

U.S. Army Center for Health Promotion and Preventive Medicine

EPIDEMIOLOGICAL REPORT NO. DD-HA-0AY0A-09
AIR MEDICAL EVACUATIONS OF SOLDIERS
FOR ORAL-FACIAL DISEASE AND INJURIES
OPERATIONS ENDURING FREEDOM/IRAQI FREEDOM
JANUARY-DECEMBER 2006



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14. ABSTRACT This retrospective study was conducted to assess the nature and causes of serious oral-facial illnesses and injuries among U.S. Army personnel deployed to Iraq and Afghanistan in 2006. Information for this study came from the U.S Air Force Transportation Regulating and Command & Control Evacuation System (TRAC2ES) database for medical evacuations (MEDEVACS) for 2006. The study found 113 oral-facial MEDEVACS out of Iraq (cumulative incidence: 10.2/10,000 soldiers per year) and 19 out of Afghanistan (cumulative incidence: 11.1/10,000 soldiers per year), a total of 132 MEDEVACS. Fifty nine percent (n=78) of oral-facial MEDEVACS were due to battle injuries caused almost entirely by acts of war. Nearly 24 percent (n=31) of oral-facial MEDEVACS were due to nonbattle injuries, primarily fractures of the face bones, mainly because of fighting, blunt trauma, falls, motor vehicle accidents or sports. Seventeen percent of all oral-facial MEDEVACS (n=23) were due to diseases of the oral cavity, salivary glands, and jaw.					
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EXECUTIVE SUMMARY
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1. **PURPOSE.** This retrospective study was conducted to assess the nature and causes of serious oral-facial illnesses and injuries among U.S. Army personnel deployed to Iraq and Afghanistan in 2006.
2. **METHODS.** Information for this study came from the US Air Force Transportation Regulating and Command & Control Evacuation System (TRAC2ES) database for medical evacuations (MEDEVACS) for 2006. The TRAC2ES was used to identify cases of US Army Soldiers who were medically air evacuated (MEDEVACed) from the US Central Command (USCENTCOM) area of responsibility (AOR) for oral-facial injury or illness between 1 January 2006 and 31 December 2006. For each MEDEVACed U.S. Army soldier, TRAC2ES included up to three diagnoses represented by a diagnosis code from the International Classification of Disease, 9th Revision, Clinical Modification (ICD-9-CM). For the oral-facial cases that were determined to be related to battle injury or nonbattle injury, the cause of injury was identified and then classified using the North Atlantic Treaty Organization (NATO) Standardization Agreement (STANAG), 5th edition, coding scheme. (See P.J. Amoroso, G.S. Smith, and N.S. Bell: Qualitative assessment of cause-of-injury coding in US military hospitals: NATO STANAG 2050. *American Journal of Preventive Medicine*. 18(3S):174–187.)
3. **RESULTS.** The study found 113 oral-facial MEDEVACS out of Iraq (cumulative incidence: 10.2/10,000 Soldiers per year) and 19 out of Afghanistan (cumulative incidence: 11.1/10,000 soldiers per year), a total of 132 MEDEVACS. Fifty nine percent (n=78) of oral-facial MEDEVACS were due to battle injuries caused almost entirely by acts of war. Nearly 24 percent (n=31) of oral-facial MEDEVACS were due to nonbattle injuries (primarily fractures of the face bones) mainly because of either fighting, blunt trauma, falls, motor vehicle accidents, or sports. Seventeen percent of all oral-facial MEDEVACS (n=23) were due to diseases of the oral cavity, salivary glands, and jaw.
4. **CONCLUSIONS.** This study reconfirmed battle injury as the leading casualty category for oral-facial MEDEVACS of U.S. Army personnel from the USCENTCOM AOR. This study also demonstrated a continued reduction in the frequency and rate of oral-facial disease MEDEVACS.

5. RECOMMENDATIONS. More studies need to be done in the areas of oral-facial MEDEVAC frequencies and rates in current and future operations to reduce these types of casualties.

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1. REFERENCES. Appendix A contains the scientific/technical references used in this report.
2. PURPOSE. This study was done as a follow up to the reports of air medical evacuations in calendar years (CY) 2003 to 2004 and CY 2005 of U.S. Army Soldiers due to oral-facial disease and injuries from Operation Iraqi Freedom (OIF) and Operation Enduring Freedom (OEF), respectively.^(1,2) The purposes of this study were to: (1) identify medically evacuated soldiers whose treatment could involve the oral, dental, and maxillofacial (oral-facial) region, (2) describe the frequency and cumulative incidence of illnesses and injuries (battle and nonbattle) of the oral-facial region that required medical air evacuation from OIF/OEF, (3) document the diagnosis categories for these casualties, and (4) determine the causes associated with battle and nonbattle injuries.
3. AUTHORITY. Under Army Regulation (AR) 40-5 (Paragraph 2-19), the US Army Center for Health Promotion and Preventive Medicine (USACHPPM) is responsible for providing data analysis as part of comprehensive health surveillance for the Army and Department of Defense (DOD). This project was undertaken as a continuation of monitoring medical air evacuations out of OIF and OEF due to serious illnesses or injuries of the oral-facial region.
4. BACKGROUND. Until the two previous studies on oral-facial medical air evacuations from OIF and OEF, there has been sparse epidemiologic data on the occurrence of oral, facial, and maxillofacial conditions during military operations.
5. METHODS.
 - a. Data Collection.

(1) This study was designed as a retrospective study of serious oral-facial illnesses and injuries among OIF and OEF Army deployed personnel using the U.S. Air Force Transportation Command (TRANSCOM) Regulating and Command & Control Evacuation System (TRAC2ES) database of medical evacuations (MEDEVACS). The study design also incorporates aspects of a nested case-control study within a retrospective cohort. The TRAC2ES was used to identify 5,647 cases of US Army soldiers (Regular Army, Army Reserves, and National Guard) who were medically air evacuated (MEDEVACed) from the US Central Command (USCENTCOM) area of responsibility (AOR) for injury or illness between 1 January 2006 and 31 December 2006. Cases transported only within theater were excluded from the analysis. All cases identified occurred while deployed to OIF (Iraq) or OEF (Afghanistan). These MEDEVACed Soldiers formed the study sample from which oral-facial cases were drawn. (For information on TRAC2ES, see Hauret et al.'s article on air medical evacuations of soldiers from OIF/OEF⁽³⁾ and

Harman et al.'s article on aeromedical evacuations from OIF.⁽⁴⁾ Denominator data for calculation of rates was obtained from the Defense Manpower Data Center.⁽⁵⁾

(2) For this study, refer to the Mitchener et al. study on 2003–2004 oral-facial MEDEVACS from OIF/OEF for what structures of the body were included in the definition of oral-facial.⁽¹⁾ Soldiers who were evacuated out of the USCENTCOM AOR for oral-facial conditions were included in both analyses.

(3) Demographic characteristics of MEDEVACed Soldiers and details of the air evacuations were obtained from TRAC2ES. Demographics included age, gender, and rank. Details regarding the air evacuation included the origin, destination, and date.

(4) Medical data obtained from TRAC2ES included the patient history, casualty event, injury type, and diagnosis. The patient history was a free text field that provided important details about each Soldier's illness or injury. Information from this patient history was used to classify the reason for air evacuations as medical conditions, generally described hereafter as illness or as injury (battle or nonbattle). The casualty event and injury type variables categorized air evacuation cases as being related to OIF or OEF and further classified each evacuation as being for battle injury (BI) or nonbattle injury (NBI) respectively.

(5) For each MEDEVACed U.S. Army soldier, TRAC2ES included up to three diagnoses (primary, secondary, and tertiary) that were assigned by the medical provider who requested the air evacuation. Each diagnosis was represented by a diagnosis code from the International Classification of Disease, 9th Revision, Clinical Modification (ICD-9-CM). Soldiers who were MEDEVACed for one or more illness or injury of the oral-facial region were identified using a selected list of ICD-9-CM codes (a list of the oral-facial conditions and associated ICD9-CM diagnosis codes was referenced in the Mitchener, et al. study on 2003–2004 oral-facial MEDEVACS from OIF/OEF⁽¹⁾). When an evacuee had more than one oral-facial ICD-9-CM code (primary, secondary, or tertiary), the first reported code was used for this study. Evacuated Soldiers identified as having illness or injury (BI or NBI) of the oral-facial region comprise the subset of evacuees hereafter described as the oral-facial cases.

(6) For the oral-facial cases that were determined to be related to BI or NBI, the cause of injury was identified from the patient history. For this study, the identified cause of injury was then classified using the North Atlantic Treaty Organization (NATO) Standardization Agreement (STANAG), 5th edition, coding scheme. (For more information on STANAG cause-of-injury coding, refer to the Amoroso et al. article in the American Journal of Preventive Medicine⁽⁶⁾.)

(7) For those cases for which there was only an external cause of injury ICD-9-CM code (E-code) available, the patient history field was reviewed to determine if the injury or medical condition involved the oral-facial region and what ICD-9-CM diagnosis code should have been

applied. Cases obtained in this manner were added to the sample. In addition, the patient history field was used to correct miscoded ICD-9-CM diagnosis codes. The patient history field was reviewed to determine if the injury or medical condition involved the oral-facial region, what the ICD-9-CM code might have been, and then it was recoded to more accurately reflect the history.

b. Analysis.

(1) This study was a nested case-control study within a retrospective cohort. Cases were all (US Army) oral-facial patients medically evacuated from OIF/OEF during 2006. Controls were (US Army) all non-oral-facial patients medically evacuated from OIF/OEF during 2006. The value used for the denominator for calculations of crude rates was average Army troop strength per year for this time period for OIF and for OEF. The numerators consisted of the number of oral-facial MEDEVACS out of OIF and OEF in that 1-year time period. In addition to calculating rates of total oral-facial MEDEVACS, the same approach was used to calculate rates of oral-facial MEDEVACS due to disease, BI, and NBI.

(2) Differences between rates of oral-facial conditions for OIF and OEF were compared with chi-square tests. Frequencies of oral-facial MEDEVACS were tabulated, and the distribution of oral-facial MEDEVACS was compared to the distribution of non-oral-facial MEDEVACS. A t-test was used to compare the differences between the mean age of Soldiers MEDEVACed for oral-facial conditions and those MEDEVACed for other reasons. Goodness of fit chi-square tests were performed to determine whether the number of oral-facial MEDEVACS for different categories of potential risk factors differed from the expected distribution of all casualties.⁽⁷⁾ Potential risk factors examined included: operation (OEF/OIF), casualty category (disease/illness, BI, and NBI), age group (17–19, 20–29, 30–39, 40–49, 50+), gender, and rank group (junior enlisted, noncommissioned officers, senior noncommissioned officers, company grade officer, field grade officer, and warrant officer).

(3) The author determined frequencies and distributions of diagnoses for oral-facial disease, BI, and NBI. Also, the author documented frequencies and distributions of causes of oral-facial BI and NBI.

6. RESULTS.

a. According to TRAC2ES data, in 2006, there were 5,647 US Army personnel MEDEVACed out of Iraq and Afghanistan that were identified by ICD-9-CM codes. Table 1 shows the breakdown of MEDEVACS due to serious injury or illness to the oral-facial region of the body and to other regions of the body according to operation, casualty category, age group, gender, and rank group. The distribution of oral-facial MEDEVACS for different categories of potential risk factors differed significantly from the expected distribution of all casualties. Three of the five categories (casualty category/type, age group, and gender) showed significant

differences in percentages of oral-facial compared to non-oral-facial MEDEVACS. Details of the differences will be discussed below.

Table 1. Distribution of (percent of) Injuries and Disease by Operation, Casualty Type, Age, Gender, and Rank

		MEDEVACS (N=5647)				p-value ^(a)
		Other (non-oral-facial) (N=5515)		Oral-facial (N=132)		
		Cases	Percent of Total	Cases	Percent of Total	
Operation ^(b)	OIF	4560	82.7	113	85.6	0.38
	OEF	955	17.3	19	14.4	
	Missing	0	0	0	0.0	
Casualty Cat/Type ^(c)	Disease	2433	44.1	23	17.4	<0.01
	BI	1177	21.3	78	59.1	
	NBI	1905	34.6	31	23.5	
	Missing	0	0	0	0.0	
Age Group	Avg. Age (29.77±8.88)			Avg. Age (26.95± 6.67)		0.02
	17-19	167	3.0	6	4.5	
	20-29	3129	56.7	87	65.9	
	30-39	1320	23.9	31	23.5	
	40-49	704	12.8	8	6.1	
	50+	195	3.6	0	0.0	
	Missing	0	0	0	0.0	
Gender	Male	4839	87.7	125	94.7	0.02
	Female	676	12.3	7	5.3	
	Missing	0	0	0	0.0	
Rank Group	Junior E	2657	48.2	75	56.8	0.25
	NCO	2185	39.6	49	37.1	
	Senior NCO	135	2.4	2	1.5	
	CO grade	257	4.7	4	3.0	
	Field Grade	179	3.2	1	0.8	
	Warrant	99	1.8	1	0.8	
	Missing	3	0.1	0	0.0	

Legend:

Cat = category

Junior E = junior enlisted

CO = commissioned officer

NCO = noncommissioned officer

Notes:

^(a) p-value for goodness of fit chi-square comparing distribution of oral-facial conditions with other MEDEVAC conditions

^(b) Operations: OIF; OEF

^(c) Casualty types: disease, BIs, and NBIs

b. For 2006, TRAC2ES reported 113 oral-facial MEDEVACS out of the Iraqi Theater of Operation and 19 out of the Afghani Theater of Operation, a total of 132 oral-facial casualties. Considering the average Army troop strength for this time period for OIF was 110,700 per year and for OEF was 17,100 per year,⁽⁴⁾ oral-facial MEDEVAC rates were calculated to be 10.2/10,000 Soldiers per year for OIF and 11.1/10,000 Soldiers per year for OEF. The rates for OEF and OIF were similar. Also, the OEF oral-facial MEDEVACS were a slightly lower percentage of total OEF MEDEVACS (2.0 percent) compared to OIF oral-facial MEDEVACS and OIF total MEDEVACS (2.4 percent) of the five categories (casualty category/type, age group, and gender) showed significant differences in percentages of oral-facial compared to non-oral-facial MEDEVACS. Details of the differences will be discussed below.

c. Among the oral-facial casualties were 17 percent (n=23) disease, 59 percent (n=78) BI, and 24 percent (n=31) NBI oral-facial MEDEVACS. Rates for these in CY 2006 were 1.8/10,000, 6.1 /10,000, and 2.4 /10,000, respectively. These combined numbers accounted for 2.3 percent of total MEDEVACS in 2006. However for BI, the 78 oral-facial MEDEVACS were nearly three times more common than expected and accounted for 6.2 percent of all BI MEDEVACS.

d. Of the oral-facial casualties with reported patient ages (n=132), 66 percent were in the 20–29 year old age group. Soldiers less than 30 years of age accounted for a higher than expected percentage of oral-facial MEDEVACS when compared to non-oral-facial MEDEVACS for Soldiers under age 30 (70.4 percent vs. 59.7 percent). The average age of the oral-facial MEDEVAC was significantly younger than the average age of all other MEDEVACS (26.95±6.67 years vs. 29.77±8.88 years, t=4.762, p<0.01, 95 percent CI = 1.650, 3.991).

e. The majority (87.7 percent) of all non-oral-facial MEDEVACS were male Soldiers. For oral-facial MEDEVACS, compared to non-oral-facial MEDEVACS, the percentage of men was higher (94.7 percent), and women were under-represented. For MEDEVACS that reported a military rank, both oral-facial MEDEVACS and non-oral-facial MEDEVACS displayed a similar rank distribution.

f. Table 2 shows the distribution of disease category of oral-facial MEDEVACS broken down by ICD-9-CM codes. Of the 23 oral-facial MEDEVACS due to disease, 100 percent (n=23) had oral-facial diseases as a primary diagnosis. Common diseases of the oral cavity, salivary glands, and jaws (such as caries, endodontic disorders, periodontal disease, and oral pathology) accounted for 39.1 percent (n=9). Malignant neoplasms accounted for 21.7 percent of oral-facial disease MEDEVACS (n=5).

Table 2. Frequencies of Air Medical Evacuations for Oral-Facial Diseases by International Classification of Disease Numerical Code or Group and Diagnosis

ICD-9 Code or Group	Diagnosis	Cases	Percent
520–529	Diseases of the Oral Cavity, Salivary Glands, and Jaws	9	39.1
526.0–526.9	Diseases of the Jaw	3	
527.0–527.9	Diseases of the Salivary Glands	2	
522.0–522.9	Diseases of Pulp and Periapical Tissues	1	
524.0–524.9	Dentofacial Anomalies, including Malocclusion	1	
525.0–525.9	Other Diseases & Conditions of the Teeth and Supporting Structure	1	
528.0–528.9	Diseases of the Oral Soft Tissues	1	
140.0–146.9	Malignant Neoplasms of Lip, Oral Cavity and Oropharynx	4	17.4
V53.4	V Code- Orthodontic Services	3	13.0
210.5	Benign Neoplasms of Tonsil	2	8.7
351.0	Bell's Palsy	2	8.7
V52.3	V Code- Dental Prosthetic Device	1	4.3
196.0	Secondary Malignant Neoplasms of Lymph Nodes of Head, Face and Neck	1	4.3
230.0	Carcinoma in situ of Lip, Oral Cavity, and Pharynx	1	4.3
	Total Diagnoses	23	100

Note: All 23 disease oral-facial MEDEVACS had an oral-facial primary diagnosis.

g. Oral-facial injuries resulting from battle were nearly three times more common than expected (see Table 1). Table 3 shows the BI oral-facial MEDEVACS broken down by both STANAG cause of injury codes and ICD-9-CM diagnosis codes. Injury cause enemy instrumentalities of war accounted for 77 of the 78 cases. In addition, 74 cases (94.9 percent) had oral-facial injuries as a primary diagnosis. The most common ICD-9-CM diagnosis codes of BI oral-facial MEDEVACS were the 802 series (fractures of the face bones); followed by the 941 series (burns of the face), and the 873 series (other open wounds of the face and mouth). Of the 27 total fractures of the face bones, 14 were for fractured mandibles.

Table 3. Frequencies of Air Medical Evacuations for Oral-Facial Battle Injuries by NATO Standardization Agreement Cause Coding Scheme and by International Classification of Disease Numerical Code or Group and Diagnosis

STANAG Cause Group	ICD-9 Code or Group	Diagnosis	Cases	Percent
Instrumentalities of War, Enemy	802	Fractures of Face Bone	26	33.3
	941	Burns of Face, Head, and Neck	23	29.5
	873	Other Open Wound of Head (Face & Mouth)	17	21.8
	959.09	Injury of Neck & Face	11	14.1
Motor Vehicle Accidents	802	Fractures of Face Bone	1	1.3
		Total Diagnoses	78	100

Note: Of the 78 BI oral-facial MEDEVACS, 74 had an oral-facial primary diagnosis, 3 had an E-code as a primary diagnosis, with an oral facial injury cited in the narrative, and 1 had a facial bone fracture as a secondary diagnosis.

h. Table 4 shows the NBI oral-facial MEDEVACS broken down by both STANAG cause of injury codes and ICD-9-CM diagnosis codes. The most common STANAG cause of injury codes for nonbattle casualties were fighting (23 percent), followed by crushing and blunt trauma (16 percent), falls (13 percent), motor vehicle accidents (13 percent), and sports (13 percent). Twenty nine cases of NBI oral-facial MEDEVACS (93.5 percent) had oral-facial injuries as a primary diagnosis. The most common ICD-9-CM diagnosis codes of NBI oral-facial MEDEVACS were the 802 series (fractures of the facial bones), which accounted for 22 diagnoses (71.0 percent). Fractured mandibles accounted for 11 (35.5 percent) diagnoses of fractures of the facial bones.

Table 4. Frequencies of Air Medical Evacuations for Oral-Facial Nonbattle Injuries by NATO Standardization Agreement Cause Coding Scheme and by International Classification of Disease Numerical Code or Group and Diagnosis

STANAG Cause Group	ICD-9 Code or Group	Diagnosis	Cases	Percent
Fighting	802	Fractures of Face Bone	7	23
Crushing and blunt trauma	802	Fractures of Face Bone	5	16
Falls	802	Fractures of Face Bone	3	13
	848.1	Strain/Sprain of TMJ	1	
Motor vehicle accidents	802	Fractures of Face Bone	2	13
	959.09	Injury of Neck and Face	2	
Sports	802	Fractures of Face Bone	3	13
	959.09	Injury of Neck and Face	1	
Complications in med/surg both prior oral surgery and in theater	351	Facial Nerve Disorders	1	6.5
	802	Fractures of Face Bone	1	
Heat, fire and corrosives	941	Burns of the Face	2	6.5
Boarding and alighting	959.09	Injury of Neck and Face	1	3
Late Effects	848.1	Strain/Sprain of TMJ	1	3
Unspecified or unknown	802	Fractures of Face Bone	1	3
Total Diagnoses			31	100

Note: 29 had an oral-facial primary diagnosis and 2 had fractures of the face bone as an oral-facial secondary diagnosis.

7. DISCUSSION.

a. As with the 2003–2004 report and the 2005 report, this report documents U.S. military aeromedical evacuations from the first major conflict involving U.S. forces in the 21st Century. The data described shows that over two percent of U.S. Army patients seriously ill or injured enough to require MEDEVACS out of the USCENTCOM area of operation (OIF of OEF) had oral-facial problems: BI accounted for 59 percent, NBI accounted for 24 percent of oral-facial evacuations, while and disease accounted for 17 percent of such problems.

b. This study is a further follow-up to a study of oral-facial MEDEVACS in 2003–2004 from OIF/OEF. In the original study, for CYs 2003 and 2004, there were 18,036 U.S. Army

Soldiers MEDEVACed out of Iraq and Afghanistan that were identified by ICD-9-CM codes. This is an average of 9,018 MEDEVACS per year. The overall (OIF and OEF) rate of oral-facial MEDEVACS in 2003–2004 was 11.6/10,000/year. The rates of oral-facial MEDEVACS for OIF and OEF in 2003–2004 were 11/10,000/year and 21/10,000/year, respectively. Forty two percent of all oral-facial MEDEVACS were due to disease, 36 percent were due to BI and 21 percent were due to NBI.⁽¹⁾

c. In the second study, for CY 2005, there were 6795 U.S. Army Soldiers MEDEVACed out of Iraq and Afghanistan that were identified by ICD-9-CM codes. The overall (OIF and OEF) rate of oral-facial MEDEVACS in 2005 increased to 14.4/10,000/year. The rates of oral-facial MEDEVACS for OIF and OEF in 2003–2004 were 13.3/10,000/year and 21.6/10,000/year, respectively. Fifty three percent of all oral-facial MEDEVACS were due to BI, 31 percent were due to disease and 16 percent were due to NBI.⁽²⁾

d. In this study, for CY 2006, total U.S. Army MEDEVACS out of Iraq and Afghanistan further dropped to 5,647. The overall (OIF and OEF) rate of U.S. Army oral-facial MEDEVACS dropped to 10.3/10,000/year for 2006. This was due to the fact that the rates of oral-facial MEDEVACS for OIF and OEF in 2006 decreased to 10.2/10,000/year and 11.1/10,000/year, respectively. Of particular note is that the rate of oral-facial MEDEVACS for OEF in 2006 sharply decreased to nearly half of the previous year's rate. The reduced MEDEVAC rate from OEF may be due to greater availability of certain types of medical/dental care, therefore, reducing the need of evacuation out of theater to a higher level of care facility.

e. Of the casualty types associated with oral-facial evacuations in 2006, BI was again the most common followed by NBI and then disease. The U.S. Army oral-facial BI rate decreased from 7.6/10,000/year to 6.1/10,000/year. The decreased oral-facial BI MEDEVAC rate in 2006 played a big part in the decreases in overall rates of U.S. Army oral-facial MEDEVACS and also OIF and OEF rates of oral-facial MEDEVACS. As in the previous studies, many BI may have been the results of U.S. Army support personnel being caught in ill-defined battle areas and the enemy's unconventional warfare techniques to include the use of improvised explosive devices (IEDS). For diagnose coding of BI, it is interesting to note that there was lesser use of E-coding, compared to 2005. It is unclear why.

f. As stated in the two prior studies, of oral-facial casualty categories in a theater of operation that led to a MEDEVAC, oral-facial NBI was potentially the most preventable and most avoidable. The U.S. Army oral-facial NBI MEDEVAC rate in 2006 was 2.4/10,000/year and has essentially stayed steady when compared to CYs 2003–2004 (2.5/10,000/year) and CY 2005 (2.3/10,000/year). In 2006, fighting was the leading cause of serious U.S. Army oral-facial NBI. There were no oral-facial NBI MEDEVACS due to fighting in 2005. In 2003–2004 and in 2005, motor vehicle accidents were the leading cause of serious U.S. Army oral-facial NBI. In 2006, motor vehicle accidents were no longer the leading cause of serious U.S. Army oral-facial

NBI. Motor vehicle accidents for U.S. Army personnel actually dropped to 13 percent of oral-facial NBI MEDEVACS in 2006 from over 36 percent in 2005.

g. In 2003–2004, disease was the most common casualty category, followed by BI and NBI. By 2006, disease was the least common casualty category. The U.S. Army oral-facial disease MEDEVAC rate decreased from 4.9/10,000/year (CYs 2003–2004) to 1.8/10,000/year (CY 2006). This may be due to increased dental assets in the USCENTCOM AOR and continued improvements in pre-deployment screening and treatment.

h. This study looked at conditions of the oral-facial region due to illness or injury that could not be treated by dental and dental specialty personnel in the theater of operations. When compared to the last study year, 2005, the need to evacuate oral-facial problems appears to have been slightly reduced. This may be due to either a decrease in oral-facial injuries and diseases or an increase in the numbers of appropriately trained healthcare personnel in-theater.

i. There were limitations to this study. It is unknown: (1) how accurate the diagnoses of oral-facial illness or injury were, (2) if any diagnoses were rendered by a dentist, oral maxillofacial surgeon or other dental specialist, and (3) the level of dental training of the nondental providers making the diagnoses. A lack of basic dental knowledge could lead to misdiagnosis and (ICD-9-CM) misclassification. Also, there might have been a proper diagnosis, but the person entering the code(s) may not have entered the most specific or correct code. Another limitation was that the patients were not categorized as either Active Component (U.S. Regular Army) or Reserve Component (U.S. Army Reserve and U.S. Army National Guard). A final limitation was having a relatively small number of oral-facial medical evacuations in relation to other medical evacuations. This reduces the statistical power to confidently identify significant results.

8. CONCLUSIONS. This retrospective study was a follow-up to two previous reports investigating MEDEVACS of U.S. Army Soldiers due to oral-facial illnesses and injuries from two theaters of operations. This study reconfirmed battle injury as the leading casualty category for oral-facial MEDEVACS of U.S. Army personnel from the USCENTCOM AOR. This study also demonstrated a continued reduction in the frequency and rate of oral-facial disease MEDEVACS. This may be due to emphasis placed on pre-deployment screening and treatment. This study also showed a decrease in oral-facial MEDEVAC rates when compared to the report of the previous year.

9. RECOMMENDATIONS. More studies need to be done in the areas of oral-facial MEDEVAC frequencies and rates in current and future operations to reduce these types of casualties.

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APPENDIX A

REFERENCES

1. T.A. Mitchener, K.G. Hauret, E.L. Hoedebecke, S.S. Darakjy, and B.H. Jones. 2008. Air medical evacuations of soldiers due to oral-facial disease and injuries, Operations Enduring Freedom/Iraqi Freedom. *Military Medicine*. 173(5):465–473.
2. T.A. Mitchener and K.G. Hauret. 2009. Air medical evacuations of soldiers for to oral-facial disease and injuries, 2005, Operations Enduring Freedom/Iraqi Freedom. *Military Medicine*. 174(2) (awaiting publication).
3. K.G. Hauret, B.H. Jones, M.C. Chervak, S. Bullock, S. Canada, J.J. Knapik, and K. Cox. 2004. Frequencies and characteristics of medical evacuations of soldiers by air (with emphasis on nonbattle injuries), Operations Enduring Freedom/Iraqi Freedom (OEF/OIF), January–November 2003. *Medical Surveillance Monthly Report*. 10(3): 8–11.
4. D.R. Harman, T.I. Hooper, and G.D. Gackstetter. 2005. Aeromedical evacuations from Operation Iraqi Freedom: a descriptive study. *Military Medicine*. 170: 521–527.
5. Defense Manpower Data Center, Statistical Information Analysis Division. DoD Personnel and Procurement Statistics. Unclassified data. 17 Oct 07.
6. P.J. Amoroso, G.S. Smith, and N.S. Bell: Qualitative assessment of cause-of-injury coding in US military hospitals: NATO standardization agreement (STANAG) 2050. *American Journal of Preventive Medicine*. 18(3S):174–187.
7. D.E. Hinkle, W. Wiersma, and S.G. Jurs. 1979. *Applied Statistics for the Behavioral Sciences*. Boston: Houghton Mifflin. p. 338.