

The author hereby certifies that the use of any copyrighted material in the thesis manuscript entitled:

The Effects of Tobacco Risk on the Dental Readiness of Soldiers in Fort Bragg

is appropriately acknowledged and, beyond brief excerpts, is with the permission of the copyright owner.



SA Anna Yoo
2-YR AEGD Program, Fort Bragg, NC
Uniformed Services University, Bethesda, MD
Date: 01 June 2017

Distribution Statement

Distribution A: Public Release.

The views presented here are those of the author and are not to be construed as official or reflecting the views of the Uniformed Services University of the Health Sciences, the Department of Defense or the U.S. Government.

Submitted by **Anna Yoo** in partial fulfillment of the requirements for the degree of Master of Science in Oral Biology. Accepted on behalf of the Faculty of the Graduate School by the thesis committee:

24 MAY 17
Date



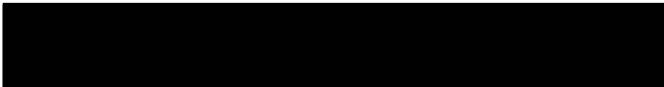
Manuel Pelaez, DMD
Research Mentor

24 May 17
Date



Jason Bullock, DMD
AEGD Assistant Director

24 May 17
Date



Stacy Larsen, DDS
AEGD Program Director

IRBNet Number:
PI:
Protocol Title:
Initial Date Submitted:
Revision Date:

**Request for Determination for Research Meeting the Criteria for
Research Not Involving Human Subjects (RNIHS)**

**1.0 PROTOCOL TITLE: THE EFFECTS OF TOBACCO RISK ON THE DENTAL
READINESS OF SOLDIERS IN FORT BRAGG**

2.0 PRINCIPAL INVESTIGATOR:

Name: Anna Yoo, DMD

Title: CPT

Department: U.S.A. DENTAC 2yr Advanced Education in General Dentistry (AEGD)

Name/Address of Institution: Smoke Bomb Hill Dental Clinic, Fort Bragg, NC 28310

Phone: (910) 643-2584

Outlook Email: anna.yoo.mil@mail.mil

2.1 OTHER INVESTIGATORS:

Name: Manuel Pelaez, DMD, MS

Title: LTC

Department: Periodontics, 2-yr AEGD

Name/Address of Institution: Smoke Bomb Hill Dental Clinic, Fort Bragg, NC 28310

Phone: (910) 396-4920

Outlook Email: manuel.pelaez2.mil@mail.mil

IRBNet Number:
PI:
Protocol Title:
Initial Date Submitted:
Revision Date:

3.0 RESEARCH NOT INVOLVING HUMAN SUBJECTS DETERMINATION Please double click on the box that applies to your research and mark the “check” box.

- 3.1. Is the activity a **systematic** investigation **designed** to develop or contribute to **generalizable** knowledge? 32 CFR 219.102(d) *Generalizable knowledge consists of theories, principles, or relationships (or the accumulation of data on which they may be based) that can be corroborated by accepted scientific observation and inference that is applicable to other related situations, populations, or devices outside of the tested situation.*
- No. Activity is not research and does not require Clinical Investigation Service oversight.
- Yes. Proceed to 3.2. Because you are making a request for Research Not Involving Human Subjects determination, this should be checked “yes.”
- 3.2 Does the research involve obtaining information about living individuals? 32 CFR 219.102(f)
- No. Activity is Research Not Involving Human Subjects. *Cadaver studies or animal studies would fall into this category.*
- Yes. Proceed to 3.3. This would almost always be checked “yes.”
- 3.3. Does the research involve **intervention** or **interaction** with the individuals? 32 CFR 219.102(f). Intervention or interaction is some form of contact with the study subject.
- Yes. Activity is Human Subjects Research. Please contact usarmy.bragg.medcom-wamc.list.wamc-irb-admin@mail.mil for further instructions. You will have to submit your proposal as an “exempt” protocol or standard protocol application.
- No. Proceed to 3.4.
- 3.4. Though you are not interacting or intervening with a living individual, you will be using their information. Is this information individually identifiable by the research team at any time?
- No. **Activity is Research Not Involving Human Subjects** and therefore does not require IRB approval. *This is the box that you will most likely check.*
- Yes. Proceed to 3.5.
- 3.5. Is the information private? 32 CFR 219.102(f)
- Yes. Activity is Human Subjects Research. Please contact usarmy.bragg.medcom-wamc.list.wamc-irb-admin@mail.mil for further instructions. You will have to submit your proposal on an “exempt” protocol or standard protocol application.
- No. **Activity is Research Not Involving Human Subjects** and therefore does not require IRB approval. *This would be information that is available in the public domain.*

IRBNet Number:
PI:
Protocol Title:
Initial Date Submitted:
Revision Date:

4.0 EXPECTED COMPLETION DATE FOR STUDY (INCLUDING DATA ANALYSIS):

May 2017

5.0 SUMMARY:

Fort Bragg is the home of the United States Army Airborne and Special Operations Forces, and has the largest number of soldiers in the nation. The soldiers are expected to be ready to deploy at a moment's notice, but the high rate of tobacco usage amongst the soldiers may present a problem due to significant effects of tobacco products on their oral wellness. The purpose of this research is then to investigate the correlation between tobacco usage and dental readiness of the soldiers in Fort Bragg. The result could be utilized to support tobacco cessation programs and to facilitate patient education tremendously.

5.1 DATA COLLECTION METHODOLOGY AND STATE THE STUDY

HYPOTHESIS OR RESEARCH QUESTION:

For this study, data will be collected by utilizing the Corporate Dental System (CDS). Patient appointment data will be queried for patients that were scheduled under the researcher encompassing the time period between September 2014 and September 2016. The research question is to find whether there is a correlation between tobacco usage and dental readiness of the soldiers in Fort Bragg.

5.2 DESCRIBE THE TYPE OF DATA OR SPECIMENS TO BE STUDIED:

The data from the CDS was used for analysis. The CDS is the Army Dental Corps' primary database to record and store patient information. This database was created in 1999 and implemented throughout the United States Army Dental Command (DENCOM) dental treatment facilities to record dental workload information. The CDS Web Scheduler can display patient's past, present, and future appointments. Each patient's dental history, current dental treatment needs, and dental status can be queried from the CDS.

5.3 NUMBER OF PARTICIPANTS:

Approximately 1000 patient data will be collected for study.

5.4 DESCRIBE ANY CODING OF DATA OR SPECIMENS, INCLUDING INFORMATION ON WHO HOLDS THE KEY TO THE CODE:

None.

5.5 MILITARY RELEVANCE:

If a positive significant relationship could be found between the use of tobacco and a soldier's dental readiness classification, the result of the study can be utilized to support tobacco cessation programs and to facilitate patient education throughout the U.S. Army.

5.6 MEDICAL APPLICATION:

Same as above (5.5)

IRBNet Number:
PI:
Protocol Title:
Initial Date Submitted:
Revision Date:

6.0 PUBLICATION REQUIREMENTS: Proper WAMC publication clearance is required prior to all presentations, abstracts, and publications. The following require WAMC approval: reports involving WAMC subjects and/or patients, reports that cite WAMC in the title or byline, reports of WAMC approved clinical investigation or research, reports of research performed at WAMC, and reports of research conducted by WAMC assigned personnel.

The investigators will obtain proper OTSG publication clearance prior to all presentations, abstracts, and publications that involve traumatic brain injury, post-traumatic stress, poly-pharmacy, pain, or suicide.

The investigators must provide to the Department of Clinical Investigation a listing of presentations, abstracts, and publications arising from the study.

IRBNet Number:
PI:
Protocol Title:
Initial Date Submitted:
Revision Date:

7.0 SIGNATURES:

I verify that the contents of this proposal are accurate and that I have read and agree to comply with the statements above which outline my responsibilities as a Principal Investigator.

[Redacted Signature]

Principal Investigator Signature

Name and Date: CPT Anna Yoo, DMD 11 FEB 2016

6.1 OTHER SIGNATURES FOR APPROVAL:

I concur with the submission of this proposal to the Department of Clinical Investigation for review and approval.

[Redacted Signature]

11 FEB 2016

Service Chief Signature

Name and Date: _____

[Redacted Signature]

Department Chief Signature

Name and Date: SPACY L. LARSEN, COL, DC

Regulatory Affairs Review

[Redacted Signature]

10 JAN 2016

Name and Date Karen Gonzalez Torres, MD, DC

Scientific Review

[Redacted Signature]

10 JAN 2016

Name and Date Karen Gonzalez Torres, MD, DC

The Effects of Tobacco Risk on the Dental Readiness of Soldiers in Fort Bragg

CPT Anna Yoo, DC, USA

Submitted in partial fulfillment of the requirements for the degree of Master of Science in the
Department of Oral Biology in the Uniformed Services University of Health Sciences
Fort Bragg, NC
2017

Submitted by **Anna Yoo** in partial fulfillment of the requirements for the degree of Master of Science in Oral Biology. Accepted on behalf of the Faculty of the Graduate School by the thesis committee:

Date

Manuel Pelaez, DMD
Research Mentor

Date

Jason Bullock, DMD
AEGD Assistant Director

Date

Stacy Larsen, DDS
AEGD Program Director

TABLE OF CONTENTS

ACKNOWLEDGMENTS.....	iv
ABSTRACT.....	v
INTRODUCTION.....	1
MATERIALS AND METHODS.....	3
RESULTS.....	4
DISCUSSION.....	7
CONCLUSION.....	10
REFERENCES.....	11
COPYRIGHT.....	13

ACKNOWLEDGMENTS

I would like to express my sincere gratitude to my AEGD Program Director, COL Larsen; Assistant Director, MAJ Bullock; Research Mentors, LTC Pelaez and LTC Gilbert; and Statistician, Mr. Thomas Beltran for their guidance, support, and developmental assistance throughout the duration of my research project. Thanks to my classmates and staff, dental assistants, and laboratory assistants.

Above all, I would like to thank my husband Sichang for his personal support and great sacrifice without which I would have not been able to successfully complete this program.

ABSTRACT

Statement of the problem: Dental problems caused by tobacco usage may affect the Dental Readiness Classification (DRC) status of the soldiers in Fort Bragg, North Carolina.

Purpose: To investigate the correlation between tobacco usage and the DRC status of the soldiers in Fort Bragg, North Carolina

Materials and Methods: The present study collected data from the Corporate Dental System (CDS). Patient appointment data were queried for patients that were scheduled under the researcher encompassing the time period between September 2014 and September 2016.

Results: Results indicate that there is a positive relationship overall between the use of tobacco and a patient's DRC, $r_s(1150) = 0.06, p = 0.046$. Examining the different tobacco types revealed a significant relationship between smoking tobacco and a patient's DRC, $r_s(820) = 0.10, p < 0.01$. However, no significant relationship was found between DRC and use of smokeless tobacco, $p = 0.31$. Likewise, no significant relationship was found between DRC and reported use of both smokeless and smoked tobacco, $p = 0.17$. The patients with the highest DRC identified as smokers, whereas among the tobacco users, patients who identified as smokeless tobacco users had lowest DRC.

Conclusion: There is a positive relationship overall between the use of tobacco and a patient's Dental Readiness Class. This finding suggests that soldiers who report tobacco use have a higher Dental Readiness Class than soldiers who report no tobacco use, which means that their dental readiness and deployability could be affected negatively with tobacco usage.

INTRODUCTION

Dental problems caused by tobacco usage have been well studied and documented. The adverse attributions of tobacco usage to oral health range from as minor as bad breath and stained teeth to as serious as to oral cancer. A plethora of studies support the fact that tobacco usage causes gum disease, tooth loss, dental caries, and oral cancer.

Tobacco usage in the United States military increased tremendously during World War I when tobacco companies started to distribute tobacco products to soldiers. Despite the United States military's effort to implement tobacco cessation programs due to concerns of the soldiers' health readiness, the association between tobacco usage and military has persisted to the present day.

Fort Bragg is the home of the United States Army Airborne Forces and Special Forces, and has the largest number of soldiers in the nation. The soldiers are expected to be ready to deploy moment's notice, but the high rate of tobacco usage amongst the soldiers may present a problem due to significant adverse effects of tobacco products on their oral wellness.

The purpose of this research study is then to investigate the correlation between tobacco usage and dental readiness of the soldiers in Fort Bragg. If the correlation between tobacco usage and dental readiness of the soldiers can be clearly identified, the result could be utilized to support tobacco cessation programs and to facilitate patient education tremendously.

Tobacco Usage and Oral Problems

Aguilar-Zinser et al.¹ observed that there is an interaction between oral hygiene and tobacco usage, and the prevalence of large caries increased as the number of cigarettes per day increased. The authors concluded that tobacco usage was an indicator of poor health behaviors

which would lead to dental caries. Hugoson et al.² confirmed in their study that there was a significant difference between tobacco users and non-users in terms of dental visits and oral hygiene behaviors. Non-users visited the dentist more regularly and brushed their teeth more frequently than tobacco users. Homen et al.³ states that caries is a multi-factorial disease with life-style, socio-economic, and socio-demographic gradients, and the tobacco usage is a clearly associated co-variable in this complex. Furthermore, Wasti et al.⁴ found that tobacco usage in any form substantially increased the risk for dental caries. They postulated that the changes in oral micro-flora owing to tobacco usage may play a critical role in the initiation and progression of dental caries.

Reports from the Oral Cancer Foundation⁵ state that one person dies from oral cancer every hour with about 132 newly diagnosed cases each day in the United States alone. Oral squamous cell carcinoma is one of the ten most common cancers worldwide.⁶ Tobacco products have been identified as a major etiology to this potentially devastating disease, and the evidence of this association has been shown in many studies. Warnakulasuriya et al.⁷ studied the effects of tobacco usage and tobacco cessation on a variety of oral disease and found that the risk of oral cancer was high among smokers. They found that the oral cancer risk estimate was 3.43 times higher in smokers compared with non-smokers. Moreover, in a study performed by Negri et al.⁸, the single factor with the highest attributable risk to oral cancer was smoking, which accounted for over 80 percent of oral cancers in males and for nearly 50 percent in females.

Research has also demonstrated that tobacco usage is a significant risk factor for the development and progression of periodontal disease.^{9,10,11,12} It was found that tobacco users are two to fourteen times likely to develop periodontal disease than non-smokers.^{13,14} Studies have also revealed a significant positive association between periapical pathosis and tobacco usage.¹⁵

Dental Readiness Classification

According to the Oral Health and Readiness Classification System¹⁶ established by the Department of Defense, patients with a current dental exam, who do not require dental treatment are classified as Dental Readiness Class (DRC) 1 and are worldwide deployable. DRC 2 patients have a current dental examination but require non-urgent dental treatment for oral conditions, which are unlikely to result in dental emergencies within 12 months. These patients are also worldwide deployable. On the other hand, DRC 3 patients are not deployable because they require urgent or emergent dental treatments for conditions such as extensive dental caries, symptomatic tooth fracture, defective restorations that cannot be maintained by the patient, cancerous oral lesions, periodontal abscess and infections, or active moderate or advanced periodontitis. DRC 4 patients require a dental exam, including those requiring annual or other required dental examinations. These patients are also not deployable until they receive a dental exam.

MATERIALS AND METHODS

The present study collected data from the Corporate Dental System (CDS). The CDS is the Army Dental Corps' primary database to record and store patient information. This database was created in 1999 and implemented throughout the United States Army Dental Command (DENCOM) dental treatment facilities to record dental workload information.¹⁷ The CDS Web Scheduler can display patient's past, present, and future appointments. Each patient's dental treatment history, current dental treatment needs and dental status can be queried from the CDS.

Patient appointment data were queried for patients that were scheduled under the researcher encompassing the time period between September 2014 and September 2016. All

patients who have received treatment from the researcher were included in the study. For each patient, gender, patient type, military rank, tobacco history, DRC history, and current DRC status, present High Caries Risk (HCR) status and Periodontal Screening and Recording (PSR) were retained for analysis.

Appointment data from 1182 patients were reviewed for this study. One patient was removed for lack of complete data, leaving 1181 for analysis. A series of Spearman's rank-order correlations were used to address the main research question of whether or not tobacco use is correlated with dental readiness. Kruskal-Wallis tests were used to analyze potential differences in DRC, HCR, and PSR based on subgroups such as military rank and tobacco type.

To mitigate Type I error inflation in cases of multiple comparisons, the a priori alpha level was corrected using the Bonferroni adjustment. A p-value <0.05 was considered to indicate statistical significance for all tests. All data were analyzed with IBM SPSS version 22 (IBM Corporation, Armonk NY, USA).

RESULTS

Among the 1182 patients whose appointment data were analyzed, 89.4% (n = 1057) were male, and 10.6% (n = 125) were female. The majority of patients (n = 1060) were listed as being on Active Duty (AD) status; while the remainder (n = 121) consisted of civilians, retirees, National Guard, Reserves, or foreign military. Enlisted service members comprised the majority of the AD patients (87%, n = 922). Only 13.0% (n = 138) of patients were listed as AD officers. Table 1 shows the breakdown of participants by service branch and rank.

Table 1. Participant Military Status by Rank

	Rank	Army	Navy	Air Force	Marines	Total
Active Duty						
Enlisted						
	E1 - E4	320	4	1		325
	E5 - E7	522	8	3		533
	E8+	48				48
Warrant Officer						
	CW1 - CW5	16				16
Officer						
	O1	3				3
	O2	11				11
	O3	83			1	84
	O4+	40				40
Other						
	Retiree					28
	Civilian					2
	Army National Guard					20
	Army Reserve					70
	Foreign Military					1
Total						1181

More than half 55.5% (n = 654) of the patients were found to have been in DRC3 at some point. However, only 16.0% (n = 189) were in DRC3 or 4 at the time of their appointment.

Table 2 shows the DRC at the time of the appointment for patients by self-reported tobacco use.

The DRC at the time of the appointment was available and applicable to 97.3% (n = 1150) of the patients. The DRC system was not applicable for 28 retiree, 2 civilian, and 1 foreign military patients, and therefore they were excluded.

Table 2. DRC by Tobacco Use

DRC	Tobacco Use		Total
	Yes	No	
1	260	289	549
2	216	197	413
3	10	6	16
4	93	79	172
Total	579	571	1150

The patients were almost evenly split among self-reported tobacco users (50.3%, n = 594) and those who denied any tobacco use (49.7%, n = 587). Patients who reported tobacco use were sub-grouped by the type of tobacco used. The majority of tobacco users were classified as smokers (42.9%, n = 256). Individuals who reported only using smokeless tobacco comprised 23.6% (n = 140) of the sample and those who reported smoking tobacco and using smokeless tobacco made up 33.4% (n = 198) of the sample.

Results indicate that there is a positive relationship overall between the use of tobacco and a patient's DRC, $r_s(1150) = 0.06, p = 0.046$. This indicates that individuals who report tobacco use have a higher DRC than individuals who report no tobacco use. Examining the different tobacco types revealed a significant relationship between smoking tobacco and a patient's DRC, $r_s(820) = 0.10, p < 0.01$. However, no significant relationship was found between DRC and use of smokeless tobacco, $p = 0.31$. Likewise, no significant relationship was found between DRC and reported use of both smokeless and smoked tobacco, $p = 0.17$.

A Kruskal-Wallis test was conducted to evaluate differences between officers and enlisted service members among tobacco usage, DRC, HCR, and PSR. The test was significant for tobacco usage $\chi^2(1, N = 1177) = 16.15, p < 0.001, \eta^2 = 0.01$; DRC $\chi^2(1, N = 1149) = 5.08, p = 0.02, \eta^2 < 0.01$; and HCR $\chi^2(1, N = 1178) = 20.18, p < 0.001, \eta^2 = 0.02$. Results indicate that enlisted service members are more likely to report using tobacco, have higher DRC ratings, and

higher HCR status than officers. However, it should be noted that the eta squared effect size indicated that these relationships are weak. Thus while statistically significant, the differences may not be practically relevant. No significant difference was found between officers and enlisted service members on PSR.

A Kruskal-Wallis test was conducted to evaluate differences between the types of tobacco use (smoke, smokeless, or both) among patients' DRC, HCR, and PSR. The test was significant for current DRC status $\chi^2(1, N = 577) = 8.12, p = 0.02, \eta^2 = 0.01$. Post-hoc tests were conducted to examine pairwise differences among the three tobacco use types. The patients with the highest DRC identified as smokers, whereas among the tobacco users, patients who identified as smokeless tobacco users had lowest DRC. Results are shown in table 3.

Table 3. Mean DRC by Tobacco Type

Tobacco Type	N	Mean	SD
Smoke	246	2.0	1.1
Smokeless	138	1.7	1.0
Both	193	1.9	1.0
Total	577	1.9	1.0

DISCUSSION

Results indicate that there is a positive relationship overall between the use of tobacco and a soldier's DRC. This finding suggests that soldiers who report tobacco use have a higher DRC than soldiers who report no tobacco use, which means that their dental readiness and deployability could be affected negatively with tobacco usage.

Furthermore, examining the different tobacco types displayed that there is a significant relationship between smoking tobacco and a soldier's DRC; however, no significant relationship was found between DRC and use of smokeless tobacco. Smokeless tobacco consumption has been considered as a major risk factor for oral cancer, but its role as a risk factor for caries or

periodontal disease is less well documented when compared to that of relationship between cigarette smoking and oral health. This suggests that use of tobacco alone does not affect DRC but rather the method of tobacco use (smoking) affects one's DRC.

Comparing demographics of the AD soldiers in this study and demographics of the AD soldiers in the U.S. Army, similarities could be found. Among all the AD soldiers whose data were analyzed in this study, 87% were enlisted service members while 13% were listed as officers. Eighty-nine percent of the AD soldiers were male and 11% were female. According to the 2014 Demographics Report by the Office of the Deputy Assistant Secretary Defense¹⁸, there are 85% AD male soldiers and 15% AD female soldiers in the U.S. Army. Enlisted AD service members comprised the majority, 76% of the U.S. Army, while 24% are AD officers.

It is of note to recognize that half of the patients in this study were self-reported tobacco users (50.3%, n = 594) and that more than half of the patients (55.5%, n = 654) were found to have been in DRC 3 and non-deployable at some point in their Army careers. Although smoking rates decline in the civilian side, the association between tobacco usage and military has persisted and still remains high.

Before a conclusion can be drawn, it is reasonable to anticipate human errors and limitations of this study. Upon a comprehensive or annual periodic evaluation exam is completed, a soldier's caries risk, tobacco risk, PSR scores, and treatment needs are entered into the CDS. During this process, inaccurate data could be entered into the system by mistake. Moreover, a patient may hesitate to provide an honest answer to the tobacco question in an attempt to please the provider. Furthermore, dental providers may use different standards or system when assigning DRC to patients. For example, provider A may assign DRC 2 for a

patient with a moderately sized caries. Provider B may postulate that the same lesion would become a larger caries that would infiltrate into the pulp and assign DRC 3 for the patient.

According to the World Health Organization¹⁹, oral health is defined as a state of being free from mouth and facial pain, oral and throat cancer, oral infection and sores, periodontal disease, tooth decay, tooth loss, and other diseases and disorders that limit an individual's capacity in biting, chewing, smiling, speaking, and psychosocial wellbeing. Tobacco usage is one of many risk factors for oral disease that affects a soldier's dental readiness, but it is a common risk factor for oral diseases. Other risk factors include an unhealthy diet, harmful alcohol use, poor oral hygiene, and social determinants. Tobacco usage, harmful alcohol use, and unhealthy diet are also risk factors for the four leading chronic diseases – cardiovascular diseases, cancer, chronic respiratory disease, and diabetes – and oral diseases are often linked to chronic disease¹⁹.

According to the DRC report for Fort Bragg for the month of September 2016²⁰ shown in Table 4, there is a total number of 40,456 soldiers assigned to 5 different dental treatment facilities (DTF) in Fort Bragg, and about 1 percent (n=396) of the soldiers have DRC of 3 and are not ready to deploy. One percent of soldiers may seem small in relation to the whole population, but every soldier who is suffering from severe oral disease or condition, and therefore not fit to deploy, is one too many.

Table 4. Complete DRC Report for Fort Bragg as of September 2016²⁰

DTF	DRC 1	DRC 2	DRC 1(%)	DRC 1&2(%)	DRC 3	DRC 4	DRC 3&4(%)	Total	Deployed	Deployed (%)
Davis	4744	2656	61.89%	96.54%	54	211	3.46%	7665	740	9.65%
Smoke Bomb Hill	5248	3927	51.30%	89.68%	119	937	10.32%	10231	111	1.08%
Joel	4571	3546	54.13%	96.13%	65	262	3.87%	8444	1	0.01%
Laflamme	6314	6378	47.91%	96.30%	153	335	3.70%	13180	0	0.00%
Pope	697	222	74.47%	98.18%	5	12	1.82%	936	2	0.21%
Total	21574	16729	53.33%	94.68%	396	1757	5.32%	40456	854	2.11%

Moreover, it is important to emphasize that more than half of the patients in this study were found to have been in DRC 3 and non-deployable at some point in their Army careers.

Preventing rather than treating oral disease should be valued more in the Army.

CONCLUSION

There is a positive relationship overall between the use of tobacco and a patient's Dental Readiness Class. This finding suggests that soldiers who report tobacco use have a higher Dental Readiness Class than soldiers who report no tobacco use, which means that their dental readiness and deployability could be affected negatively with tobacco usage.

REFERENCES

- ¹ Aguilar-Zinser, V., M.e. Irigoyen, G. Rivera, G. Maupomé, L. Sánchez-Pérez, and C. Velázquez. "Cigarette Smoking and Dental Caries among Professional Truck Drivers in Mexico." *Caries Research* 42, no. 4 (2008): 255-62.
- ² Hugoson, Anders, Lena Hellqvist, Margot Rolandsson, and Downen Birkhed. "Dental caries in relation to smoking and the use of Swedish snus: epidemiological studies covering 20 years (1983–2003)." *Acta Odontologica Scandinavica* 70, no. 4 (2012): 289-96.
- ³ Holmén, Anders, Ulf Strömberg, Kerstin Magnusson, and Svante Twetman. "Tobacco use and caries risk among adolescents – a longitudinal study in Sweden." *BMC Oral Health* 13, no. 1 (2013).
- ⁴ Wasti, A., G. Dhani, and N. Rathode. "Effect of nicotine on cariogenic micro-organism: A pilot study." *Journal of Oral and Maxillofacial Pathology*, 46, no. 18 (2014).
- ⁵ O "Oral and oropharyngeal cancer information." The Oral Cancer Foundation. Accessed March 30, 2017. <http://www.oralcancer.org/>.
- ⁶ Scully, C., and D. H. Felix. "Oral Medicine — Update for the dental practitioner Oral Cancer." *British Dental Journal* 200, no. 1 (2006): 13-17.
- ⁷ Warnakulasuriya, S., T. Dietrich, M. M. Bornstein, E. C. Peidro, P. M. Preshaw, C. Walter, and J. Bergstrom. "Oral health risks of tobacco use and effects of cessation." *International Dental Journal* 60, no. 1 (2010): 7-30.
- ⁸ Negri, E., C. La Vecchia, and S. Franceschi. "Attributable risk for oral cancer in northern Italy." *Cancer Epidemiol Biomarkers* 2, no. 3 (1993): 189-193.
- ⁹ Albandar, Jasim M. "Global risk factors and risk indicators for periodontal diseases." *Periodontology* 2000 29, no. 1 (2002): 177-206.
- ¹⁰ Bergström, Jan, and Hans Preber. "Tobacco Use as a Risk Factor." *Journal of Periodontology* 65, no. 5s (1994): 545-50.
- ¹¹ Ogawa, Hiroshi, Akihiro Yoshihara, Toshinobu Hirotomi, Yuichi Ando, and Hideo Miyazaki. "Risk factors for periodontal disease progression among elderly people." *Journal of Clinical Periodontology* 29, no. 7 (2002): 592-97.
- ¹² Rivera-Hidalgo, F. "Smoking and periodontal disease." *Periodontology* 2000 32 (2003): 50-58.
- ¹³ Grossi, S.g., R.j. Genco, E.e. Machtet, A.w. Ho, G. Koch, R. Dunford, J.j. Zambon, and E. Hausmann. "Assessment of Risk for Periodontal Disease. II. Risk Indicators for Alveolar Bone Loss." *Journal of Periodontology* 66, no. 1 (1995): 23-29.

¹⁴ Papapanou, Panos N. "Periodontal Diseases: Epidemiology." *Annals of Periodontology* 1, no. 1 (1996): 1-36.

¹⁵ Walter, C., F. R. Rodriguez, B. Taner, H. Hecker, and R. Weiger. "Association of tobacco use and periapical pathosis - a systematic review." *International Endodontic Journal* 45, no. 12 (2012): 1065-073.

¹⁶ Department of the Army. *TB MED 250 Dental Record Administration, Recording, and Appointment Control*. 2006.

¹⁷ Eikenburg, S. "Use of the Army Dental Command Corporate Dental Application as an Electronic Dental Record in the Iraq Theater of Operations." *AMEDD Journal*, 2001, 51-57.

¹⁸ Defense Manpower Data Center. *2014 Demographics PROFILE OF THE MILITARY COMMUNITY*. Report. Office of the Deputy Assistant Secretary of Defense. 2014. 1-227.

¹⁹ "Oral health." World Health Organization. Accessed March 30, 2017. <http://www.who.int/mediacentre/factsheets/fs318/en/>.

²⁰ "Complete Detail Report for: FT BRAGG." Corporate Dental System. Accessed March 30, 2017. <https://conus.dencom.army.mil/CDSHome/LegacyCDA/Home/Index/36>.

The author hereby certifies that the use of any copyrighted material in the thesis manuscript entitled:

The Effects of Tobacco Risk on the Dental Readiness of Soldiers in Fort Bragg

is appropriately acknowledged and, beyond brief excerpts, is with the permission of the copyright owner.

Anna Yoo
2-YR AEGD Program, Fort Bragg, NC
Uniformed Services University, Bethesda, MD
Date: 01 June 2017