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4 NAVAL MEDICAL RESEARCH UNIT SAN ANTONIO

5 **COMPARISON OF THE MOST COMMON DENTAL EMERGENCIES SEEN AT**
6 **DENTAL TREATMENT FACILITIES AND THE MOST COMMON ORAL-**
7 **FACIAL DISEASE REQUIRING MEDICAL EVACUATIONS OF U.S. ARMY**
8 **PERSONNEL IN DEPLOYED THEATERS SINCE 2000**

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22 **NAMRU-SA REPORT # 22-633**

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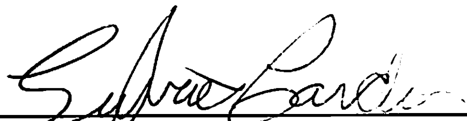
38 

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68 ## ABBREVIATIONS

69

70 CY- calendar year

71 DE – dental emergency

72 DTF – dental treatment facility

73 ICD9CM- International Classification of Disease, 9th Revision, Clinical Modification

74 MEDEVAC – medical evacuation (air)

75 MTF – military treatment facility

76 OMF – oral-maxillofacial

77 TMJ- temporomandibular joint

78 **EXECUTIVE SUMMARY**

79 **Background:** The percentage of dental emergencies (DE) that can be expected in a deployed
80 environment is estimated to be about 12%. Future combat situations may be more challenging,
81 and difficult to plan accurately. Accordingly, military medical planners need to take into
82 consideration past operations in planning the numbers of general dentists and dental specialists
83 required in theater for future operations and engagements. Planners also need to estimate the
84 level of training needed for these providers and ensure that the appropriate personnel are trained
85 and available for deployment.

86 **Objective:** To evaluate the major causes of DE presenting to deployed dental treatment facilities
87 (DTF) and the leading causes of medical evacuation (MEDEVAC) of Army personnel out of
88 theater for severe oral-facial disease. These data can lead to a cadre of better-trained and better-
89 equipped dental providers who can properly diagnose and treat these DE in a deployed setting.

90 **Methods:** Peer-reviewed studies of DE of U.S. Army personnel seeking treatment in DTFs in
91 deployed regions of operation beginning in 2000 were evaluated. Peer-reviewed studies and
92 military technical reports of MEDEVAC out of theater (Iraq and Afghanistan) due to severe oral-
93 facial disease were also evaluated.

94 **Results:** The most common DE causes involved caries (26.1%), endodontic issues (20.7%), and
95 fractured teeth or defective restorations (19.4%). Oral pathology issues stood out
96 overwhelmingly (37.4%) as the most common cause for MEDEVAC out of theater.

97 **Conclusions:** The most common oral facial diseases requiring MEDEVAC differ from the
98 most common DE categories at DTFs. This information provides valuable knowledge,
99 informing medical planners of greatest in-theater needs. The information also guides dental
100 personnel towards on-site triage and treatment of these issues, reduces costs and
101 expenditures, and enhances the dental readiness of the entire force. Further study into this

102 topic is needed.

INTRODUCTION

As noted by King and Chisick nearly 30 years ago, "epidemiological data on the occurrence, preventability, and treatment of oral, dental, and maxillofacial conditions during military operations are sparse [1]." This notion is also applicable in the present day, as most studies on dental issues faced by military members concentrate on dental emergencies (DEs). A DE has been defined in literature as "an acute episode of a dental or oral condition (due to either illness or injury) which becomes painful or threatens to become systemically debilitating [2, 3]." The Department of Defense (DoD) defines DE as “care provided for the purpose of relief of oral pain, elimination of acute infection, control of life-hazardous oral conditions and treatment of trauma to teeth, jaws, and associated facial structures [4, 5].” King and Chisick described DE as “any visit where a patient presents to the dental clinic for an unscheduled visit [1, 2].”

The most commonly reported dental statistic during military conflicts and operations other than war is the DE rate. This statistic measures the number of soldiers with dental illness and/or injury who visited military dental treatment facilities (DTFs) per a stated number of service members per a designated time period [3]. According to the most recent review, the mean DE rate among deployed, on field exercises, or in garrison U.S. military personnel since 2000 was 118.2 per 1,000 persons per year, or about 11.8% [6].

For deployed military personnel, DE can create negative outcomes related to mission success and are often associated with dangerous logistical requirements to transport personnel to DTFs [6]. Dental emergencies and treatment of DE are considered important as the incident takes the soldier away from his/her place of duty to seek dental care, and thus is not available to perform his/her particular mission [5].

For this report, the term '"oral-facial" refers to hard and soft tissues of the oral cavity, maxillofacial area, and/or the adjacent and associated structures'" such as the orbital floor (formed

127 in part by the maxilla) and parts of the neck closest to the mandible [3]. The term "oral-
128 maxillofacial" (OMF), especially "maxillofacial" implies more complex hard tissue/bone (as in the
129 maxilla) and the skin and muscles (soft tissues) of the face. Injuries (and severe disorders) of the
130 OMF region are typically not treated in a DTF. These more complex issues necessitate the care of
131 an OMF surgeon in a medical structure called a military treatment facility (MTF). Oral-facial
132 diseases such as caries, periodontitis, endodontic problems, and third molar issues, are common DE
133 issues. These are most likely to be seen first at a DTF. In addition, simple "injuries" of the oral
134 cavity like a chipped tooth or a lost restoration, resulting from (for example) a fall, are oral-facial
135 injuries and seen in DTFs. Therefore, in this report, the term oral-facial will be used instead of
136 OMF to address a larger range of concerns in DE.

137 In addition to dealing with DE, service members and military healthcare providers also must
138 address oral-facial conditions that cannot be treated in theater. These oral-facial conditions need to
139 MEDEVAC to a DTF or MTF with higher clinical expertise or better equipment. There have been
140 few studies of MEDEVAC due to oral-facial illnesses and disease from a theater of operation. A
141 study of MEDEVACS due to oral-facial diseases out of Iraq and Afghanistan in 2003-2004
142 accounted for a rate of about 4.9/10,000/year [3].

143 The objectives of this study were to assess in a deployed setting the following: 1) the
144 number of personnel presenting with DE at DTFs in theater and 2) the number of personnel
145 presenting with severe oral-facial disease that required MEDEVAC out of theater for treatment. In
146 this study, the most common categories of DE at DTFs in deployed settings were determined.
147 Additionally, the most common categories of severe oral-facial diseases that required MEDEVAC
148 out of theater for definitive treatment were determined.

149

150 **METHODS**

151 PubMed, a freely searchable database provided by U.S. National Library of Medicine of the
152 National Institutes of Health, was used to make multiple queries of published literature related to
153 DE and oral-facial diseases occurring in deployed U.S. military personnel. A literature search was
154 also performed on Google Scholar, another freely accessible web search engine used to search for
155 scholarly literature. The first step of this report was to uncover studies that quantified and
156 categorized DEs in U.S. military members in a deployed setting since 2000. Multiple synonyms for
157 DE have been used by authors, and therefore, the search strategy used 'U.S.', 'dental', 'dental
158 emergency', 'disease non-battle injury' and 'dental casualty' as key words. As stated previously,
159 restrictions were placed on year of publication (2000 onward). From these searches, we were able
160 to identify four peer-reviewed articles that span 12 years (2000-2012) that quantified the DEs.
161 The second step of this report was to identify studies that quantified and categorized serious
162 oral-facial and OMF disease among deployed U.S. military personnel requiring MEDEVAC since
163 2000. Using PUBMED and Google Scholar, the search strategy included key words 'oral-
164 maxillofacial disease', 'oral-facial disease', 'MEDEVAC' and 'air medical evacuation'. Restriction
165 on year of publication was placed with studies published in 2000 or later. Military reports
166 describing serious oral-facial or OMF illnesses in U.S. military personnel were also identified for
167 inclusion in this review. Only studies which reported the counts of DE, OMF or oral-facial
168 disease/illness among U.S. Army personnel were included in this analysis. Counts from the
169 following deployed environments were included in the search: (1) combat operations (2)
170 stabilization operations and peacekeeping deployments, and (3) other deployments, which included
171 deployments on naval vessels, joint Army and Marine training missions/exercises, and Army field
172 exercises. From these searches, we were able to identify three peer-reviewed articles that quantified
173 and categorized MEDEVACs due to serious oral-facial illnesses in U.S. Army personnel between
174 2003 and 2006.

175 Chi-squared tests were used to assess statistical differences between 1) the most common
176 DE categories and their corresponding International Classification of Disease, Ninth Revision,
177 Clinical Modification (ICD-9-CM) categories of MEDEVAC and 2) the most common ICD-9-CM
178 categories of MEDEVAC and their corresponding DE categories. Some common DE categories
179 had no exact ICD-9-CM counterpart, and vice versa, some individual DE categories were found to
180 be arbitrarily separated into two different ICD-9-CM categories, and some DE categories were
181 found arbitrarily combined and placed into a single ICD-9-CM category. Therefore, it was
182 necessary to implement a "best fit" for comparison of DE and MEDEVACs in some categories.
183 Significance was set at $\alpha = 0.05$.
184
185 **RESULTS**
186
187 ***Dental Emergencies***
188 From the four studies of DE visits to DTFs in a deployed environment since 2000 [7, 8, 9,
189 10], there were 58,675 cases of DE. Table 1 shows the frequency and breakdown of the
190 etiology/categories of DE at DTFs in theater. Caries appears as the leading cause of DE visits,
191 accounting for more than 26.1% of all cases. Endodontic issues involving the tooth pulp represent
192 20.7% of cases as the second most common reason for a DE visit. Next, broken, chipped, and
193 cracked teeth and defective restorations account for 19.4% of the total DE cases. The fourth leading
194 cause of DE visits were third molars, and they account for 10.2% of total visits. Periodontal issues
195 follow at 6.3%, then temporomandibular joint (TMJ) issues (5.6%), dentin hypersensitivity (4.0%),
196 and tooth trauma (1.1%). All other DE categories are below 0.1%. Over 50% of all DE would
197 require the basic and essential competencies of operative or restorative dentistry (caries, broken
198 teeth, defective restorations, dentinal hypersensitivity) for treatment in theater. Around one third of

all DE would require treatment beyond the expertise of the operative or restorative dentist. This more complex treatment would need to be performed by specialists, such as the endodontist, the oral-maxillofacial surgeon, or the periodontist.

Oral-Facial MEDEVACs

The results of three studies of severe oral-facial disease that had to be medically evacuated out of a deployed theater for treatment [3, 11, 12] are described in Table 2 and paint a slightly different picture. Oral pathology arises as, by far, the primary category for MEDEVAC out of theater for treatment. Over a three-year period, oral pathology accounts for almost 40% of all oral-facial disease MEDEVACs out of deployed theater. In a distant second place, ICD-9-CM code category 525 accounts for 14.7% of these types of MEDEVACs. ICD-9-CM category 525 includes 1) loss of tooth due to trauma, periodontal disease, or extraction, 2) failed, cracked, fractured or inadequate restorations, 3) (dental) implant failure, and 4) retained tooth roots. In third place (12.2%) are "diseases of the oral soft tissue (except gingiva)," which corresponds to IC-9-CM code category 528 and similar ICD-9-CM category 682. These include ulcers, cellulitis, abscesses, and cysts.

Pulpal/endodontic issues follow as the fourth leading category of oral-facial disease in MEDEVAC cases (6.5%), followed by third molar issues (6.1%), facial nerve disorders (5.7%), and "dentofacial anomalies, including malocclusion" (TMJ, skeletal issues of the maxilla and mandible) at 5.3%. It is of note that the eighth most common category of oral-facial disease MEDEVACs, at 4.9%, were for the medical category "Diseases of the hard tissues of teeth" (ICD-9-CM code 521). "Diseases of the hard tissues of teeth" include caries, chipped teeth, cracked teeth, tooth abrasion, tooth erosion and dentinal hypersensitivity. All other oral-facial MEDEVAC categories were in single digits and under 3% of total oral-facial MEDEVACs. Annual rates of

223 oral-facial disease in MEDEVAC cases for 2003-2004, 2005, and 2006 were also noted (Table 2).

224

225 ***Comparing Dental Emergencies and Oral-Facial Disease MEDEVACs***

226 The frequencies of DE visits to the DTF from 2000-2012 and oral-facial disease

227 MEDEVACs out of theater from 2003-2006 are compared in Figure 1 providing a visual aid for the

228 observations. MEDEVACs are separated into calendar years 2003-2004 and 2005-2006. Oral

229 pathology accounts for such a small frequency of DTF visits that it cannot be displayed on the

230 graph, while it is now shown, by comparison, that oral pathology is the leading category in oral-

231 facial disease MEDEVACs by a significant margin. Similarly, the third most common category in

232 MEDEVACs ─ "Diseases of the soft oral tissues"/ICD-9-CM codes 528 and 682─ displays higher

233 frequency in MEDEVACs than DTF visits for the dental category counterpart. All other categories

234 have observably higher frequencies in DTF visits than in oral-facial disease MEDEVACs.

235

236 ***Chi-Square Analysis***

237 Chi-squared analysis compared number of caries, pulpal, third molar, oral pathology,

238 defective restorations/ (tooth) trauma, and ulcers and infections to their corresponding ICD-9-CM

239 category. These categories were either among the most common DE categories or the most

240 common oral-facial disease MEDEVAC categories. Chi-Squared tests demonstrated observable

241 differences of statistical significance in certain categories. The p-values seen in Tables 3 and 4

242 resulted from the comparison of the number of visits to a DTF and number of oral-facial disease

243 MEDEVACs. Table 3 compares visits to DTFs in 2000-2012 to oral-facial disease MEDEVAC in

244 2003-2004. Table 4 compares visits to DTFs in 2000-2012 to oral-facial disease MEDEVAC in

245 2005-2006.

246 Caries and pulpal p-values reveal there is a significantly higher chance for them to be
247 treated in a DTF as opposed to be MEDEVACed out of theater for treatment. When comparing data
248 on both oral pathology and ulcers/infections, p-values revealed there is a significantly higher
249 chance for both issues to be MEDEVACed out of theater for treatment than to be treated in a DTF.
250 This is the same for Table 3 (comparing to MEDEVACS in 2003-2004) and Table 4 (comparing to
251 MEDEVACS in 2005-2006).
252 The p-values from third molar and defective restoration and (tooth) trauma tell a different
253 story. During 2003-2004 (Table 3), the p-value indicated, within the confidence interval ($\alpha = 0.05$),
254 that it was more likely to be treated in a DTF than to be MEDEVACed out for a third molar issue.
255 However, during 2005-2006 (Table 4), the p-value failed to demonstrate a statistically significant
256 difference between DTF visits and MEDEVACs. For the entirety of the observed 2003-2006 time
257 period, the p-values for defective restoration and (tooth) trauma fail to show a statistically
258 significant difference between DTF visits and MEDEVACs.
259 A further chi-squared analysis was done on the differences between the frequencies of oral-
260 facial MEDEVAC categories seen during 2003-2004 and 2005-2006. The p-values of all categories
261 fail to show a statistically significant difference between the 2003-2004 and 2005-2006
262 frequencies.
263
264 **DISCUSSION**
265 The most common category of DE that presented to military DTFs in deployed settings
266 (Bosnia, Afghanistan, and Iraq) was caries. Over one-fourth of all DE presenting to DTFs (26.1%)
267 was due to caries, followed by endodontic and pulpal issues (20.7%), broken and defective
268 restorations (19.4%) and third molar issues (10.2%).
269 Concerning oral-facial diseases and DE that could not be treated in theater and required a

270 MEDEVAC, the most common categories of MEDEVAC differ from the most common DE
271 categories at DTFs. Oral Pathology accounts for 37.1% of all oral-facial disease MEDEVACs out
272 of theater. "Other diseases & conditions of the teeth and supporting structure" (ICD-9-CM code
273 525- defective restorations, failed implants, etc.) follows in second place with 14.7% of all oral-
274 facial disease MEDEVACs. Ulcers, cellulitis, abscesses, and cysts (ICD-9-CM codes 528 and 682-
275 "diseases of the oral soft tissue [except gingiva]) appear as the third most common category at
276 12.2%.

277 Comparing the most common DE categories at DTF with the most common oral-facial
278 disease in MEDEVACs yields intriguing findings. Caries was the most common DE category
279 observed at DTF (26.1%). Compared to oral-facial disease in MEDEVACs, caries is part (along
280 with chipped/cracked teeth, dentinal hypersensitivity, etc.) of only the eighth prevalent category
281 diseases of the hard tissue of teeth (ICD-9-CM 521) at 4.9%. It should be mentioned that this is a
282 medical category created by medical personnel (and not dental personnel) as part of medical ICD-
283 9-CM coding. Endodontic and pulpal issues are the second leading category of DE at DTFs and the
284 fourth leading category of oral-facial MEDEVACS. According to a chi-squared test, there is a
285 significantly higher chance that caries and pulpal issues will be treated in a DTF than they will need
286 to be MEDEVACed out of theater for treatment. Third molars rank as the fifth most common oral-
287 facial disease in MEDEVAC category (6.1%) while it is the fourth prevalent (10.2%) oral-facial
288 disease at DTF in theater. Chi-squared testing reveals that third molar issues were statistically more
289 likely to be treated in a DTF than to be MEDEVACed only during 2003-2004.

290 Broken teeth and defective restorations rank as the third leading category of DE at DTFs
291 (19.4%). However, when it comes to broken teeth and defective restorations, medical coding
292 separates broken teeth and defective restorations into two different ICD-9-CM codes. According to
293 medical personnel, defective restorations are part of a medical ICD-9-CM category (525) "Other

294 diseases and conditions of the teeth and supporting structure" which, at 14.7%, is the second
295 leading category of oral-facial disease MEDEVACs. It is of note that the cases in the DE category
296 "Prosthodontic Failure" are placed in either this medical ICD-9-CM category (525) or in ICDCM
297 code V52.3 (Prosthetic Device). Medical coding places broken teeth into the medical IC9CM
298 category 521 "Diseases of the hard tissues of teeth" along with the DE category "caries" and the
299 DE category "dentinal hypersensitivity".

300 Looking at the leading MEDEVAC categories that are not common DE categories at DTFs,
301 two categories stand out. Oral pathology was by far the most common MEDEVAC category.
302 However, it is only the twelfth of 14 DE categories and accounts for less than 0.1%. There is a
303 significantly higher chance for oral pathology to be MEDEVACed for treatment than to be treated
304 in a DTF ($p < .00001$). This may be because most oral pathology is considered serious and most
305 general dentists do not have the expertise to treat these types of cases. Also, due to the seriousness
306 of the issue, most oral pathology cases may be routed at an MTF instead of a DTF, therefore the
307 numbers are not properly captured. Dental specialties such as an OMF surgeon or an oral
308 pathologist are more likely to be associated with an MTF than a DTF. "Diseases of the oral soft
309 tissue", such as ulcers, cellulitis, abscesses, and cysts account for 12.2% of oral-facial
310 MEDEVACS. However, ulcers and infection (cellulitis) combined account for well under 0.1% and
311 are the two lowest DE categories at DTFs. There is a significantly higher chance for "disease of the
312 soft tissue" to be MEDEVACed for treatment than to be treated in a DTF ($p < .00001$). Part of this
313 reason could be, for example, that a severe cellulitis may be routed to an OMF surgeon at the MTF
314 and bypass the DTF all together. Oral-maxillofacial surgeons at an MTF are better trained and
315 better equipped than general dentists at a DTF to diagnose and treat these conditions. Then, the
316 decision was made to evacuate the patient from the battlefield.

317 When looking at the rates of oral-facial (disease) MEDEVACs out of theater, one can tell a

318 drop in rates over time. For 2003-2004, the average yearly MEDEVAC rate was 79 cases/calendar
319 year (CY). In the early part of operations in Iraq and Afghanistan, dental assets were relatively few.
320 The immaturity of these theaters of operations increased the likelihood of MEDEVAC out of
321 theater for a dental issue. In 2005, the rate dropped to 64 cases/CY and by 2006 there was a
322 tremendous rate drop to 23 cases/CY. Over time, the theater in Iraq and Afghanistan matured.
323 More dental and dental specialty personnel were brought in to treat the patient in theater and reduce
324 the need for sending the patient out of theater. In conjunction with this, more supplies, equipment,
325 and other assets arriving in the theater did most certainly allow dental providers to provide the tools
326 necessary to properly treat patients without having to MEDEVAC certain cases out. Also, the
327 mechanisms to deploy military to theaters of operation, such as pre-deployment dental screenings
328 and treatment, continued improving over time. These improvements reduce the amount of potential
329 untreated dental issues arriving in the deployed areas, later to cause problems. These untreated
330 dental problems keep military personnel from completing their mission and take away essential
331 resources from other areas to take care of them.

332 There were limitations to the three MEDEVAC studies. It is unknown (1) how accurate the
333 diagnoses of oral-facial illness or injury were, (2) how many diagnoses were rendered by a dentist,
334 oral-maxillofacial surgeon, or other dental specialist, and (3) the level of dental training of the
335 nondental providers making the diagnoses. Also, there might have been a proper diagnosis but the
336 person entering the code(s) may not have entered the most specific or correct code [3]. It was
337 mentioned earlier that the ICD-9-CM codes were created by medical personnel. Therefore, the
338 ICD-9-CM codes did not completely correlate to dental categorization and classification. This
339 incomplete correlation and a lack of dental knowledge could lead to (ICD-9-CM) misclassification.
340 This may explain why there were so many MEDEVACS due to oral pathology in 2003-2004 and
341 not nearly as many by 2006. By 2006, there were more dental assets available to help properly

342 diagnose and classify dental conditions.

343 This review reveals that the leading categories of DE that present to DTFs in a deployed
344 setting are caries, closely followed by endodontic issues, and broken teeth/defective restorations.
345 This review also reveals that oral pathology was, by far, the leading category of severe oral-facial
346 disease that lead to MEDEVAC. The frequency of oral pathology leading to MEDEVAC was
347 greater than the second, third, and fourth leading categories combined. Due to the limited study
348 base of DE and MEDEVACS as a result of severe oral-facial diseases, additional research is needed
349 to determine their effect on the delivery of military healthcare.

350 Currently, the U.S. Army has launched a validation program that seeks to assess all medical
351 and dental go-to-war individual preparedness and competencies. This initiative is called the
352 Individual Critical Task lists (ICTLs). Deployed dental providers at a minimum must show
353 competencies in broader tasks that are not often seen or treated routinely in the DTF. Additionally,
354 dental providers should review and be comfortable treating the most common dental emergencies
355 (Top 5 DE) that they may encounter in the battle space and ensure increased proficiency. Finally,
356 providers should also be exposed to treatment and sustainment modalities for oral pathologies that
357 cause MEDEVACs. The fact that these oral conditions require MEDEVACs is of great concern
358 because in a contested battlespace, air evacuations will not always be available and will be
359 hazardous in an Anti-Access/Area Denial (A2/AD) environment.

360

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369 **Funding**: This work was supported by the Defense Health Agency (G1804).

370 **Conflict of Interest**: The authors have no conflicts of interest to report.

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Table 1. The number and frequency of dental emergencies, categorized based on data from a literature review of dental emergencies that incurred at dental treatment facilities in theater.

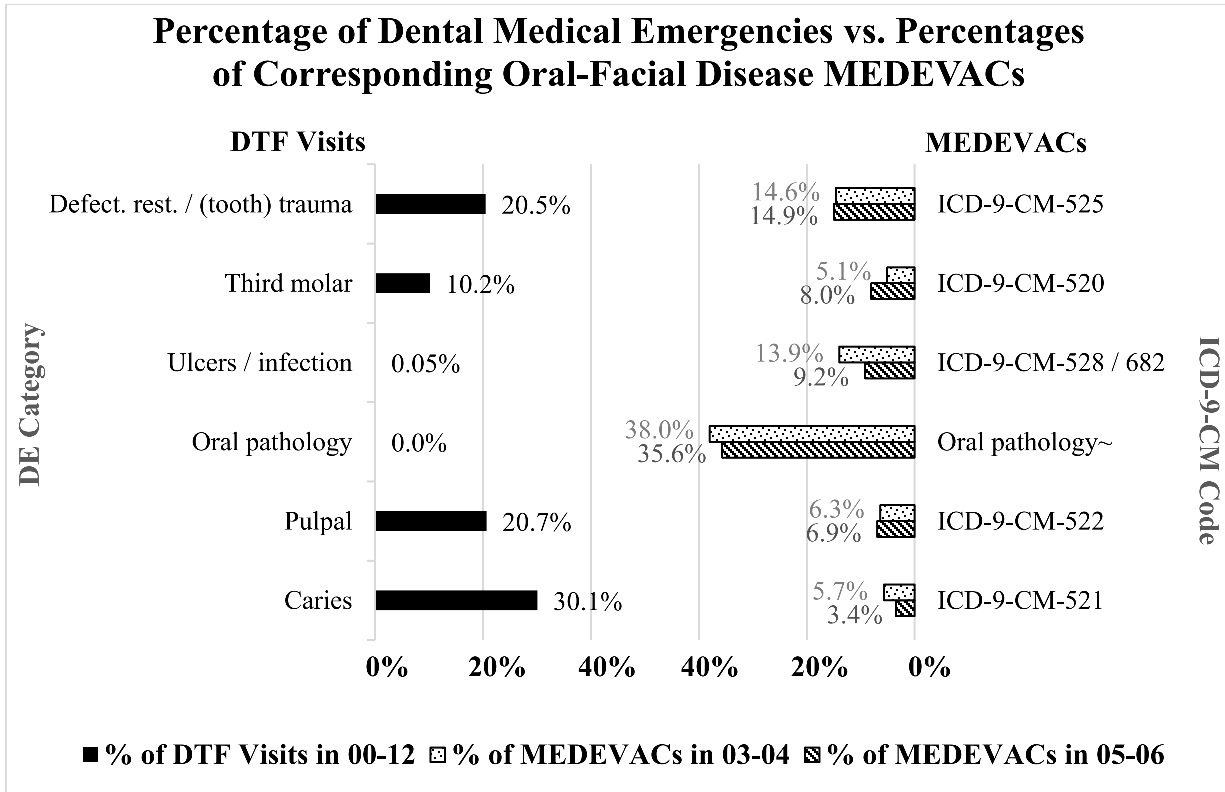
Rank	CATEGORIES	NUMBER OF CASES	%
1	Caries	15312	26.10
2	Pulpal	12123	20.66
3	Broken teeth/defective restoration	11396	19.42
4	Third molar	5959	10.16
5	Other/unspecified	3780	6.44
6	Periodontal	3676	6.27
7	Temporomandibular joint	3292	5.61
8	Dentin hypersensitivity	2345	4.00
9	Trauma	634	1.08
10	Surgical postoperative	54	0.09
11	Prosthodontic failure	47	0.08
12	Oral pathology	29	0.05
13	Aphthous ulcer	18	0.03
14	Infection	10	0.02
	TOTAL	**58675**	100

Table 2. Summary of data on oral-facial disease collected from a literature review, grouped and ranked by year, category, and their respective ICD-9-CM codes.

Rank	ICD-9-CM	CATEGORY	2003-2004^	2005*	2006*	total	%	NOTE
1	140-147,170-176, 196, 210-230	Oral pathology	60	18	13	**91**	37.1	
2	525	1) Loss of teeth due to trauma, periodontal disease or extraction; 2) failed, cracked, fractured or inadequate restorations; 3) failure of implants 4) retained tooth roots	23	12	1	**36**	14.7	Other Diseases & Conditions of the Teeth and Supporting Structure
3	528, 682	Diseases of the oral soft tissues (except gingiva)-ulcers, cellulitis, abscesses, cysts	22	7	1	**30**	12.2	
4	522	Pulpal/endodontic	10	5	1	**16**	6.5	
5	520	Third molars	8	7	0	**15**	6.1	
6	350-351	Nerve disorders (trigeminal nerve, bell's palsy, etc.)	7	5	2	**14**	5.7	
7	524	1) Orthodontic issues-skeletal; 2) Temporomandibular joint disorders	8	4	1	**13**	5.3	Dentofacial Anomalies, including Malocclusion
8	521	1) Caries, 2) cracked teeth, 3) abrasion, 4) erosion, 5) dentin issues	9	3	0	**12**	4.9	Disease of Hard Tissues of Teeth
9	523	Periodontal/gingival	5	2	0	**7**	2.9	
10	750.26	Other abnormalities of the mouth	3	0	0	**3**	1.2	
11	V 72.2	V-Code Dental Examination V 72.2	3	0	0	**3**	1.2	
12	V 53.4	V Code- Orthodontic Service V 53.4 (fixed/removable devices)	0	0	3	**3**	1.2	
13	V 52.3	V-Code- Prosthetic Device V 52.3 (Full Denture/partial denture)	0	1	1	**2**	0.8	
		TOTAL	**158 ^**	**64**	**23**	**245**		
	Rate	**MEDEVACS PER CALENDAR YEAR**	**79/year**	**64/year**	**23/year**			

^-two calendar year period
*- one calendar year

Figure 1. Comparative analysis of oral-facial diseases treated at DTF and MEDEVACed based on DTF case categories and their "best-fit" ICD-9-CM codes.



Note~ ICD-9-CM codes 140-147,170-176, 196, 210-230

Table 3. Summary of chi-squared analyses made using 2003-2004 oral-facial disease data collected from a literature review categorized by DTF case category and their "best-fit" ICD-9-CM codes.

Category	Corresponding MEDEVAC ICD-9-CM Coding Category	p-value	Confidence
Caries	ICD-9-CM-521-Disease of Hard Tissues of Teeth- **note#**	< .00001	✓
Pulpal	ICD-9-CM-522-Pulpal/Endodontic	< .00001	✓
Third molar	ICD-9-CM-520-3rd molars	0.034	✓
Oral Pathology	Oral Pathology-**note~**	< .00001	✓
Defect. Rest. & (tooth) Trauma	ICD-9CM-525-Other Diseases & Conditions of the Teeth & supporting Structure-**note***	0.064	✗
Ulcers & infection	ICD-9-CM-528,682-Diseases of the Oral Soft Tissues (except gingiva)- ***note^***	< .00001	✓

✓ = we are confident that the differences in results are not due to chance
✗ = we are not confident that the differences in results are not due to chance

note-# Caries and Dental Hypersensivity. ICD-9-CM code 521-Diseases of the Hard Tissues of Teeth combines caries and dentin issues

note~ ICD-9-CM codes 140-147,170-176, 196, 210-230

note* Broken Teeth and Defective Restorations are combined in dental
Broken Teeth and Defective Restorations are separated in medical ICD9 coding
Broken Teeth go in ICD-9-CM code 521 and Defective Restorations go in ICD-9-CM 525
Defective Restorations and Tooth Trauma are combined in medical going into ICD-9-CM 525

note-^ Includes ulcers, cellulitis, abscesses, cysts

Table 4. Summary of chi-squared analyses made using 2005-2006 oral-facial disease data collected from a literature review categorized by DTF case category and their "best-fit" ICD-9-CM codes.

Category	Corresponding MEDEVAC ICD-9-CM Coding Category	p-value	Confidence
Caries	ICD-9-CM-521-Disease of Hard Tissues of Teeth-**note#**	< .00001	✓
Pulpal	ICD-9-CM-522-Pulpal/Endodontic	0.0015	✓
Third molar	ICD-9-CM-520-3rd molars	0.385	✗
Oral Pathology	Oral Pathology-**note~**	< .00001	✓
Defect. Rest. & (tooth) Trauma	ICD-9-CM-525-Other Diseases & Conditions of the Teeth & supporting Structure- **note***	0.199	✗
Ulcers & infection	ICD-9-CM-528,682-Diseases of the Oral Soft Tissues (except gingiva)- ***note^***	< .00001	✓

✓ = we are confident that the differences in results are not due to chance
✗ = we are not confident that the differences in results are not due to chance

note-# Caries and Dental Hypersensitivity. ICD-9-CM-521-Diseases of the Hard Tissues of Teeth combines caries and dentin issues
note~ ICD-9-CM codes 140-147,170-176, 196, 210-230
note* Broken Teeth and Defective Restorations are combined in dental
Broken Teeth and Defective Restorations are separated in medical ICD-9-CM coding
Broken Teeth go in ICD-9-CM code 521 and Defective Restorations go in ICD-9-CM 525
Defective Restorations and Tooth Trauma are combined in medical going into ICD-9-CM 525
note-^ Includes ulcers, cellulitis, abscesses, cysts