

# Evaluation of DoD Syndrome Mapping and Baseline for ICD-9-CM to ICD-10-CM Transition

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## Objective

The transition from ICD-9-CM to ICD-10-CM requires evaluation of syndrome mappings to obtain a baseline for syndromic surveillance purposes. Two syndrome mappings are evaluated in this report.

## Introduction

The Department of Defense conducts syndromic surveillance of health encounter visits of Military Health System (MHS) beneficiaries. Providers within the MHS assign up to 10 diagnosis codes to each health encounter visit. The diagnosis codes are grouped into syndrome and sub-syndrome categories. On October 1, 2015, the Health and Human Services-mandated transition from ICD-9-CM to ICD-10-CM required evaluation of the syndrome mappings to establish a baseline of syndrome rates within the DoD. The DoD data within the BioSense system currently utilizes DoD ESSENCE syndrome mappings. The Master Mapping Reference Table (MMRT) was developed by the CDC to translate diagnostic codes across the ICD-9-CM and ICD-10-CM encoding systems to prepare for the transition. The DoD ESSENCE and MMRT syndrome definitions are presented in this analysis for comparison.

## Methods

DoD data was pulled from the BioSense Platform through a RStudio server on October 11, 2016, querying data from October 1, 2014 to September 30, 2016. This time period provides twelve months of ICD-9-CM data and twelve months of ICD-10-CM data. The ICD codes were binned to both DoD ESSENCE syndromes and MMRT macro syndromes for comparison. Although a patient visit may contain up to 10 ICD codes, only the first four were included for this analysis. Providers are trained to prioritize diagnosis codes by position. Only 2.2% of visits had greater than 4 diagnostic codes. Each ICD code in a visit is binned to an applicable syndrome. The total number of visits includes visits that binned and did not bin to a syndrome. Multiple syndromes may be assigned to one patient's health encounter visit if multiple ICD codes are binned. Additionally, more than one code per visit may bin to the same syndrome; however, only unique syndromes are counted in the total syndrome rate. The total syndrome rate was calculated by total unique syndrome visits as the numerator and total number of visits during the ICD-9-CM or ICD-10-CM time period as the denominator. The rates per 1000 total visits were calculated.

## Results

Among the DoD ESSENCE syndromes, the ICD-9-CM rate for ILI was 36.3 per 1,000 compared to the ICD-10-CM rate of 38.6 per 1,000. The ICD-9-CM rate for neurological was 18.1 per 1,000 compared to the ICD-10-CM rate of 0.2 per 1,000.

Among the MMRT syndromes, the ICD-9-CM rate for ILI was 16.7 per 1,000 compared to the ICD-10-CM rate of 38.4 per 1,000. The ICD-9-CM rate for mental disorders was 73.8 per 1,000 compared to the ICD-10-CM rate of 73.2 per 1,000.

## Conclusions

This analysis provides baseline rates of MMRT syndromes and sub-syndromes for syndromic surveillance during the ICD-9-CM to

ICD-10-CM transition. These data will serve for future comparison and tracking of syndrome-specific trends for military-relevant health threats.

Table 1. Frequency and visit rate per 1,000 total visits for DoD ESSENCE syndromes by ICD coding system, October 1, 2014 - September 30, 2016

DoD ESSENCE Syndrome	ICD-9-CM		ICD-10-CM	
	October 1, 2014 - September 30, 2015		October 1, 2015 - September 30, 2016	
	Frequency N=106,464,144	Rate (per 1,000)	Frequency N=95,426,013	Rate (per 1,000)
All Other	80,921,475	760.1	71,434,061	748.6
Botulism-like	158,399	1.5	148,691	1.6
Combat/Operation Stress Reaction	300,895	2.8	150,850	1.6
Dermatologic	4,135,797	38.8	3,559,799	37.3
Fever, Unexplained	335,642	3.2	416,346	4.4
Gastrointestinal	1,079,307	10.1	891,232	9.3
Heat/Cold	16,345	0.2	12,193	0.1
Hemorrhagic Illness	234,266	2.2	264,389	2.8
ILI	3,867,598	36.3	3,687,648	38.6
Influenza Specific	89,270	0.8	57,426	0.6
Injury, Hostile	177	0.0	2,000	0.0
Injury, Other	13,653,969	128.2	11,415,539	119.6
Localized Cutaneous Lesion	146,552	1.4	101,881	1.1
MVA	62,312	0.6	43,570	0.5
Neurological	1,926,713	18.1	17,170	0.2
Ophthalmologic	2,967,835	27.9	890,091	9.3
Psychiatric/Mental Illness	9,611,868	90.3	8,444,193	88.5
RAD/Asthma	863,334	8.1	733,803	7.7
Rash	336,573	3.2	370,937	3.9
Shock/Coma/Death	25,650	0.2	12,901	0.1
Sports/Rec	210,306	2.0	98,977	1.0
Upper Respiratory	2,625,853	24.7	4,839,431	50.7
Work/Trng	82,106	0.8	8,407	0.1
No Mapping	10,713,601	100.6	8,787,133	92.1

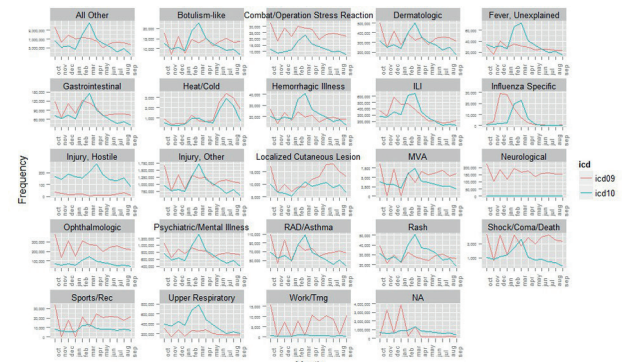


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**Table 2. Frequency and visit rate per 1,000 total visits for MMRT macro syndromes by ICD coding system, October 1, 2014 -September 30, 2016**

MMRT Macro Syndrome	ICD-9-CM		ICD-10-CM	
	October 1, 2014 - September 30, 2015		October 1, 2015 - September 30, 2016	
	Frequency N=106,464,144	Rate (per 1,000)	Frequency N=95,426,013	Rate (Per 1,000)
Dental Health				
Dental Health	143,862	1.4	105,497	1.1
E-codes External Causes				
Animal Exposure	14,148	0.1	13,356	0.1
CO Exposure	533	0.0	416	0.0
Fall	174,395	1.6	165,439	1.7
Heat Excessive	12,900	0.1	9,277	0.1
Motor Vehicle Traffic Accidents	61,522	0.6	NA	NA
Transportation-related Injuries	NA	NA	34,563	0.4
GI				
Gastrointestinal	2,418,794	22.7	2,113,662	22.1
Gastrointestinal Hemorrhage	113,565	1.1	123,749	1.3
Infectious				
Anthrax	898	0.0	8	0.0
Arbovirus	NA	NA	84	0.0
Cholera	7	0.0	187	0.0
Dengue fever	117	0.0	157	0.0
Diphtheria	38	0.0	27	0.0
Escherichia coli	325	0.0	330	0.0
Fever	296,022	2.8	280,206	2.9
Foodborne Illness	2,843	0.0	1,933	0.0
H Influenza	543	0.0	941	0.0
Hemorrhagic fever	NA	NA	32	0.0
Hepatitis A	232	0.0	273	0.0
Hepatitis B	17,827	0.2	17,388	0.2
Hepatitis C	22,829	0.2	15,350	0.2
Lyme	3,560	0.0	5,088	0.1
Measles	33	0.0	7	0.0
Meningitis and Encephalitis	10,413	0.1	5,982	0.1
Meningococcal	18	0.0	63	0.0
Mosquito-borne hemorrhagic fever	409	0.0	NA	NA
Mumps	714	0.0	197	0.0
Pertussis	1,015	0.0	NA	NA
Pneumococcal	4,420	0.0	1,319	0.0
Pneumonia and Lung Abscess	276,795	2.6	319,402	3.3
Polio	29	0.0	7	0.0
Rabies	22	0.0	107	0.0
Rotavirus	275	0.0	264	0.0
RSV	19,480	0.2	23,420	0.2
Rubella	82	0.0	112	0.0
Salmonella	1,076	0.0	1,138	0.0
Septicemia and Bacteremia	54,383	0.5	47,465	0.5
Smallpox	31	0.0	78	0.0
Tetanus	155	0.0	35	0.0
Tuberculosis	4,798	0.0	28,554	0.3
Typhoid	NA	NA	19	0.0
Varicella	1,841	0.0	1,885	0.0
Viral infection unspecified	566,816	5.3	52,773	0.6
West Nile Virus	83	0.0	72	0.0
Whooping Cough	NA	NA	838	0.0
Yellow fever	15	0.0	7	0.0
Injury				
Allergy	1,370,391	12.9	1,293,456	13.6
Burn	49,895	0.5	29,321	0.3
CO Poisoning	NA	NA	416	0.0
Fractures and Dislocations	803,872	7.6	449,685	4.7
Injury NOS	163,626	1.5	140,384	1.5
Poisoning by Medicine	20,691	0.2	12,890	0.1
Strain and Sprain	1,306,883	12.3	634,755	6.7
Mental				
Mental Disorders	7,860,445	73.8	6,986,131	73.2
Musculoskeletal				
Joint Pain	5,112,028	48.0	5,153,116	54.0
Myalgia	261,902	2.5	161,173	1.7
Nervous System				
Botulism-like	211,041	2.0	166,158	1.7
Pregnancy				
Pregnancy, Childbirth and Puerperium Complications	1,685,803	15.8	1,448,184	15.2
Respiratory				
Acute URI	2,997,467	28.2	2,409,653	25.3
Acute URI NOS	27,332	0.3	NA	NA
Asthma	715,764	6.7	541,964	5.7
Bronchitis Acute	329,541	3.1	306,152	3.2
COPD	183,373	1.7	137,366	1.4
ILI	1,782,605	16.7	3,663,283	38.4
Influenza	88,808	0.8	57,210	0.6
Parainfluenza	431	0.0	289	0.0
Pneumonia and Lung Abscess	276,795	2.6	319,402	3.3
Respiratory	7,285,453	68.4	6,634,707	69.5
Respiratory Failure	21,377	0.2	25,824	0.3
Skin				
Localized cutaneous lesion	439,142	4.1	110,969	1.2
Lymphadenopathy	102,339	1.0	89,332	0.9
Rash	1,033,313	9.7	772,499	8.1

Skin Infection	568,644	5.3	434,040	4.5
Symptoms/Signs				
Abdominal pain	891,339	8.4	886,241	9.3
Alteration of Consciousness	27,677	0.3	NA	NA
Chest Pain	27,332	0.3	NA	NA
Coma	NA	NA	30,200	0.3
Convulsions	152,989	1.4	128,698	1.3
Cough	228	0.0	575,039	6.0
Cyanosis and Hypoxemia	22,379	0.2	NA	NA
Death	749	0.0	1,451	0.0
Dehydration	64,949	0.6	60,104	0.6
Diarrhea	545,788	5.1	312,213	3.3
Difficulty Breathing	NA	NA	262,099	2.7
Dyspnea	434,725	4.1	NA	NA
Edema	60,010	0.6	74,590	0.8
Headache	437,141	4.1	520,005	5.4
Malaise and fatigue	242,390	2.3	192,202	2.0
Meningismus	90	0.0	77	0.0
Nausea and Vomiting	331,157	3.1	540	0.0
Severe Unknown Illness or Death	10,577	0.1	13,024	0.1
Syncope and collapse	137,004	1.3	126,697	1.3
Unexplained bleeding	36,002	0.3	NA	NA
Visual impairment	26,252	0.2	14,899	0.2
Urinary Tract				
Urinary tract infection	539,444	5.1	449,016	4.7
No Mapping	90,014,396	845.5	79,517,679	833.3



**Figure 1. Frequency of visits of DoD ESSENCE syndromes by coding system, October 1, 2014 - September 30, 2016**

**Keywords**

syndromic surveillance; syndrome mappings; DoD ESSENCE; MMRT

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