, and TRANSCOM Regulating and Command & Control Evacuation System (TRACE2ES). These data include medical encounter, pharmacy transactions, and member's vitals from shipboard facilities, battalion aid stations, combat support hospitals, and other in-theater facilities throughout deployment settings. Internal validation efforts showed that not all in-theater facilities currently submit records and that some records may

take several weeks to be transferred into the centralized TMDS system. The quality and completeness of each data source may be inconsistent and efforts to validate records are ongoing. Inpatient/outpatient status is dependent on correct designation within the encounter record.

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For more than a decade, the EpiData Center (EDC) has provided timely, actionable data surveillance and analysis for the Department of the Navy and Department of Defense in support of military health and readiness. The EDC's epidemiological and technical expertise informs a comprehensive, evidence-based suite of public health products regarding reportable and emerging infections, healthcare-associated infections and patient safety, behavioral and operational health, exposure and injury analysis, and application development and data systems support.

For questions about this report or to inquire about project support, please contact the EDC at **usn.hampton-roads.navmcpubhlthcenpors.list.nmcphc-epi-plls@health.mil**.

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