Oral–Maxillofacial Injury Surveillance in the Department of Defense, 1996–2005

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Introduction: Oral–maxillofacial injuries can lead to deformity and malfunction, greatly diminishing quality of life and worker productivity. Data suggest that over 10% of civilian emergency room visits are due to craniofacial injuries. The size and scope of oral–maxillofacial injuries in the military is not well understood. This study reports U.S. military rates of oral–maxillofacial injuries, causes of oral–maxillofacial hospitalizations, and recommends approaches to improving surveillance, research, and prevention.

Methods: Active duty U.S. military personnel who sought inpatient or outpatient treatment for one or more oral–maxillofacial injuries from 1996 to 2005 were identified in the Defense Medical Surveillance System using ICD-9-CM diagnosis codes associated with oral–maxillofacial injuries. ICD-9-CM diagnosis codes were divided into two categories: oral–maxillofacial wounds and oral–maxillofacial fractures.

Results: The oral–maxillofacial fracture rates for men were consistently 1.5 to 2 times higher than those for women, with 2000–2005 rates between 1.2 and 1.5/1000 person-years for men and between 0.7 and 1.0/1000 person-years for women. Wound rates for men were similar to those for women for all years examined ($p<0.001$), with 2000–2005 rates ranging from 11.0 to 14.6/1000 person-years for men and 12.2–14.8/1000 person-years for women. Compared to the over-40 age group, active duty personnel under age 25 had the highest rates of both oral–maxillofacial fractures and wounds ($p<0.001$). Among those injuries with a cause recorded, fighting (13.5%) was the leading cause of oral–maxillofacial injury hospitalizations in 2005.

Conclusions: Oral–maxillofacial injuries can and should be monitored using military medical surveillance data. Surveillance efforts would be enhanced by the addition of dental care data. There is also a need for additional quality intervention studies on the strategies to prevent oral and craniofacial injury.

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Introduction

Injuries are a major public health problem, outranking cancer and heart disease as a leading cause of death in some age groups of the population. Cranial injuries in particular are a leading cause of mortality and morbidity for all age groups under 45.[1] According to the National Institute of Dental and Craniofacial Research, there are 20 million visits to emergency departments for craniofacial injuries every year.[2] This equates to 11% of emergency room visits annually.[3] In addition, there are close to 6 million oral–facial injuries treated annually by dentists in private offices.[2] According to the Surgeon General's 2000 report on oral health in America, "Oral–facial injuries can bring disfigurement and dysfunction, greatly diminishing quality of life and contributing to social and economic burdens."[4]

Compared to other public health problems, there is very little recent rate-based data available on craniofacial injuries or (more specifically) on oral–facial injuries. What is known is that trends observed in 1993–1994 showed that individuals visiting emergency rooms and emergency departments for craniofacial injuries tended to be male and under the age of 25.[2,3]

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In the military, there have been past studies of injury to the oral–facial area that included rate-based data. Most notable was a study of army personnel by Katz on "accidental dentofacial" injury rates (dentofacial defined as *pertaining to the teeth, jaws, intraoral soft tissues, perioral soft tissues, and facial bones*). Katz showed that men were much more prone to injury than women and that over 90% of "dentofacial" injury occurred prior to age 25.[5] More recently, Mitchener did a study of air medical evacuations (MEDEVACs) of soldiers out of Operations Enduring Freedom and Iraqi Freedom due to oral–facial conditions, 2003–2004, in which he found an oral–facial nonbattle injury MEDEVAC rate of around 0.3/1000/year and an oral–facial battle injury MEDEVAC rate of 0.4/1000/year.[6] Mitchener et al.[7] also did a follow-up study using 2005 data and found the oral–facial nonbattle injury MEDEVAC rate to be 0.2/1000/year, and the oral–facial battle injury MEDEVAC rate to be around 0.8/1000/year.

In summary, due to the lack of epidemiologic studies, the size and the scope of the problem are not clearly understood for both civilian and military populations. However, one may argue that the burden of craniofacial and oral–facial injuries in civilian populations is slightly better-defined than in military populations. The purpose of this study is to add to the descriptive epidemiology available for military oral–maxillofacial (oral–facial) injury. Department of Defense (DoD) distributions, rates, and causes of oral–maxillofacial injuries are reported and approaches to improving surveillance, research, and prevention are recommended where possible. This analysis was originally completed for and submitted to the Defense Safety Oversight Council (DSOC).

Methods

For this study, the term oral–facial referred to hard and soft tissues of the oral cavity, maxillofacial area, and/or the adjacent and associated structures[8] such as the orbital floor (formed in part by the maxilla) and parts of the neck closest to the mandible. Adjacent structures such as the ear, the eye, and the nose were not included. Active duty U.S. military personnel who sought inpatient or outpatient treatment in fixed U.S. military medical facilities worldwide or non-DoD facilities (outsourced care) for one or more injuries of the oral–facial region, 1996–2005, were identified in the Defense Medical Surveillance System (DMSS) using a list of the ICD-9-CM diagnosis codes. These ICD-9-CM codes are consistent with those used in prior studies of oral–facial conditions in the military.[6,7] ICD-9-CM diagnosis codes were further divided into two categories: oral–facial (soft tissue) wounds and (hard tissue, i.e., bone) oral–facial fractures (Table 1).

Defense Medical Surveillance System data were obtained from the Armed Forces Health Surveillance Center (formerly, Army Medical Surveillance Activity). DMSS is the central repository of medical surveillance data for the U.S. Armed Forces. The DMSS integrates data from sources worldwide in a continuously expanding relational database that documents the military and medical experiences of service members throughout their careers.[9] All data on U.S. military members contained in DMSS is validated against DoD personnel data obtained from the Defense Manpower Data Center. Stratum data elements (i.e., gender, age, rank, race/ethnicity, and marital status) for a medical event are derived from personnel data considered to be current on the date of the medical event. Overall and stratum-specific population statistics (i.e., person-year denominators) are calculated based on longitudinal personnel data. Inpatient data in DMSS are obtained from the Standard Inpatient Data Record extracted from the Composite Health Care Systems (CHCS), now known as AHLTA (Armed Forces Health Longitudinal Technology Application), used in DoD military treatment facilities worldwide. Outpatient data in DMSS are obtained from the Standard Ambulatory Data Record extracted from the Ambulatory Data System and CHCS, now known as AHLTA.[10]

Multiple visits for the same oral–facial injury diagnosis within 60 days of the initial visit were excluded to reduce the overestimation of rates due to follow-up visits. To capture all oral–facial injury visits and not just those for which the oral–facial injury was the primary reason for the visit, both primary and non-primary oral–facial injury diagnoses were obtained from DMSS. Rates were calculated by dividing the number of injuries by the person-years of the DoD active duty population at risk, and are presented by gender and age group. Given that the majority of oral–facial injuries are treated on an outpatient basis (92% in 2005), rates include both inpatient and outpatient medical encounters. Rate ratios (with 95% CIs) and chi-square tests were used to assess statistical differences between rates by gender and age group. Linear regression analyses were used to assess the significance of trends in gender and age-group rates.

To examine cause of injury information available from the medical surveillance data for the last study year (2005), the distribution of the leading causes of oral–facial injury hospitalizations are presented. Cause of injury from DMSS is collected using the NATO Standardization Agreement (STANAG), 5th edition coding scheme.[11]

Results

Figures 1–4 illustrate a dramatic rise in fracture and wound rates by gender and age from 1996 to 2000, likely due to (across DoD) changes in clinic data reporting and improvements in clinic data ascertainment/collection (M Rubertone, J Brundage, Armed Forces Health Surveillance Center, personal communication, January 10,

2007). In addition, there were advances in computer capabilities from 1996 to 2000. As a result, further discussion focuses on rates from 2000 to 2005.

From 2000 to 2005, oral–maxillofacial fracture rates, men and women combined, ranged from 1.2/1000 person-years in 2000 to 1.3/1000 person-years in 2005, with a peak of 1.4/1000 person-years in 2004. Rates of oral–facial wounds, men and women combined, ranged from 12.0/1000 person-years in 2000 to 12.7/1000 person-years in 2005, with a peak of 15.1/1000 person-years in 2004.

Figure 1 shows the rates of oral–maxillofacial fractures by gender. The fracture rates for men are consistently higher than for women, with rate ratios ranging from 1.37 (95% CI= 1.19, 1.61) in 2001 to 1.90 (95% CI=1.62, 2.29) in 2005. Differences between male and female fracture rates were significant for all years examined ($p<0.001$). The fracture rate for men from 2000 to 2005 ranged from just over 1.2 fractures/1000 person-years (in 2000) to 1.5 fractures/1000 person-years (in 2004), with rates in other years approximately 1.4 fractures/1000 per-

Table 1. ICD-9-CM codes used to identify dental, oral, and maxillofacial injuries

Fractures	
802.20–802.29	Mandible fracture, closed
802.30–802.39	Mandible fracture, open
802.4 and .5	Malar and maxillary bones, closed and open
802.6 and .7	Orbital floor (blow-out), closed and open
802.8 and .9	Other facial bones, closed and open (alveolus, palate)
830.0 and .1	dislocation of jaw, closed and open
848.1	Sprain or strain of TMJ
Wounds	
873.40	Open wound of the face, unspecified site, not complicated
873.41	Open wound of the face, cheek, not complicated
873.43	Open wound of lip
873.44	Open wound of jaw
873.50	Open wound of the face, unspecified site, complicated
873.51	Open wound of the face, cheek, complicated
873.53	Open wound of lip, complicated
873.54	Open wound of jaw, complicated
873.6	Open wound of internal structures of mouth, fractured tooth
873.7	Open wound of internal structures of mouth, fractured tooth, complicated
905.0	Late effect of fracture of facial bones (including maxilla and mandible)
906.0	Late effect of open wound of head (including oral region)
906.5	Late effect of burn to face, head area (including oral region)
910.0–910.9	Superficial injury of face, neck (including oral region, lip, gum)
920	Contusion of face (includes lip and gum)
935.0	Foreign body in mouth
941.00	Burn of face and head, unspecified site, unspecified degree
941.03	Burn of lip, unspecified degree
941.10	Burn of face and head, unspecified site (first degree)
941.13	Burn of lip, erythema (first degree)
941.20	Burn of face and head, unspecified site (second degree)
941.23	Burn of Lip, blisters, epidermal loss (second degree)
941.30	Burn of face and head, unspecified site (third degree NOS)
941.33	Burn of Lip, full, thickness skin loss (third degree NOS)
941.40	Burn of face and head, unspecified site, deep necrosis of underlying tissues (deep third degree) without mention of loss of a body part
941.43	Burn of lip, deep necrosis of underlying tissues (deep third degree) without mention of loss of a body part
941.50	Burn of face and head, unspecified site, deep necrosis of underlying tissues (deep third degree) with loss of a body part
941.53	Burn of lip, deep necrosis of underlying tissues (deep third degree) with loss of a body part
947.0	Burn of mouth and pharynx (gum and tongue)
951.2	Injury to trigeminal nerve
959.09	Injury to face (lip and mouth)
Injury codes in diseases of oral cavity, salivary glands, and jaws	
525.11	Loss of teeth due to trauma
528.9	Other and unspecified diseases of the oral soft tissues-includes cheek and lip biting and (traumatic) ulcers

NOS, not otherwise specified; TMJ, temporal mandibular joint

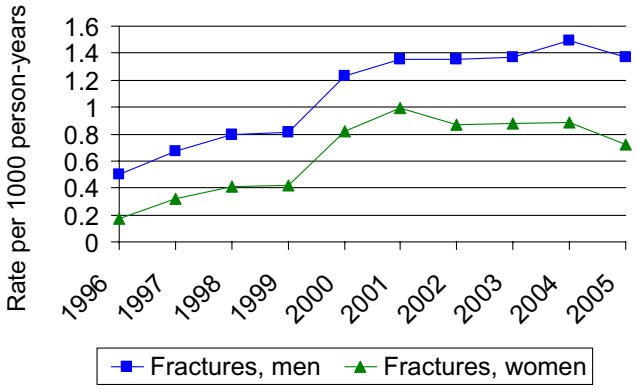

Figure 1. Rates of oral–maxillofacial fractures by gender, Department of Defense active duty, CY1996–2005
Inpatient and outpatient visits; primary and nonprimary diagnoses; considered a follow-up visit if same diagnoses seen within 60 days
Source: Defense Medical Surveillance System, Army Medical Surveillance Activity, 2006

son-years. The rate of fractures for women peaked in 2001 at 1.0 fractures/1000 person-years. The rate then stayed steady from 2002 to 2004 at a rate of 0.8–0.9 fractures/1000 person-years, and dropped to 0.7 fractures/1000 person-years in 2005. Overall, the trend for fracture rates for both men and women, 2000–2005, was not significant ($p>0.05$).

Figure 2 shows the rates of oral–maxillofacial wounds by gender. From 2000 to 2001, rates for women were slightly higher than rates for men, with a rate ratio in 2000 of 1.12 (95% CI=1.07, 1.17) and 1.05 in 2001 (95% CI=1.01, 1.09). From 2003 to 2005, rates for men and women did not differ significantly ($p>0.05$). While

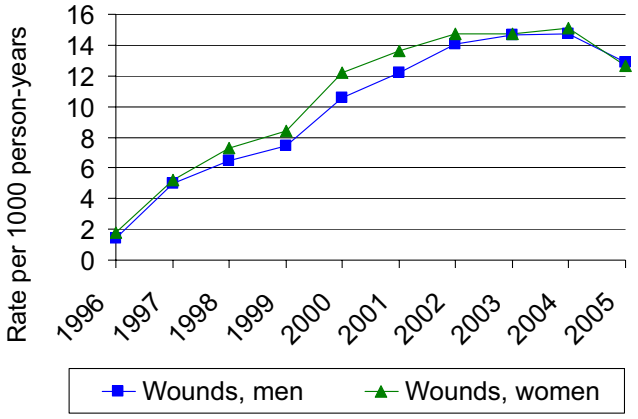

Figure 2. Rates of oral–maxillofacial wounds by gender, Department of Defense active duty, CY1996–2005
Inpatient and outpatient visits; primary and nonprimary diagnoses; considered a follow-up visit if same diagnoses seen within 60 days
Source: Defense Medical Surveillance System, Army Medical Surveillance Activity, 2006

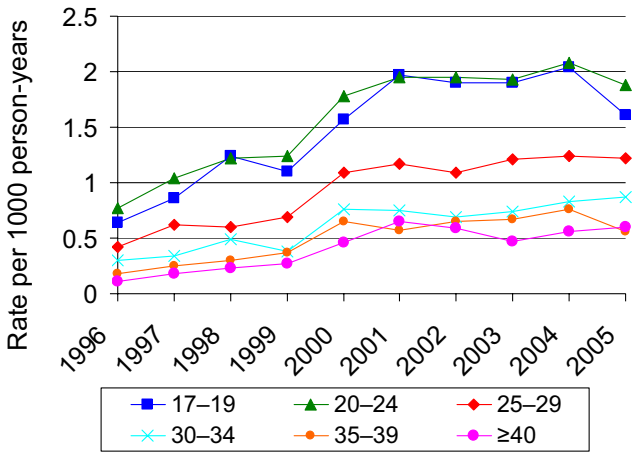

Figure 3. Rates of oral–maxillofacial fractures by age group, Department of Defense active duty, CY1996–2005
Inpatient and outpatient visits; primary and nonprimary diagnoses; considered a follow-up visit if same diagnoses seen within 60 days
Source: Defense Medical Surveillance System, Army Medical Surveillance Activity, 2006

rates appeared to increase from 2000 to 2002, the overall trend in wound rates for men and women, 2000–2005, was not significant ($p>0.05$).

Figure 3 shows the rates of oral–maxillofacial fractures by age group. From 2000 to 2005, fracture rates for the 17–19 and 20–24 age groups were consistently above 1.5 fractures/1000 person-years. Overall, there were no sig-

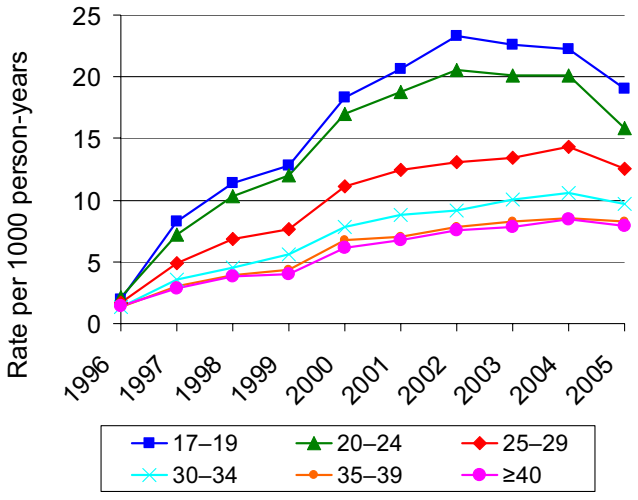

Figure 4. Rates of oral–maxillofacial wounds by age group, Department of Defense active duty, CY1996–2005
Inpatient and outpatient visits; primary and nonprimary diagnoses; considered a follow-up visit if same diagnoses seen within 60 days
Source: Defense Medical Surveillance System, Army Medical Surveillance Activity, 2006

nificant linear trends ($p>0.05$) in these two age groups for 2000–2005. Ages 25–29 years stayed fairly steady from 2000 to 2005 ($p>0.05$) at around 1.1–1.2 fractures/1000 person-years. All other age groups had relatively stable rates ($p>0.05$) well below 1.0 fractures/1000 person-years for 2000–2005.

Comparing age groups, rates for the group aged 17–19 years were consistently more than twice those in the group aged 40 years and above, with rate ratios (17–19 versus ≥40) ranging from 2.69 (95% CI=2.09, 3.54) in 2005 to 3.38 (95% CI=2.58, 4.63) in 2000. Similarly, rate ratios for the 20–24 age group compared to the 40+ age group ranged from 2.99 (95% CI=2.44, 3.81) in 2001 to 4.12 (95% CI=3.30, 5.42) in 2003. For all years examined, differences between age groups within each year were significant ($p<0.001$).

Figure 4 shows the rates of oral–maxillofacial wounds by age group. Overall, the younger the age group, the higher the wound rate. As seen with fractures, rates among the younger age groups were more than twice the rates of the oldest age group. Rate ratios comparing the youngest and oldest age groups (17–19 vs ≥40) ranged from 2.41 (95% CI=2.24, 2.59) in 2005 and 3.09 (95% CI=2.89, 3.32) in 2002. Rate ratios comparing the group aged 20–24 years with the oldest age group ranged from 2.01 (95% CI=1.89, 2.14) in 2005 to 2.78 (95% CI=2.59, 2.99) in 2000. For all years examined, differences between age groups within each year were significant ($p<0.001$).

From 2000 to 2005, all age groups had a rise in wound rates, followed by a decline. Age groups 17–19 and 20–24 had peaks in 2002 (of approximately 22 wounds/1000 person-years and 20 wounds/1000 person-years, respectively) followed first by small declines, then larger declines in 2005. Other age groups had slower, smaller increases in rates, followed by small peaks in 2004. Tests for linear trend, 2000–2005, were not significant ($p>0.05$) for the younger age groups (17–19, 20–24, 25–29), but were significant ($p<0.05$) for older age groups (30–34, 35–39, 40+).

The leading causes of hospitalization due to oral–maxillofacial injury among DoD active duty military in the calendar year 2005 are shown, according to STANAG cause of injury code groupings, in Figure 5. "Fighting" was the leading (STANAG) cause of oral–maxillofacial injury requiring hospitalization. Fights (at 13.5%) were over 1.5 times as common as the next leading cause, "land transportation accidents" (8.4%). After "land transportation accidents" came "enemy actions during war" (8.0%) and "guns" (8.0%); followed by "falls" (5.1%), "medical and surgical complications" (4.8 %), and "sports" (3.4%).

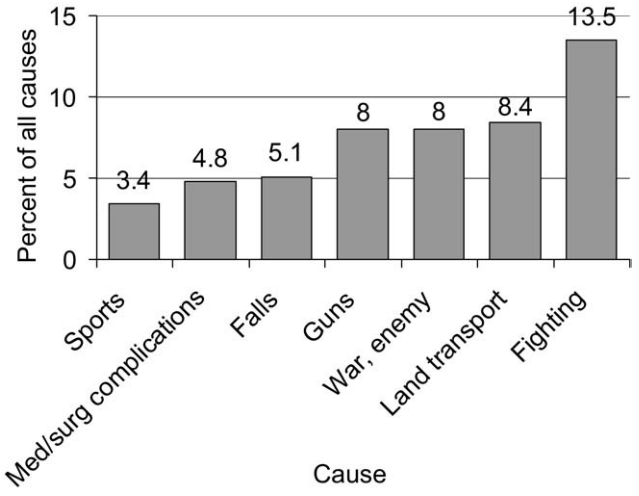

Figure 5. Causes of oral–maxillofacial injury hospitalizations, Department of Defense active duty, CY2005
Chart includes the NATO standardization agreement (STANAG) 2050 (5th ed) cause categories contributing >1%
Total 2005 Department of Defense oral–maxillofacial injury hospitalizations = 1456; 42% did not have a cause code
Source: Defense Medical Surveillance System, 2008

Discussion

As was expected, men had a higher oral–maxillofacial fracture rate than women. This is in agreement with Katz, who showed that female soldiers were significantly less likely to sustain a "dentofacial" injury than would be expected ($p<0.01$).[5] Mitchener found that women were also significantly less likely to be MEDEVACed for oral–facial conditions than men ($p=0.03$).[6] There were studies in the 1960s and early 1970s that suggested men are involved with more high-risk activities (e.g., fighting, falls) that put them in risk for oral–facial injuries. However, this warrants further investigation. It was surprising to find that men did not have a higher oral–maxillofacial wound rate than women. In fact, from 2000 to 2002, the opposite was true, the reasons for which are unknown.

Regarding age groups, as expected, the younger the age group, the higher the rate for both oral–maxillofacial wounds and fractures. In addition, this analysis showed that age groups 17–19 and 20–24 had much higher rates for both wounds and fractures, as was seen in the Katz study, which suggested that 90% of such injuries occur by age 25. Katz performed analysis of age in relation to the cause of "dentofacial" injuries, and it revealed with statistical significance that "fistfights" and miscellaneous injuries due to "misaction" on the part of the victim (e.g., falls, falls down stairs, horseplay) predominated in the youngest age groups (ages 17–20). When level of formal education was considered, the less-educated soldiers sustained

most of their "dentofacial" injuries in "fistfights" compared to more educated soldiers. "Fistfights" were the major cause of injury in his study, and Katz suggested that the youngest and less-educated soldiers sustained more of their "dentofacial" injuries in fistfights than older and more educated soldiers.[5]

In this study, fighting was found to be the leading cause of oral–maxillofacial injury for military personnel. A recent study found fighting to be the one of the major causes of soldiers MEDEVACed out of Iraq and Afghanistan for nonbattle oral–facial injury, especially for soldiers under age 30.[6] Motor vehicle crashes (STANAG code "land transportation accidents") were the second leading cause of oral–maxillofacial injury in this study. Prior studies have revealed motor vehicle crashes as one of the top four causes of oral and craniofacial injuries[5,12,13] and as the leading cause of nonbattle oral–facial injuries being MEDEVACed out of Iraq and Afghanistan.[6,7]

In this study, unexpectedly, falls were found to be only the fifth leading cause of oral–maxillofacial injury for military personnel. Prior studies have shown falls as one of the major causes of all oral–facial injuries.[14] It was also mildly surprising that sports ranked as the seventh leading cause of oral–maxillofacial injury hospitalizations, as past research has shown sports injuries to be one of the top three causes of these types of injuries.[5,12,15]

The strengths of this study were the following: (1) the data were collected on all medical encounters of active duty U.S. military personnel[9]; (2) all medical encounters were subject to standardized and routine recordkeeping; (3) the collected data came from a large patient population (approximately 1.3 million active duty personnel have access to military health system care); and (4) the data captured care received both within the military health system and outside the military health system.

There were weaknesses and limitations to this study. These data are likely to be an underestimate of all oral–maxillofacial injuries for active duty service members, as the surveillance system does not capture treatment for minor injuries received at battalion aid stations or for medical care received in nonfixed medical facilities in theaters of operation such as Iraq and Afghanistan. It is also unknown (1) how accurate the diagnoses of oral–facial injury were; (2) how many 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 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. The above limitations must also be considered with respect to injury cause codes, although a prior study found STANAG injury mechanism codes in the military hospitalization surveillance data to be 100% complete and 88% compliant with an external reviewer's coding.[11]

Looking toward prevention, most studies on the prevention of oral and craniofacial injuries have dealt with the use of helmets, facemasks, and mouthguards to protect athletes. Starting in 1962, a growing number of governing bodies of organized sports mandated the use of helmets, facemasks, and mouthguards (alone or in combination) in practice or in competition. Several professional health organizations (to include the American Medical Association and the American Dental Association) have recommended the use of helmets, facemasks, mouthguards, or a combination of these protective devices in a variety of contact sports at all levels of competition, both organized and unorganized.[15] In the military, the army has required, since 2004, that mouthguards be issued to basic trainees and fitted at medical in-processing. The mouthpieces are to be used during pugil stick training, confidence/obstacle courses, unarmed combat, and rifle/bayonet training.[16] This could partially explain the drop in rates for 2005 of oral–facial wounds and fractures for both genders and especially the younger age groups.

A systematic review of published studies conducted in 2001 on behalf of the Task Force on Community Preventive Services found that available studies provided insufficient evidence to determine the effectiveness of population-based interventions that encourage use of oral–facial protection (helmets, facemasks, and mouthguards) in contact sports in increasing oral–facial protection use or reducing injury or injury-related death.[17] There were only four studies that qualified for the review, showing fair quality of execution.[15,18] The study, from those four, with the greatest effect was the Benson study, measuring hockey–face shield effectiveness. This study showed that half-face shields increased the relative risk (RR) of injury compared to full-face shields (head and neck injuries [half face/full face] RR=2.52; facial lacerations RR=2.31; dental injury only RR=9.90).[19]

Since this report, additional intervention studies have demonstrated the effectiveness of certain types of craniofacial protectors. Marshall showed that use of faceguards in baseball reduced the risk of facial injury by 35%.[20] Knapik found that the risk of oral–facial sports injury was 1.6–1.9 times higher when a mouthguard was not worn.[21] Dela Cruz found that army basic trainees had about 1.8 times higher overall risk of oral–facial injury when mouthguards were not worn while engaged in four basic training activities (pugil stick training, unarmed combat, rifle/bayonet training, and confidence/obstacle course) compared to when mouthguard use was mandated.[22]

Conclusion and Recommendations

The key findings of this study concerning oral–maxillofacial injury were the following: (1) DoD active duty U.S. military men had a higher oral–maxillofacial fracture rate, 2000–2005, than women; (2) rates of oral–maxillofacial wounds were similar among men and women, 2000–2005, with women having a slightly higher rate than men in 2000–2002; (3) active duty personnel under age 25 had the highest rates of both oral–maxillofacial fractures and wounds; and (4) fighting was the leading cause of oral–maxillofacial injury hospitalizations in 2005.

Since this was intended to be a "first look" at an injury issue that had not been previously examined, this analysis suggests many opportunities for further exploration. Further insights into the problem could be gained through an investigation of rates by other variables available in the DMSS such as component, military service branch, and occupational specialty. Further exploration of the causes over multiple years by gender, age group, and other risk factors is also warranted. Multivariate analyses are also needed to gain an understanding of the most important predictors of oral–facial injury among military personnel.

In the future, the military would benefit from a system of surveillance that incorporates not only medical care data, but also dental care data. Unfortunately, there are no known oral and craniofacial health surveillance systems. It is a goal of Healthy People 2010 (HP 2010), goal 21–16, to have an oral and craniofacial surveillance system in all states and the District of Columbia.[23] At the present time, because of limited tracking data, this HP 2010 goal (21–16) could not be assessed for progress.[24]

In addition to surveillance needs, both the medical and dental care organizations need better coding of diagnoses, treatment, and causes. An avenue to get better and more accurate surveillance of oral–maxillofacial injury could involve greater education for medical personnel regarding diagnosis and treatment of oral–maxillofacial trauma. A recent study evaluating the knowledge of military physicians and emergency medical technicians regarding dento-alveolar and maxillofacial injuries among the Israeli army population showed that only 22% received education regarding oral–maxillofacial trauma.[25] Improved knowledge will result in more accurate diagnoses and more accurate surveillance of these types of injuries.

Overall, there is also a need for additional quality intervention studies on strategies to prevent oral and craniofacial injury. In addition to the 2001 review by the Task Force for Community Preventive Services, a 2005 review by U.S. and Canadian researchers concluded that the literature on sports-related craniomaxillofacial injury prevention lacked the high-quality scientific design and evidence on which mandatory interventions could be based.[26]

This descriptive epidemiologic analysis was one of the first to investigate oral–facial injury distributions, rates, and causes among U.S. military service members and was the first to use medical surveillance data to do so. This analysis serves as a baseline for in-depth future studies on this topic. More analytic epidemiology, program evaluations, and intervention trials are needed to focus prevention efforts, evaluate potential prevention strategies, and make progress toward prevention of oral–facial injuries in the military.

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