

# Impact of Troop Dental Health on Combat Readiness

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Dental examinations were performed on six hundred soldiers before a 22-week noncombat deployment to an isolated area. Examinations included identification of dental conditions which the examiner felt had a high probability of precipitating a dental emergency within one year. During the deployment a record was kept of soldiers reporting for treatment of dental emergencies. Study results indicate that examining dentists were able to accurately identify dental conditions with a high potential for causing emergencies.

## Introduction

The potential of dental emergencies to reduce combat effectiveness is a major concern of military dental providers.<sup>1-3</sup> A modern military force must be able to deploy troops rapidly, engage in combat immediately, and fight a sustained battle for 30 days or more. Requirements to deploy rapidly necessitate that an austere force be employed. Every soldier is a critical asset. A reduction in preventable dental emergencies will help ensure a more effective fighting force.

Dental readiness refers to the dental health of troops sent to combat and the availability of dental personnel and equipment to provide dental care in the field. In future conflicts the availability of dental care and other combat service support may be reduced in order to deploy and supply a greater proportion of combat troops. Under such circumstances, the time lost from duty during combat as a result of dental emergencies will be increased by long distances to treatment facilities and limited transportation resources.<sup>4</sup> The importance of soldiers being able to fight without experiencing dental problems as well as constraints on the early deployment of dental units make it advantageous for all troops subject to deployment to be dentally prepared for any contingency. This study reports on the incidence of dental emergencies experienced by 600 soldiers during a 5-month noncombat exercise.

Dental examination and prioritization of dental care are the important first steps in providing dental treatment and reducing the risk of dental emergencies. All soldiers must be examined periodically to detect developing dental disease. When all dental treatment required by a soldier cannot be rendered in a timely manner, the dental examination should include identification of those conditions which may lead to a dental emergency or loss of dental structures. In this way, available dental resources can be prioritized to reduce dental emergencies, decrease suffering, and increase dental readiness. This study evaluates the accuracy of examining dentists in identifying

those dental conditions which are most likely to result in dental emergencies.

## Method

Troops of the 1st Battalion, 505th Infantry Regiment (Airborne) were deployed for 6 months to the Sinai Peninsula, Egypt, as part of the Multinational Force and Observers. During the 5 months prior to deployment an intensive program was conducted to improve the dental health of the troops being deployed. Prospective dental examination of 602 soldiers allowed their dental status to be classified in one of three categories. Dental categories used were: Category A—no dental treatment needed; Category B—needs routine dental treatment; and Category PE—high potential for dental emergency within one year.

All dentists performing dental examinations were briefed on uniform criteria for potential emergency conditions. Dental conditions which were considered to have a high emergency potential included any tooth indicated for endodontic treatment, non-restorable teeth indicated for extraction, carious teeth with a history of acute symptoms or caries within 1 mm of the dental pulp, third molars with a history of pericoronitis, and soldiers with significant untreated periodontal disease.

Accurate records were kept during the 154 days of deployment of the number of troops in the study population and the dental emergencies they experienced. The deployment involved noncombat duty with approximately one-third of the force in the field and the remainder in a garrison-like compound. Geographic restrictions inherent in the mission, the relatively small size of the force, and local security measures allowed a precise daily record of the study population size to be maintained. The same factors restricted the availability of dental care to one provider at a designated location, thereby ensuring the identification of any soldiers seeking emergency dental care. Each soldier reporting to the health facility for dental care was screened by the dentist to determine whether a dental emergency existed. An emergency dental patient was defined as a patient presenting for treatment with symptoms of pain, loss of function, or sufficient psychological concern to cause him to seek or be referred for emergency dental treatment.

A 30-item study survey form prepared by the U.S. Army Health Care Studies and Clinical Investigation Activity, Fort Sam Houston, Texas, was completed at the time of examination for each dental emergency patient. Data collected included date of visit, identification of the soldier, demographic data, duration of complaint, dental condition causing complaint, treatments rendered, disposition of patient, the patient's dental category, and whether in the examiner's opinion the condition was potentially preventable. The patient's permanent dental record was later reviewed to determine whether the condition causing the complaint had been treated or indicated for treat-

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ment. Data obtained from the study survey forms were compiled and analyzed for statistical significance.

## Results

Thirty-nine dental emergencies were experienced by 35 individuals during deployment. The number of soldiers in each dental category and the rate of dental emergencies experienced by soldiers in each category are shown in Table 1. An overall emergency rate of 160 dental emergencies per thousand troops per year was experienced by the deployed soldiers. The extensive dental treatment received by the troops prior to their deployment must be considered when interpreting these results.

Dental conditions diagnosed as responsible for emergency visits are listed in Table 2. All cases of pericoronitis involved mandibular third molars. Gingival inflammation other than pericoronitis was a secondary causative factor in eight dental emergencies but was not the primary condition diagnosed in any emergency. Only one patient was reappointed for additional treatment required by a dental emergency and that suture removal was considered a dental emergency visit. No dental patients required hospitalization or further evacuation.

Primary and adjunctive treatments rendered to dental emergency patients are reported in Table 3. The prescription of medication was the most frequently rendered treatment for dental emergency conditions. Extraction was the most frequent definitive (primary) treatment for dental emergencies.

At the time of emergency treatment a judgment was made

TABLE 1  
RATE OF DENTAL EMERGENCIES BY DENTAL CATEGORY

Dental Category	Average Troops per Day	Dental Emergencies	Emergency Rate per 1000 Troops per Year
A	247	7	67
B	260	16	145
PE	72	16	530
Totals	579	39	160

TABLE 2  
INCIDENCE OF DENTAL EMERGENCIES BY PRESENTING DIAGNOSES

Diagnosis	Incidence	Percent of Emergencies
Caries	8	20.5
Pericoronitis	8	20.5
Periapical abscess	5	12.7
Fractured tooth	4	10.2
Defective restoration	3	7.7
Endodontic complication	3	7.7
Periodontal abscess	3	7.7
Traumatic ulcer	1	2.6
Sialadenitis	1	2.6
Occlusal trauma	1	2.6
Soft tissue laceration	1	2.6
Suture removal	1	2.6
Total	39	100.0

TABLE 3  
FREQUENCY OF TREATMENT RENDERED FOR DENTAL EMERGENCIES

Type of Treatment Rendered	Primary Treatment		All Treatment	
	Freq.	%	Freq.	%
Amalgam/resin restoration	5	12.8	5	7.5
Temporary restoration	3	7.7	5	7.5
Extraction	14	35.9	14	20.9
Pulp treatment	8	20.5	8	11.9
Periodontal treatment	4	10.2	12	17.9
Prescription	3	7.7	21	31.3
Suture	1	2.6	1	1.5
Postoperative treatment	1	2.6	1	1.5
Total	39	100.0	67	100.0

TABLE 4  
INCIDENCE OF PREVENTABLE DENTAL EMERGENCIES BY DENTAL CATEGORY

Category	Preventable Emergencies	Number of Troops	Incidence Rate*
A	3	247	29
B	8	260	73
PE	15	72	497
Total	26	579	106

\* Incidence rate per thousand troops per year.

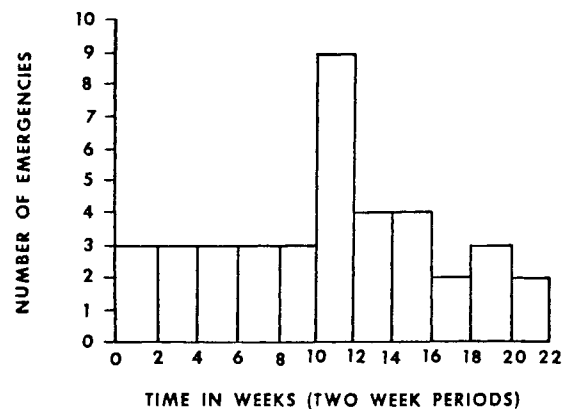


Fig. 1. Frequency distribution of dental emergencies.

as to whether the condition precipitating the emergency could realistically have been treated in a way that would have prevented the emergency. Thirteen dental emergencies (33.3%) were determined to be nonpreventable and 26 emergencies (66.7%) were judged to be potentially preventable with proper diagnosis and treatment. The incidence of preventable dental emergencies is shown in Table 4.

The distribution of dental emergencies during the 154 days of deployment (Fig. 1) showed no significant increase or decrease in the rate at which emergencies were experienced. Ten of the 11 two-week intervals displayed a range of two to four dental emergencies while nine dental emergencies were experienced during the two-week interval in the middle of the deployment.

## Discussion

The incidence rate of dental emergencies during the Sinai deployment was 160 emergency visits per thousand troops per year. This statistic should only be compared to other studies with the understanding that the Sinai population had received extensive dental treatment prior to deployment. The 39 emergencies recorded during the Sinai peacekeeping mission were "non-battle" dental emergencies and therefore represent only a portion of the dental emergencies which might be expected under combat conditions.

The 5<sup>1</sup>/<sub>2</sub>-month Sinai deployment is one of the longest studies of dental emergencies during a noncombat exercise. The fairly steady rate of dental emergencies during deployment is noteworthy. Data indicate that the dental health of the soldiers did not deteriorate significantly during the deployment despite the lack of routine dental care. Troops in the Sinai did have adequate opportunity for maintaining oral hygiene and combat stress was not a factor. Results of this study show that the dental health of a troop population prior to deployment will be a significant determinant of the dental health of the force for an extended period.

The incidence of dental emergencies experienced by soldiers not requiring any dental treatment (Category A) is an approximation of the noncombat dental emergencies which could be expected in a troop population with no dental treatment required. During the Sinai deployment, seven Category A soldiers experienced a dental emergency resulting in an incidence rate of 67 dental emergencies per thousand troops per year. The incidence rate of 70 dental emergencies per thousand per year is an indication of the minimum rate of noncombat dental emergencies which could be expected with ideal dental health of all troops.

During the Sinai deployment each dental emergency was evaluated subjectively as being preventable or nonpreventable. Thirteen (33.3%) of the 39 dental emergencies experienced during deployment were determined to be "nonpreventable" with reasonable dental care. Nonpreventable dental conditions included fractured teeth which otherwise appeared sound, fractured restorations, restored teeth which required endodontic treatment, and the results of traumatic injuries. Thirteen nonpreventable dental emergencies from the sample population represents an incidence rate of 53 noncombat dental emergencies per thousand troops per year. This rate is comparable to the nonpreventable emergency rate of 43 dental emergencies per thousand troops per year reported by Payne and Posey<sup>1</sup> during a noncombat field exercise.<sup>4</sup> Sixty-seven percent of dental emergencies during the study were determined to have been preventable if known dental conditions had been treated prior to deployment.

Comparison of the incidence of preventable dental emergencies between the three dental treatment categories in which the soldiers were placed prior to deployment (Table 4) provides some insight into the possible benefits of dental treatment in reducing dental emergencies. One-fifth of the soldiers diagnosed as having potential emergency conditions reported for treatment of a preventable emergency during the 5<sup>1</sup>/<sub>2</sub> months of deployment. Soldiers in the potential emergency category experienced preventable dental emergencies at 17 times the rate of soldiers with no dental treatment required. If only

soldiers requiring dental treatment at the time of deployment are considered, the soldiers diagnosed as having potential emergency conditions reported for emergency treatment 7 times as frequently as soldiers requiring only routine care.

The benefit of treating potential emergency conditions is even greater than the previous group statistics would indicate. Only a fraction of the total dental treatments required by potential emergency category soldiers were for potential emergency conditions. If the potential emergency conditions had been treated, these soldiers could have been expected to have approximately the same number of preventable dental emergencies as other soldiers requiring only routine care.

A retrospective collection of data from dental records revealed that 1459 dental conditions were indicated for treatment at the time of deployment, of which 157 were classified as potential emergency conditions. Thirteen of the 157 potential emergency conditions resulted in an emergency visit while the remaining 1302 routine treatments were associated with five emergency visits. Potential emergency conditions were associated with dental emergency visits during deployment 21 times as frequently as conditions indicated for routine treatment. This statistic would suggest that experienced dental examiners can accurately identify potential dental emergency conditions.

Dental emergencies experienced during the Sinai deployment permit evaluation of the potential emergency criteria utilized during the predeployment examination program. Eight cases of pericoronitis were responsible for dental emergency visits but only one of the mandibular third molars involved had been indicated for extraction. This experience shows that all third molars exposed to oral fluids and partially covered by soft tissue should be closely evaluated as possible potential emergency conditions. Evaluation of carious lesions indicated that caries within 1 mm of the dental pulp would be a conservative criterion for nonsymptomatic teeth. Teeth requiring endodontic treatment, including teeth with pulpotomies, are a significant source of dental emergencies.

Dental emergencies are a military problem whether they occur during training or combat. This study indicates that potential dental emergency conditions can be accurately identified during routine dental examinations and that potential emergency conditions result in a significant percentage of preventable dental emergencies.

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## References

1. Payne TF, Posey WR: Analysis of dental casualties during field training exercises. *Milit Med* 146:265-271, 1981
2. Parker WA, King JE, Brunner DG: Assessment of the relationship between past dental experience and dental sick call in the field, in *Dental Studies Office Report #81-013*. Ft. Sam Houston, TX, USAHSC, 1981
3. Grover PS, Carpenter WM, Allen, GW: Predictability of dental emergencies by panography. *Milit Med* 148:148-150, 1983
4. Cassidy JE: The problem is elephants. *J Am Soc Prev Dent* Oct 7-10, 1970