



Armed Forces Health Surveillance Center CASE DEFINITION DEVELOPMENT

1. OVERVIEW

This document introduces and explains the purposes and the process of development for the standard surveillance case definitions used by the Armed Forces Health Surveillance Center (AFHSC). Following best epidemiologic practices, case definitions allow public health practitioners to measure disease trends and related biological phenomena in different environments and situations over time. The AFHSC surveillance case definitions have been designed for use with administrative healthcare data derived from the US military electronic health record (EHR) contained in the Defense Medical Surveillance System (DMSS) and other available datasets.

The surveillance case definitions in this document describe the standard methodologies used by the AFHSC for routine surveillance and reporting. They are based on the most recent update of the International Classification of Diseases, 9th Revision, Clinical Modification (ICD9)¹ codes to identify conditions diagnosed in the military healthcare system.² Each definition includes the rationale for selecting or excluding ICD9 codes and for establishing "incidence" and "prevalence" rules. When case definitions are changed due to addition or deletion of ICD9 codes, changes in surveillance objectives, or the introduction of new data sources, notes in the *Development and Revisions* section of the case definition reflect those changes.

Case definitions³ used at AFHSC may not be appropriate for other databases or other forms of health surveillance such as clinical disease management, healthcare utilization (cost) summaries, outbreak investigation or notifiable disease reporting. The AFHSC surveillance case definitions in this document also should not be confused with the *Tri-Service Reportable Medical Events Guidelines and Case Definitions* that AFHSC also supports but that are distinctly clinical in nature.⁴

Other aspects critical to epidemiologic studies – determining the appropriate study design, selecting and identifying a population, determining the appropriate surveillance time period(s), calculating person-time or other denominators, interpreting results – are not addressed in this volume. Formal documentation of the AFHSC surveillance case definitions is intended to harmonize health surveillance and

¹ Updated October 2010

² Centers for Disease Control and Prevention website. Classification of Diseases, Functioning, and Disability: International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM). <http://www.cdc.gov/nchs/icd/icd9cm.htm> last accessed 9 March 2011.

³ Case definitions for Tri-Service reportable events are not included in this document. They are available at http://afhsc.army.mil/viewDocument?file=TriService_CaseDefDocs/June09TriServGuide.pdf

epidemiologic analyses throughout the DoD rather than dictate study design for unique research or surveillance objectives, even when identical data sources are used.

AFHSC surveillance case definitions are developed by healthcare providers and epidemiologists serving on the Surveillance Methods and Standards (SMS) working group. Many of the case definitions were originally created by staff of the Medical Surveillance Monthly Report (MSMR) for that publication. Topic experts internal and external to AFHSC and DoD are consulted and included in the development process when needed.

2. AUTHORITY

This document and the AFHSC surveillance case definitions are developed in compliance with the following provision of DoD Directive 6490.02E Comprehensive Health Surveillance:

Section 5.9.4 [*The Director of AFHSC shall*] *establish standardized, reproducible, DoD analytical health surveillance methods.*

The SMS working group prioritizes case definition development efforts according to topic timeliness, military relevance, potential for public scrutiny, and importance to military leadership.

3. GOALS OF THE SMS WORKING GROUP

The use of standard surveillance case definitions for analysis and reporting promotes consistency and comparability in health surveillance and epidemiologic research.⁵

The SMS working group aims to:

- Promote internal consistency at the AFHSC, as well as the credibility, reliability, and efficiency of the Center's surveillance efforts over time.
- Provide case definitions and methods that will serve as guidelines for other DoD health surveillance and research organizations.
- Make available easy-to-understand and concise documentation of the methodologies, discussions and rationales used in the development of AFHSC surveillance case definitions, especially when methodologies differ from other published guidelines or studies.⁶

⁵ DeFraithe, R. F. The Armed Forces Health Surveillance Center: enhancing the Military Health System's public health capabilities. *BioMed Central Public Health* 2011 11 (Suppl 2):S1

⁶ Charter, AFHSC Surveillance Methods and Standards Working Group, September 2010.

4. CASE DEFINITION DEVELOPMENT

Case definition and methodology development is a complex process. At AFHSC, the process typically begins with a search for, and review of, case definitions previously used in the MSMR – AFHSC’s publication of record – and by other researchers and agencies. Variations of candidate case definitions are carefully compared and contrasted in an iterative process. AFHSC staff may conduct exploratory analyses of the relevant database(s) to determine which criteria produce results that are meaningful for the condition of interest. These analyses often include qualitative judgments as to the sensitivity and specificity of the case definition and, occasionally, objective assessments of sensitivity and specificity when “gold standard” data are available.

Assessment and interpretation of various forms of the case definition, incidence rules (see Section 4.7 below), and ICD9 code selection rely upon the scientific and clinical knowledge, experience, and professional judgment of internal and external medical and epidemiologic experts. Validating estimates derived from specific case definitions by measuring the level of agreement with population-based survey data or chart reviews is usually not possible.

The following factors are important in the development of case definitions at the AFHSC:

4.1 Surveillance Objectives

Surveillance objectives require consideration of the magnitude of the problem, how the results will be used and the specific interests of stakeholders.

4.2 Data Repositories

- *Defense Medical Surveillance System (DMSS)*. DMSS is the primary administrative healthcare database and repository of data at AFHSC. It is an executive information system that contains data on personnel status, inpatient and outpatient diagnoses, reportable medical events, HIV test results, immunizations, death records, deployments and deployment health assessments. Data from civilian facilities and providers for encounters that are reimbursed by TRICARE (e.g. network care) are included. *DMSS does not currently include data for healthcare encounters that take place in operational theaters*. DMSS currently contains data relevant to more than 9 million individuals who have served in the US Armed Forces since 1990.⁷
- *Theater Medical Data Store (TMDS)*. This data source captures outpatient and inpatient medical encounters within theaters of operation. While the data captured by TMDS can be used to characterize health care delivered in theater and to identify individuals for follow-up surveillance studies, TMDS data are

⁷ Rubertone, M. V, Brundage, J. F. The Defense Medical Surveillance System and the Department of Defense Serum Repository: Glimpses of the Future of Public Health Surveillance. *American Journal of Public Health*, Vol. 92, No. 12, Dec. 2002.

used carefully for routine reports because the EHR is not deployed uniformly and there is incomplete capture of medical events in theater.

- *US Air Force Transportation Command (TRANSCOM) Regulating and Command and Control Evacuation System (TRAC²ES)*. This database captures medical evacuations to and from the theaters of operation. Like the TMDS data, TRAC²ES records are considered an external dataset at this time.

4.3 Surveillance Population

The “Armed Forces” typically includes the Army, Navy, Marine Corps, Air Force, and Coast Guard. The surveillance population may be specified as the active, reserve, guard, or all components of the military. In addition, some surveillance may include “military associated populations” such as family members, civilian employees, or other beneficiaries.

The population under surveillance determines the statistics that can be used. Rate calculations (using person-time) are limited to the active component of the Armed Forces because of incomplete capture of healthcare records for guard, reserve and civilian personnel who are not on active duty at all times. For the guard and reserve, complete personnel records are available, though “active duty time” is not. Complete demographic records are not available for civilian healthcare beneficiaries (family members), civilian employees, contractors or retirees.

4.4 Source of Health Care Encounter Data

Case definitions often specify criteria that apply to the source of the health care encounter, whether inpatient health care encounters, outpatient encounters, or both. Reportable medical events (notifiable disease reports) constitute another source of encounter data. Medical Expense Performance Reporting System (MEPRS) codes, as defined by TRICARE, can also be used to increase the specificity of a case definition by limiting cases to a specific clinic type.⁸ MEPRS codes are only available for military treatment facilities.

4.5 Diagnosis and Procedure Codes

The AFHSC surveillance case definitions are based primarily on ICD9 codes. Disease and injury diagnoses are designated by ICD9 codes in the range of 001 through 999.99. Descriptions of the ICD9 codes used for AFHSC surveillance case definitions may use the notation of “x” or “xx” following the first 3 digits. This indicates additional values 0 through 9 and specifies related diagnoses in the hierarchical classification system. This convention is used for simplicity even when all possible values may not exist. When additional ICD9 codes are added to or removed from the official code set, the case definitions are reconsidered.

⁸ TRICARE Management Activity. Medical Expense and Performance Reporting System (MEPRS) portal. <http://www.meprs.info/tma.cfm> last accessed 9 March 2011.

“V codes” are also part of the ICD9 coding system and are often included in the case definitions in order to identify other factors that influence health status and reasons for a healthcare encounter. “E codes”, which range from E800-E999, may also be used to denote external causes of injury, poisoning and other adverse health effects.

When needed, the AFHSC may use procedure codes to indicate that a patient underwent a diagnostic or therapeutic procedure specific to a particular condition.^{9,10} Both inpatient and outpatient procedure codes may be used. At this time, outpatient procedure codes are available only when care is delivered at a military treatment facility. When available, AFHSC considers code sets published by the Agency for Health Research and Quality (AHRQ),¹¹ the Centers for Disease Control and Prevention (CDC)¹² or the Defense Center of Excellence for Psychological Health and Traumatic Brain Injury (DCoE), among others, in the development of the case definitions.

4.6 Incidence Rule

The incidence rule combines the above elements along with the *number of medical encounters* required for an individual to be considered a case. Also specified are the *time period* between valid encounters (e.g. within 14 days of each other) and the *position* of the diagnostic code within the healthcare record (e.g. any, primary, secondary, etc). The incidence rule also specifies how many times an individual may be counted as a case during a specific surveillance period (e.g. once per month, year, or lifetime). The rules are based on knowledge of the natural history of the disease or injury, treatment efficacy, provider practices, patient health-seeking behavior, functional aspects of the health information systems, and changes in the healthcare system over time. A typical incident rule follows this form:

One inpatient medical encounter or two outpatient medical encounters, within a [specified time period], with any of the defining diagnoses of [the condition](see specified ICD9 codes), in [a specified diagnostic position].

An individual is considered a case [once per specified time period]

⁹ US Centers for Disease Control and Prevention. Classification of Diseases, Functioning, and Disability: International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM). <http://www.cdc.gov/nchs/icd/icd9cm.htm> last accessed 9 March 2011.

¹⁰ Centers for Medicare and Medicaid Services. HCPCS Release and Codes Sets. <https://www.cms.gov/HCPCSReleaseCodeSets> last accessed 9 March 2011.

¹¹ Agency for Healthcare Research and Quality website. Healthcare Cost and Utilization Project (HCUP) portal. http://www.hcup.us.ahrq.gov/tools_software.jsp last accessed 9 March 2011.

¹² US Center for Disease Control and Prevention. Case Definitions for Infectious Conditions Under Public Health Surveillance. http://www.cdc.gov/osels/ph_surveillance/mndss/casedef/index.htm last accessed 9 March 2011.

4.7 Deployment-Associated Cases

AFHSC uses deployment data from the Defense Manpower Data Center (DMDC) to define “deployment-associated” cases as follows:

The initial defining encounter must have occurred while the individual was deployed to, or within 30 days of returning from, a theater of operation of interest and the deployment must have been for 30 days or longer.

The allowance of 30 days following the deployment represents a reasonable time frame to allow for post-deployment screening for conditions that might have developed (or progressed) during the deployment period. The use of the term “deployment associated” *should not be taken to mean that a condition develop as a result of the deployment*, only that it appears to have been diagnosed during that time.

5. CASE DEFINITIONS FORMAT

AFHSC case definitions are “condition-specific,” meaning that the case definition applies to an individual medical condition only, (e.g., hypothermia); or are “condition-general”, meaning the definition applies to a group of related medical conditions, (e.g., cold weather injuries). They are organized into the above two categories and grouped by medical specialty. Each case definition contains the following sections and information:

Section	Description
Background	History of the case definition. The purpose(s) for which the definition was developed and the identity of the originating office are included.
Clinical Description	Brief clinical description of the condition.
Case Definition and Incidence Rules	A set of criteria that must be fulfilled in order to identify a case. The incidence rules and exclusion criteria are included.
Codes	Specific ICD9 codes and other codes that are used to identify cases of a particular condition.
Development and Revisions	Chronological history of case definition development, including dates of development, rationale for incidence rule decisions and ICD9 code selection, and dates and rationale for any revisions.
Reports	List of condition-specific reports produced by AFHSC.
Review	List of dates when case definition was reviewed and by whom.
Comments	Supplementary information related to the case definition.