Dental Readiness Classification and Treatment Provided for Dental Emergencies of Deployed Army Personnel

MAJ Martin Smallidge, DMD, MPH, MS, John W. Simecek, DDS, MPH, Timothy A. Mitchener, DMD, MPH

ABSTRACT

For nearly 30 years, the U.S. Department of Defense has used the Dental Readiness Classification (DRC) system to prioritize dental treatment to reduce dental emergencies during military operations. The first objective of this study was to determine the proportion of Dental Readiness Classification (DRC) categories of Army service members (SMs) who present for a dental emergency (DE) during military operations. The study then describes the categories of treatment conducted for the dental emergencies to understand the severity of treatment requirements by DRC. This study used existing deidentified data that were captured in the Army Corporate Dental System (CDS) during Army (combat and operational) deployments, training missions, and exercises from 2009-23. The data set included 2,914 dental emergencies. Of the dental emergencies observed, 31% were DRC 1, 39% were DRC 2, 8% were DRC 3, and 22% were DRC 4. Categories of treatment revealed statistical differences between the categories with DRC3 requiring more oral surgery and endodontic (root canal) procedures compared to DRC 1 and DRC2. The conclusion is that 70% of soldiers who present for a DE are currently categorized as DRC 1 or 2. Further research is needed to investigate the criteria to determine Dental Readiness Classification to improve dental readiness and reduce dental emergencies.

INTRODUCTION

During large-scale combat operations (LSCO), medical organizations must concentrate resources on returning soldiers to duty and minimizing medical evacuations.[1] Additionally, the Military Health System (MHS) must focus on Force Health Protection as a way of preventing disease and non-battle injuries (DNBI) through prevention, surveillance, and pre-deployment treatment that will reduce the demand for health service support in theater. To do so, the Department of Defense (DoD) must have effective tools to predict preventable DNBIs and treat those conditions before deployment.

The DoD Dental Readiness Classification (DRC) system is a tool to prioritize surveillance (a dental examination) and dental treatment by severity based on the assessment of whether current disease or condition will cause the SMs to have a DE within 12 months. The definitions of the DRC categories are as follows: DRC 3 is defined as a SM having a condition that will likely cause a DE within 12 months with the SM being considered non-deployable; DRC 2 is defined as a SM having dental conditions that are not likely to cause a DE withing 12 months; and DRC 1 is defined as a SM having no dental treatment needed. Dental Readiness Classification 4 (DRC 4) is defined as a SM who has not received a dental examination in the last 12 months.[2] The objective is to maintain 95% medical readiness, DRC 1 and 2, across the force and, ideally, to reach 100% medical readiness when a unit is deployed. [3, 4]

Despite high levels of dental readiness, decades of literature demonstrate the actual experience of DEs in deployed SMs is approximately 12% with a median of 15% and range from 26 to 437 per 1,000 personnel per year. [5, 6] Dental emergencies, also referred to as dental DNBI, cause 10-19% of visits in deployed medical treatment facilities.[7,8] If a dental team is not present at the military treatment facility, often the SM must be evacuated. Dental emergencies account for 3.2% to 16.0% of all such evacuations in military populations.[9] These observations bring into question the effectiveness of the DRC system to predict and treat DEs prior to deployment to reduce incidence of DEs, maximize return to duty, and reduce evacuations.

The effectiveness of the DRC system has been evaluated. Comparisons of DE rates by DRC have been reported as: 530-749 per 1,000 for DRC3, 145-192 per 1,000 for DRC 2, and 67-85 per 1,000 for DRC 1.[10, 11] The DRC system is effective at categorizing higher risk of DEs. However, previous studies have demonstrated that the majority of DEs do not occur in the DRC 3 population. Teweles and King reported that 41% of dental emergencies occurred in a population with "high potential for DE within one year".[11] More recent, reports observed the 11-32% of DEs are from the DRC 3 population.[12, 13] The DRC system has not demonstrated the sensitivity, high predictive value, and accuracy needed to identify potential dental emergencies to drive down DE rates, dental DNBI, to the level expected by commanders.[13,14]

The objective of this study is to determine the proportion of DRC categories of Army SMs who present for a DE during military operations. To understand the severity and treatment capability requirements, we also investigate the categories of dental treatment provided for the DEs within in each of the DRC categories.

METHODS

This study used existing deidentified data that were captured in the Army Corporate Dental System (CDS) during Army (combat and operational) deployments, training missions, and exercises from 2009-2023. Most of the data captured came from deployments, training missions and exercises outside the Continental United States (OCONUS). However, some data were captured in the Continental United States (CONUS) during exercises, such as field training exercises, and training missions. Data were collected and deidentified by personnel at the Joint Operational Medicine Information Systems (JOMIS) Program, Dental Integration Service Center (DISC).

Variables contained in the dataset include the following: Location of treatment; Year of treatment; Masked ID; Dental Readiness Classification (DRC) Before Treatment; DRC After Treatment; Current American Dental Association (ADA) Dental Terminology (CDT) Codes (up to 17) that describe the treatment rendered for the DE. The dataset contains documented dental treatment for over 81,000 active-duty Army SMs. CDT Code A0199 (used up to calendar year 2016) and W0199 (used calendar year 2017 onward) defined the patient encounter as a DE.

The CDT codes were organized according to the ADA "categories of service" to establish the treatment categories of DE. For this study, refer to the Mitchener et al. study on 2007-2009 study of DE among US military and civilian personnel during combat operations for the study dental treatment categories.[15] U.S. Army active-duty patients documented as having experienced a DE will be described by the treatment provided.

Chi-Square analysis was performed to determine if statistical differences occurred between deployable (DRC 1 "in" and DRC 2 "in") and non-deployable (first DRC 3 "in" and then DRC 4 "in") SMs among common dental treatment categories of DEs. Significance was set at $\alpha = 0.05$. Chi-Square analysis was also performed to determine if statistical differences occurred between DRC 3 Before Treatment and DRC 4 Before Treatment SMs among common dental treatment categories of DEs. Significance was set at $\alpha = 0.05$.

RESULTS

The CDS report captured 81,642 entries, from 2009 to 2023, for (routine and emergency) dental visits of U.S. Army SMs at fixed and mobile dental treatment facilities (DTFs) Outside the Continental United States or within the continental United States (CONUS). Data come from DTFs across United States Central Command (CENTCOM), United States European Command (EUCOM), the Army CONUS sites, Air Force CONUS sites, United States Southern Command (SOUTHCOM), and Korea. CENTCOM consists of countries in the Middle East, Africa, and parts of South Asia. EUCOM area of responsibility include the European continent and Russia. SOUTHCOM sites consist of those facilities in Central America, South America, and the Caribbean. Of these entries, starting in 2011, 2,914 entries had a (general) location noted, a A0199 or W1099 code for DE, a DRC in, a DRC out and CDT treatment codes listed. Table 1 shows the breakdown of DEs by location and the DRC arriving at the DTF.

Of the 2,914 DEs noted, 900 (30.9%) were DRC 1 when arriving to the DTF and 1,138 (39.1%) were DRC 2. DRC 3 "in" and DRC 4 "in" accounted for 7.9% and 22.1% of

Table 1 – Dental Readiness Category (DRC) In by Location (2011-2023)

Location	DRC1	DRC 2	DRC 3	DRC 4	Grand Total
CENTCOM/Area 1 2011-2020 (ended in 2021) (Afghanistan)	388	550	178	523	1639
CENTCOM/Area 2 (Kuwait)	212	249	27	51	539
CENTCOM/Area 3 (Iraq)	68	93	11	52	224
CENTCOM/Area 4 (UAE)	70	80	1	3	154
EUCOM (Kosovo)	71	38	4	5	118
CENTCOM/Area 5 (Saudi Arabia)	28	34	1	2	65
Army CONUS	13	38	4	1	56
CENTCOM Area 6 (Qatar)	18	21	0	4	43
Deployed Dentistry	6	24	1	3	34
Air Force CONUS	25	5	2	0	32
CENTCOM Area 7 (Sinai)	0	3	2	1	6
SOUTHCOM	0	3	0	0	3
Korea	1	0	0	0	1
Grand Total	900 (31%)	1,138 (39%)	231 (8%)	645 (22%)	2,914

DEs, respectively. It should be noted that the overwhelming number of DRC 3 and DRC 4 DEs came out of one location, CENTCOM AREA 1 (Afghanistan). In other locations, there were 1,275 DEs with DRCs 1 to 4 accounting for 40.2%, 46.1%, 4.2%, and 9.6% of DEs, respectively.

Table 2 shows the breakdown of DEs by dental treatment category and the DRC arriving at the DTF. Restorative dentistry was the most common DE procedure at 1,064 (36.5%), followed by diagnostic/preventive services (primarily examinations) at 816 (28.0%). All other dental treatment categories were below 12.5% of the total.

Table 2 – Dental Readiness Category (DRC) In by Dental Treatment Category

Dental Treatment Category	DRC1	DRC 2	DRC 3	DRC 4	Grand Total
Restorative	368	397	47	252	1064
Diagnostic & Preventative only	274	352	62	128	816
Adjunctive Services	101	153	28	79	361
Oral Surgery	59	99	37	88	283
Endodontic	22	66	51	56	195
Periodontal	33	35	2	12	82
Multiple	11	13	3	14	41
Orthodontic	21	16	0	2	39
Removable Prosthodontics	7	3	1	8	19
Fixed Prosthodontics	4	4	0	6	14
Grand Total	**900**	**1138**	**231**	**645**	**2914**

Looking at dental treatment categories by DRCs gives a different take on the matter. Using the 231 DRC 3 "in" DEs as a reference, 62 (26.8%) of DRC 3 DEs were treated by diagnostic & preventative treatment (such as a limited examination and radiographs to diagnose and possibly schedule a treatment appointment), 51 (22.1%) received endodontics, 47 (20.3%) received restorative treatment, and 37 (16.0%) received oral surgery treatment for DE.

As for the 900 DEs that were DRC 1 when arriving to the DTF, 368 (40.9%) received restorative treatment, 274 (30.4%) received only diagnostic/preventive treatment, 59 (6.6%) received oral surgery treatment for DE, and only 22 (2.4%) received endodontics. When comparing dental treatment categories of in DRC 1 vs. DRC 3, DRC 3 had a significantly higher percentages of endodontic treatment ($p < .00001$) and oral surgery treatment ($p < .00001$). A DRC 3 patient was significantly more likely to have endodontic treatment or oral surgery treatment for DE than a DRC 1 patient. However, a DRC 3 patient was significantly less likely to have restorative treatment for DE than a DRC 1 patient ($p < .00001$).

There were 1,138 DEs arriving to the DTFs in DRC 2. As for these, 397 (34.9%) received restorative treatment, 352 (30.9%) only diagnostic/preventive treatment, 99 (8.7 %) received oral surgery treatment for DE, and 66 (5.8 %) received endodontics. When comparing dental treatment categories of in DRC 2 vs. DRC 3, a DRC 3 patient was significantly more likely to have endodontic treatment ($p < .00001$) or oral surgery treatment ($p < .00001$) for DE than a DRC 2 patient. However, a DRC 3 patient was significantly less likely to have restorative treatment for DE than a DRC 2 patient ($p < .00001$).

There were 645 DEs that were DRC 4 when arriving to the DTFs. The treatment requirements for those DEs included: 252 (39.1%) received restorative treatment, 128 (19.8%) received diagnostic/preventive treatment, 88 (13.6 %) received oral surgery treatment for DE, and 56 (8.7 %) received endodontics. When comparing dental treatment categories of in DRC 4 vs. DRCs 1 and 2, a DRC 4 patient was significantly more likely to have endodontic treatment for DE than a DRC 1 patient ($p < .00001$) and a DRC 2 patient ($p = .02$). Also, a DRC 4 patient was significantly more likely to have oral surgery treatment for DE than a DRC 1 patient ($p < .00001$) and a DRC 2 patient ($p = .001$). However, there were no significant differences between the percentage of restorative treatment in DRC 4 vs. DRC 1 ($p = .4$) and in DRC 4 vs. DRC 2 ($p = .1$).

As for comparing DRC 4vs. DRC 3, a DRC 3 patient was significantly more likely to have endodontic treatment ($p < .00001$) for DE than a DRC 4 patient. However, a DRC 3 patient was significantly less likely to have restorative treatment for DE than a DRC 4 patient ($p < .00001$). There was no significant difference between the percentage of oral surgery in DRC 4 vs. DRC 3 ($p = .4$). It should be noted that DRC 4 had just 19.8% only diagnostic/preventive treatment, which is by far the lowest of any DRC. A DRC 4 patient was significantly less likely to have only diagnostic/preventive treatment for DE than a DRC 3 patient ($p = .03$), a DRC 2 patient ($p < .00001$), and a DRC 1 patient ($p < .00001$).

DISCUSSION

The current study observed that the majority of DE in the operational environment occur in the deployable population. Seventy percent (70%) of DEs were categorized as DRC 1 or 2 when they reported for a DE visit. Despite high DE rates in the DRC 3 population, only 7.9% of DEs were found to be DRC 3 when reporting to the DTF. These results confirm previous investigations, which ranged from 11-41% in various military populations and operations.[11,12, 13]

The cause of this discrepancy is the volume of DRC 1 and 2 patients versus the volume of DRC 3 patients. This is best described in a hypothetic scenario. If a battalion of 2,914 soldiers were deployed, dental readiness was 95% prior to deployment, and all soldiers had current dental exams, the unit would deploy with the following readiness: 55% (1,603) DRC 1, 43% (1,253) DRC 2, 2% (58) DRC 3, and 0% (0) DRC4. Given historic rates of DE by DRC, the commander/medical planners can expect approximately 370 DEs to occur in a 12-month deployment. If calculated using the average DE rate (12%), 350 DEs are expected. For this exercise, the DE rates by DRC were averaged from the two discussed above.[10,11] Expected DEs by DRC would then be: 122 (33%) DRC 1, 211 (57%) DRC 2, and 37 (10%) DRC 3. As the readiness of the unit approaches 100%, the amount of DRC 3 SMs drops, and a higher proportion of DEs will come from the ready force (DRC 1 and 2).

The inclusion of DRC 4 patients in this study fills an unreported gap in the literature. This study found that 22.1% of dental emergencies occur in the DRC 4 population. Observing DRC 4 patients enables an assessment of time as a factor, as the DRC 4 categories is a time dependent category rather than clinically dependent. Given the available data it is not possible to determine the proportion of DRC 4s which were previously in other categories.

Inclusion of DRC 4 impacts our medical planning scenario, as 194 SMs (2,914 / 15 months) will convert to DRC 4 monthly. By six months of deployment, 40% of the force will be DRC 4, making the DRC categories 787 (27%) DRC 1, 817 (28%) DRC 2, 88 (3.0%) DRC 3, and 1,164 (40.0%) DRC 4. The primary author was aware of a DE rate for DRC 4 found by U.S. Army Medical Command, which observed the DRC 4 DE rate in garrison to be 57 per 1,000.[15] The limitation is that garrison DE rates are often lower than deployed setting. Using this and historic DE rates by DRC, the following volume and proportion of DEs are expected at 6 months of deployment: 73 (26%) DRC1, 127 (45%) DRC 2, 15 (5%) DRC 3, and 66 (23%) DRC 4. These proportions are consistent with the outcomes of the current study, demonstrating the impact of DRC 4 conversions during deployment on expected DE rates.

This study also observed the categories of treatment rendered to treat DEs. Endodontic and oral surgery categories represent the most severe DE cases as they require the most invasive treatment requirements. Endodontic therapy, or root canals, are typically the result of extensive dental caries. Oral surgery procedures are most often required for infection of the soft tissue around third molars, extensive dental caries, or tooth fracture. One would anticipate that DRC 3 patients would have the most advanced treatment requirement. Indeed, the data revealed that 38% of DRC 3 patients treated for a DE required endodontic or oral surgery procedures compared to 9% for DRC 1 and 15% for DRC 2. What was unexpected was that 22% of DRC 4 SMs who reported with a DE required these advanced treatments. Time, again, explains this observation. SMs become DRC 4 because they are 15 months past their last dental examination.[16] Therefore, any disease or condition that can cause a DE has gone without observation and increased in risk. Further study is necessary to better understand DE rates by DRC.

The main limitation of this observational study is the lack of a total patient population. Due to the lack in data, it is not possible to calculate the DE rates by DRC. Continued study of dental emergencies is required to understand DE rates for DRC 4 SMs when deployed and the outcomes of DE visits.

CONCLUSIONS

DoD dental readiness has been nearly maximized within the current policy and dental clinical operations as the DoD maintains 95% dental readiness and deploys units at nearly 100% deployability. However, the military medical literature demonstrates that the desired outcome, to minimize DEs and evacuations, is not being reached. The current study observed that 70% of DEs in the operational environment occur within the DRC 1 and 2 population. Service members who deploy as or become DRC 3 and DRC 4 while deployed require more advanced dental treatment, endodontics, and oral surgery, than DRC 1 and DRC 2 SMs. The DoD should consider policy changes and additional research to improve the Dental Readiness Classification system to better predict DEs for Force Health Protection.

References

1. U.S. Department of the Army. Army Futures Command Concept for Medical 2028., AFC Pamphlet 71-20-12. Washington, DC: Department of the Army, 04 March 2022. https://usawc.libguides.com/ld.php?content_id=69356296
2. U.S. Department of Defense. *Oral Health and Readiness Classification System* Health Affairs Policy 02-011. (Washington DC, Department of Defense, 04 June 2002. Last accessed on 1/26/2025: https://www.health.mil/Reference-Center/Policies/2002/06/04/Policy-on-Standardization-of-Oral-Health-and-Readiness-Classifications
3. U.S. Department of Defense. *Policy on Oral Health and Readiness,* Health Affairs Policy 06-001. (Washington DC, Department of Defense, 08 January 2006).
4. U.S. Department of Defense. *Policies on Uniformity of Dental Classification System, Frequency of Periodic Dental Examinations, Active Duty Overseas Screening and Dental Deployment Standards,* Assistant Secretary of Health Affairs Policy Memo 98-021 of February 19, 1998. Last accessed on 1/26/2025:https://www.health.mil/Reference-Center/Policies/1998/02/19/Policies-on-Uniformity-of-Dental-Classification-System—Frequency-of-Periodic-Dental-Examinations—A
5. Lee L, Dickens N, Mitchener T, Qureshi I, Cardin S, Simecek J: The burden of dental emergencies, oral-maxillofacial, and craniomaxillofacial injuries in US military personnel. *Mil Med* 2019; 184(7-8): e247–52. 10.1093/milmed/usz059

6. Struthers MW, Kosaraju A, and Vandewalle KS, Dental Emergency Rates at an Expeditionary Medical Facility Supporting Operation Inherent Resolve, *Mil Med*, 2024; usae505, https://doi.org/10.1093/milmed/usae505

7. McKee KT Jr, Kortepeter MG, Ljaamo SK: Disease and nonbattle injury among United States soldiers deployed in Bosnia-Herzegovina during 1997: summary primary care statistics for Operation Joint Guard. *Mil Med* 1998; 163(11): 733–42.

8. Murray CK, Reynolds JC, Schroeder JM, Harrison MB, Evans OM, Hospenthal DR: Spectrum of care provided at an Echelon II Medical Unit during operation Iraqi Freedom. *Mil Med* 2005; 170(6): 516–20.10.7205/MILMED.170.6.516

9. 9 Qureshi I, Simecek J, Mitchener TA. A Review of Medical Evacuations Related to Dental Emergencies and Oral-Maxillofacial Injuries. *J Spec Op Med*: 2023 Apr 18: JSEQ-S0JT.

10. York AK, Moss DL, Martin GC. A longitudinal study of dental experience during the first four years of military experience. *Mil Med*. 2008 Jan 1;173(suppl_1):38-41.

11. Teweles RB, King JE. Impact of troop dental health on combat readiness. *Mil Med.* 1987 May;152(5):233-5. PMID: 3108716.

12. Simecek JW, Diefenderfer KE. An Evaluation of U.S. Navy Dental Corps Classification Guidelines, *Mil Med*, Volume 175, Issue 11, November 2010, Pages 895-900, https://doi.org/10.7205/MILMED-D-09-00252

13. Simecek JW, McGinley JL, Levine ME, Diefenderfer KE, Ahlf RL. A statistical method to evaluate dental classification systems used by military dental services. *Mil Med*. 2008 Jan 1;173(suppl_1):51-5.

14. Richardson PS. Dental Risk Assessment for Military Personnel, *Mil Med*, Volume 170, Issue 6, June 2005, Pages 542-545, https://doi.org/10.7205/MILMED.170.6.542

15. Discussion with U.S. Army Medical Command Dental Readiness Division, Mr. Brian Delfs.

16. U.S. Department of Defense. *Department of Defense Instruction 6025.19 Individual Medical Readiness Program.* (Washington DC, Department of Defense, 13 July 2022). Last accessed on 02/03/2025: https://www.esd.whs.mil/portals/54/documents/dd/issuances/dodi/602519p.pdf