

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.



UNIFORMED SERVICES UNIVERSITY OF THE HEALTH SCIENCES

POSTGRADUATE DENTAL COLLEGE
SOUTHERN REGION OFFICE
2787 WINFIELD SCOTT ROAD, SUITE 220
JBSA FORT SAM HOUSTON, TEXAS 78234-7510
<https://www.usuhs.edu/pdc>



THESIS APPROVAL PAGE FOR MASTER OF SCIENCE IN ORAL BIOLOGY

Title of Thesis: An Assessment of Air Force Prosthodontic Practice Trends and Influencing Factors

Name of Candidate: Dr. Casey D. Goss
Master of Science Degree

THESIS/MANUSCRIPT APPROVED:

DATE:

SHUTE.WESLEY
Y.S.1298008080

Digitally signed by
SHUTE.WESLEY.S.1298008080
Date: 2023.06.13 13:40:02 -05'00'

6/13/23

Dr. Wesley Shute
DEPARTMENT OF PROSTHODONTICS, USUHS Postgraduate Dental School
Committee Chairperson

SCHLOTTKE.SAE
EUN.1468454226

Digitally signed by
SCHLOTTKE.SAE-
EUN.1468454226
Date: 2023.06.13 15:07:16 -05'00'

6/13/23

Dr. Sae-Eun Schlottke
DEPARTMENT OF PROSTHODONTICS, USUHS Postgraduate Dental School
Committee Member

HARDING.AARON.BE
NJAMIN.1271169031

Digitally signed by
HARDING.AARON.BENJAMIN.12
71169031
Date: 2023.06.13 14:35:02 -05'00'

6/13/23

Dr. Aaron Harding
DEPARTMENT OF PROSTHODONTICS, USUHS Postgraduate Dental School
Program Director

Dr. Paul Longo
DEPARTMENT OF PROSTHODONTICS, USUHS Postgraduate Dental School
Department Chair

LONGO.PAUL.
A.1012768601

Digitally signed by
LONGO.PAUL.A.1012768601
Date: 2023.06.29 09:06:44
-05'00'

6/29/23

An Assessment of Air Force Prosthodontic Practice Trends and Influencing Factors

An Assessment of Air Force Prosthodontic Practice Trends and Influencing Factors

Short Title: Air Force Prosthodontics

Capt Casey D. Goss, DMD

Lt Col Aaron B. Harding, DMD, MS, FACP

Lt Col Ryan Sheridan, DMD, MS, FACP

Col Scott Irwin, DDS, MPH

Affiliations:

Uniformed Services University of Health Sciences
USAF Postgraduate Dental School
Prosthodontics Residency
2133 Pepperrell St, Bldg 3352
JBSA Lackland, TX 78236

USAF Dental Research and Consultation Service
3698 Chambers Pass, Bldg 3610
JBSA-Ft Sam Houston, TX 78234

Keywords: Prosthodontics, prosthodontists, American Dental Association, Patients, Residency, American Board of Prosthodontics, Survey results, Access to Care, economics

Declarations: None

Acknowledgments: The authors would like to acknowledge the contributions of their colleagues for their insightful comments: Maj Melissa Thomas, Col (ret) Kraig Vandewalle.

Prior Presentation: Not applicable

Funding Sources: United States Air Force

Clinical Trial Registration: Not applicable

Institutional Review Board (non-human subjects): This study was approved as IRB exempt by USUHS Institutional Review Board (IRB), approval number FWH20210095E.

Institutional Animal Care and Use Committee: Not applicable

Competing Interests: None

Individual Author Contribution Statement: CDG collected and analyzed the data and drafted the original manuscript. ABH aided in research design, reviewed and edited the

An Assessment of Air Force Prosthodontic Practice Trends and Influencing Factors

manuscript. RS aided in research design. SI collected and analyzed the data, reviewed and edited the manuscript. All authors read and approved the final manuscript.

Data Availability Statement: The data underlying this article were provided by the USAF Dental Research and Consultant Service in accordance with USUHS IRB guidelines. Data will be shared on request to the corresponding author with permission of the Defense Health Agency.

Disclaimer: The views expressed in this material are those of the authors, and do not reflect the official policy or position of the U.S. Government, the Department of Defense, or the Department of the Air Force.

Institutional Clearance: Form 3039

An Assessment of Air Force Prosthodontic Practice Trends and Influencing Factors

STRUCTURED SUMMARY

Purpose: The purpose of this study is to evaluate the current state of clinical practice of active duty prosthodontists within the U.S. Air Force Dental Corps (AFDC).

Materials and Methods: Select data were pulled from Corporate Dental Application for fiscal years 2013, 2016, and 2019 to evaluate trends in services rendered.

Results: Prosthodontists account for 6-7% of the Air Force restorative dental providers. They completed an average of 53.2 exams per year and produced an average of \$332,414.68 per provider per year during the years reviewed.

Conclusion: The practice of prosthodontics is rapidly advancing; in order to maintain a standard of excellence and maintain or even increase productivity, it is imperative that providers have the support necessary to keep up their skill sets and continue to bring technical and digital innovations to the AFDC.

INTRODUCTION

Prosthodontics is defined by the American Dental Association (ADA) as “The dental specialty pertaining to the diagnosis, treatment planning, rehabilitation and maintenance of the oral function, comfort, appearance and health of patients with clinical conditions associated with missing or deficient teeth and/or oral and maxillofacial tissues using biocompatible substitutes.”¹ It was first recognized as a specialty by the ADA in 1948.² The American Board of Prosthodontists (ABP) was established in 1946 at the request of the ADA. It is the board responsible for evaluating and certifying qualified candidates who have completed postgraduate prosthodontic training.³ The American College of Prosthodontists (ACP) is the recognized specialty organization and is the only

An Assessment of Air Force Prosthodontic Practice Trends and Influencing Factors

prosthodontic specialty association whose membership is based solely on educational credentials. To be a member of the ACP, one must be enrolled in or have graduated from a Commission on Dental Accreditation (CODA) accredited postgraduate prosthodontics residency.^{3,4}

The United States Air Force Medical Service (AFMS) was established on 8 June 1949 by Order No. 35, with the Air Force Dental Corps (AFDC) as one of its six divisions. The Air Force Dental Division inducted its first members on 1 July 1949 and was renamed the Air Force Dental Service (AFDS) in 1951. By the mid-1950's, the AFDS committed to establishing its own graduate dental training programs in an effort to solve the problem of recruiting dental specialists. In 1957, the Air Force Advanced Training in Prosthodontics was established at Lackland Air Force Base (AFB) and was accredited by the ADA Council on Education in 1958. Beginning with the graduating class of 1964, the length of the program was extended from 12 months to 36 months. From 1965 to 1973, there were also prosthodontics residencies at Wright-Patterson AFB and Andrews AFB. When these residencies shut down, the residency program at Lackland was expanded to accommodate four residents per year.⁵ That number has fluctuated since then, depending on the needs of the Dental Corps, and is currently slotted for two residents per year as of the Class of 2023.⁶

Dr. Kenneth D. Rudd (Col) was the first residency program director from 1957 to 1966 and is considered the "Father of Air Force Prosthodontics". He also became the first Diplomate of the American Board of Prosthodontics in the AFDS in 1954. At the end of his tenure as residency program director, Dr. Rudd published an article titled "The Training of

An Assessment of Air Force Prosthodontic Practice Trends and Influencing Factors

a Prosthodontist”, which gave some historical insight into the program and how it was run. At the time of publication, the program was 36 months long.⁷

Beginning in 1984, the standards applied to postgraduate prosthodontic education were set and published by CODA, with input from the ABP. From their first examination in 1949, until CODA assumed control, the ABP was solely responsible for setting and publishing these standards.³ As advances have been made in dentistry over the last several decades, CODA requirements have been changed and updated to ensure postgraduate education kept up with these advances. One of the most recent changes to the CODA standards for postgraduate prosthodontic education is in regard to the surgical placement of dental implants. CODA Standard 4-23, which was adopted effective 1 July 2016 and implemented in 2017, states that “Students/Residents must be competent in the placement and restoration of dental implants, including referral.”⁸

In order to implement the new standard, the Air Force Prosthodontics residency was extended from 36 months to 42 months. The first class of residents to complete residency during this change graduated in June 2020. One of the major drivers of this decision was to add surgical implant placement into the curriculum without taking away from other training needs within the specialty and without adding to the number of hours residents work in a day.⁶ As the curriculum continued to develop, faculty were able to offer didactic coursework previously taught at a local civilian residency program. The time savings and flexibility enabled a reduction in program length again to 36 months. Resident Master’s certificates are awarded by the Uniformed Services University of Health Sciences.

A series of articles published by Dr. Kent Nash and Dr. Douglas Benting reported data obtained through a series of surveys sponsored by the ACP between 2001 and 2017.

An Assessment of Air Force Prosthodontic Practice Trends and Influencing Factors

In these articles, trends in the clinical practice of private practice prosthodontists were observed and identified. These articles were reviewed and used to inform design of this study.^{9,10} The purpose of this study was to collect information from dental metrics software (Corporate Dental Application or CDA) from three fiscal years to identify trends in how prosthodontics is practiced across the Air Force. Such research may allow data-driven decision-making in the Air Force Dental Corps and to evaluate trends over time.

MATERIALS AND METHODS

A survey comprised of 31 questions was created using Survey Monkey. The questions were written based on personal communication with active duty (AD) prosthodontists, including faculty in the Air Force Prosthodontic residency program. To achieve face validity, the survey was administered to residency faculty and revised as needed prior to dissemination. A current list of AD Air Force Prosthodontists (n=52) was obtained from the Prosthodontic Specialty Consultant.

The survey was distributed electronically via email to this convenience sample of AD USAF prosthodontists. Respondents were able to respond to the survey during more than one session but could submit only one completed survey when they were finished. This allowed for respondents to stop mid-survey to collect relevant information from their records to provide more accurate responses. Follow-up emails were sent at monthly intervals until the survey closed after a period of three months. The data collected from the surveys included answers to questions involving respondent demographics (years in service, rank, years since residency, Air Force vs. civilian residency, primary duty type), number of implants placed in residency, the types of procedures being performed, how time is allocated during the duty day for various tasks including how much of their own lab

An Assessment of Air Force Prosthodontic Practice Trends and Influencing Factors

work they do; their own access to care (ATC), its effect on readiness, and comparison relative to that of the periodontists and oral surgeons in the clinic; general dentists' ATC, and adequacy of manning at their clinic for prosthodontists.

For the following questions, respondents were asked whether they agreed with the following statements on a scale of 1 (strongly disagree) to 5 (strongly agree): "I am satisfied with the number of lab techs at my base; I am satisfied with local laboratory support; I am satisfied with regional and area dental laboratory support; I satisfied with currently-available technology in my clinic (CBCT, digital scanners, restorative planning software, etc.); The conditions of my clinic allow me to practice to the fullest extent of my credentials; I need to treat non-active duty (non-AD) patients to practice to the fullest extent of my credentials; and My prosthodontic training prepared me to confidently perform all prosthodontic procedures."

Finally, respondents were asked the number of full-arch rehabilitations and implants placed per year; factors influencing the decision to place or refer implant placement; and need for additional training with preferred format.

Survey responses and data collected from CDA were exported into Microsoft Excel and the accumulated data was analyzed descriptively.⁹⁻¹²

Data was also collected from CDA for the following fiscal years: 2013, 2016, and 2019. Since 2019 is the last fiscal year not affected by COVID disruption in patient treatment, this was the latest year chosen. To gather more long-term trends, an interval of 3 years was chosen. The specific years also capture information from before and after the change in CODA requirements regarding implant surgery.

An Assessment of Air Force Prosthodontic Practice Trends and Influencing Factors

The total number of restorative dental providers, consisting of general dentists and prosthodontists, was calculated per fiscal year. Productivity data was collected from CDA on any provider with the AFSC 47XX; this included dental residents and non-AD prosthodontists working at an Air Force DTF.

In addition, specific codes included number of dental implants placed (D6010), fixed prostheses (D2000-2999; D6200-6999), implant prostheses (D6000-6199), removable prostheses (D5000-5899) and implant-supported fixed complete dental prostheses (D6114-6117) that were placed by each prosthodontist. The average productivity for a single prosthodontist per year was extrapolated, for the AD and non-AD patient populations, by number of procedures completed and productivity. The non-AD patients were not further subdivided into specific types i.e., dependents, retirees, etc.

Procedure types not normally referred to prosthodontists – but nonetheless vital comprehensive medical readiness program (CMRP) skillsets – include oral and maxillofacial surgery (OMFS) and periodontal (Perio) surgical procedures, endodontics (Endo), and pain and palliative treatment. The average number of procedures in CMRP categories per prosthodontist per year was calculated for both AD and non-AD patient populations. OMFS codes were D7000-7999, Perio codes were D4000-4999, and Endo codes were D3000-3999, and pain and palliative treatment codes were D9110, 9120, 9211, 9212, 20550, 20552, 20553, 99202-99205, and 99213-99215.

Another component of CMRP is managing members' Dental Readiness Classification (DRC) by completing annual exams and identifying treatment needs. The total number of periodic oral exams (D0120, addressing DRC 4) completed by prosthodontists was

An Assessment of Air Force Prosthodontic Practice Trends and Influencing Factors

calculated for each fiscal year, and the number of patient encounters designated as emergencies (addressing DRC 3), was calculated.

Reports were separately generated for number of patients seen, the total number of procedures performed, per year per prosthodontist.⁹⁻¹²

Data collected from CDA were exported into Microsoft Excel and the accumulated data was analyzed descriptively.

RESULTS

Of the 52 surveys sent, 47 (90.7%) prosthodontists responded, and 42 (80.7%) completed the survey questions. Respondents' demographic information, how many implants they placed during residency and currently, and how many full arch rehabilitations they complete each year is shown in Figure 1.

Figure 1 Here

Respondents were asked to rank factors that influence their decision to refer implant surgeries in order of importance. The following factors are ranked from "most important" to "least important":

- Surgical competence/comfort level
- Case complexity
- Patient demand for sedation
- Access to care
- Maintain cordial interdisciplinary relations

Surgical competence/comfort level was the most common response rated as "most important" while access to care and maintaining cordial interdisciplinary relations tied for "least important".

Respondents were then asked to estimate the time they spend per week at work, and the breakout of tasks: 18 (44%) reported an average of 40-50 hours per week at work,

An Assessment of Air Force Prosthodontic Practice Trends and Influencing Factors

15 (37%) reported an average of 51-60 hours per week at work, and 8 (19%) reported an average of 60+ hours per week at work. The detailed breakout of tasks is shown in Figure 2.

Figure 2 Here

The survey then asked a series of questions on provider satisfaction with laboratory support, available technology, the conditions of their clinics, and their prosthodontic training. The answers to these can be seen in Figure 3.

Figure 3 Here

Respondents were then asked a series of questions regarding access to care, comfort level with emergency procedures, and desired trainings. The answers to these can be seen in Figure 4.

Figure 4 Here

Data points were collected for the entire AFDC, as well as specific data for AD Air Force prosthodontists. Figure 1 illustrates the average number of restorative providers in the AFDC per fiscal year, the number of patient encounters in the AFDC per fiscal year, and the number of procedures in the AFDC per fiscal year in different treatment categories.

Figure 5 Here

Figure 2 illustrates the number of exams, emergency patient encounters, and number of CMRP procedures completed by prosthodontists per fiscal year

Figure 6 Here

Figure 3 illustrates the total number of patient encounters, procedures completed, and production per fiscal year of all AF prosthodontists.

Figure 7 Here

An Assessment of Air Force Prosthodontic Practice Trends and Influencing Factors

The average productivity for a single prosthodontist per year was extrapolated, for the AD and non-AD patient populations, by number of procedures completed and productivity. Productivity was calculated by converting dental weighted values (DWV) to U.S. dollars. In both patient populations, fixed and implant restorations accounted for the highest number of procedures and highest productivity per year (Figure 4).

Figure 8 Here

DISCUSSION

The majority of respondents (75%) graduated since 2011, and 60% have less than 11 years of service. This indicates many prosthodontists do not stay beyond the mid-career 10-year mark. Despite this, most prosthodontists (70%) responded they believe there are enough prosthodontists at their base. Future studies should consider this question again, with changes in the manning model to reduce the number of prosthodontists overseas and at AEGD-1 training bases. These individuals' workloads would be expected to significantly increase. While prosthodontists were not queried about salary, it would take over 20 years of service with promotion to O-6 and a \$65,000 annual bonus (which is no longer available) to reach the average annual private practice prosthodontist income of \$263,850¹⁶.

The Air Force residency program appears to be a vital institution, having trained 74% of the current workforce. The data from procedure counts in this study support a continued a curriculum emphasis on dental laboratory work, readiness dental skills, fixed, and implant restorations. While procedure counts in removable prostheses and implant placement are low, these skills are part of what constitutes the prosthodontics specialty. Part of readiness is provider readiness. Servicemembers deserve access to prosthodontists who are skilled at all aspects of care, including removable prostheses. Commanders should

An Assessment of Air Force Prosthodontic Practice Trends and Influencing Factors

continue to support the treatment of non-active duty patients to maintain currency or consider allowing prosthodontists to do so.

Those respondents who spent either 40-50 or 51-60 hours per week at work divided their time similarly between clinical, teaching, and “other” responsibilities (Fig. 2), but those that spent 60+ hours at work had a decrease in clinic time and increase in time spent on “other” responsibilities. For all three groups, leadership roles and lab work were the highest responses for their “other” time split.

It is no secret that prosthodontists tend to be more involved in the lab work for their clinic cases than the average restorative provider, however, 63% of the providers who completed this survey reported doing <25% of their own lab work. The reasons given for doing lab work included having lab techs who lack training and skills, lack of consistent product quality, and long turnaround times. Reasons cited for not doing as much lab work included lack of time due to additional duties and the need to maximize clinic chair time.

Within the military medical system, access to care is a metric that is closely monitored by administrators and the Defense Health Agency (DHA). Access to care is the number of days before a provider’s next available appointment, and each discipline of medicine has a defined standard for what an acceptable number is. For general dentists, acceptable access to care is defined by DHA as less than or equal to 21 days; for prosthodontists that number is less than or equal to 28 days. Most respondents felt that their access to care was satisfactory as well as the general dentists in their clinic. Half of respondents felt that their access to care was better than or about the same as the periodontist in their clinic. The majority of respondents felt that their access to care was about the same or worse than the oral surgeon in their clinic. While prosthodontists in the

An Assessment of Air Force Prosthodontic Practice Trends and Influencing Factors

future may increase their productivity by placing more dental implants, the majority of respondents cited lack of experience as a limiting factor. As more prosthodontists gain surgical training, there will likely be an increase in the number of implants placed, but access to care may become more of a limiting factor.

When asked about satisfaction with local, regional, and area dental laboratory support, the responses were evenly distributed in terms of percentages. However, the fill in comments painted a different picture. Out of 41 respondents, 16 chose to use the free response comment section when asked about regional and area dental lab support. Half of the free responses in the comment sections for these survey questions had negative reviews of lab support at all three levels (local, regional, and area). The reasons given for dissatisfaction included poor product quality, unacceptable turn-around times, and inability to handle complex cases.

The majority of respondents were either neutral or dissatisfied with the technology currently available to them in their clinic. Many locations reported outdated equipment and computers, with DHA restrictions, connectivity restrictions, and local funding as the biggest barriers to obtaining needed equipment updates and upgrades. As stated earlier, technology is a main driver of productivity¹⁷. Over 70% of respondents felt they need to treat non-AD patients to maintain currency. Treatments like complete dentures, full-arch rehabilitations, and implant-supported fixed complete dental prostheses are uncommon among active duty patients, so commander support for treatment of non-AD patients may be a vital part of retention of specialists with key skillsets. It may be a concern of use of government resources for non-AD patients, but the overall number of procedures performed is low, so across the board, prosthodontists do not appear to be excessively

An Assessment of Air Force Prosthodontic Practice Trends and Influencing Factors

using this privilege. According to the data collected, non-AD patients account for 47.5% of total care provided by Air Force prosthodontists.

Most respondents felt somewhat to extremely confident about their ability to perform emergency procedures for sick call. Those that felt less confident cited lack of experience in general dentistry and endodontics as reasons for lower confidence in those areas. Confidence levels were lower when providers were asked about the same procedures when not stationed with other specialists.

The majority of respondents placed 10 or fewer implants during their residency, and the majority of respondents reported placing no implants in their current practice. Since the years selected for this study predate the change in CODA requirements for implant placement, these numbers were as expected. Given the increase in implant placement following the CODA curriculum change, should this study be repeated in the future it stands to reason that the number of implants placed during residency and after graduation should continue to increase.

Following the questions about implant placement numbers, respondents were asked what influenced their decision to refer patients for implant placement as opposed to placing the implants themselves. The most common response was surgical competence and comfort level; this correlates with the fact that the majority of respondents graduated prior to the change in CODA requirements and were likely not trained in implant placement.

The end of the survey inquired about training needs for Air Force prosthodontists. The majority of respondents indicated a need for more training on digital workflows and surgical skills, and the most preferred method of training selected was hands-on training.

An Assessment of Air Force Prosthodontic Practice Trends and Influencing Factors

While the number of general dentists in the AFDC declined by about 50 providers every three fiscal years, the number of prosthodontists has remained the same. The total number of patient encounters in the AFDC decreased each fiscal year, for both the AD and non-AD patient populations; however, the percentage of encounters completed by AF prosthodontists remained consistent. For all fiscal years reviewed, the treatment category with the highest number of procedures completed across the AFDC was restorative (D2000-2999), followed by surgical services (D4000-4999; D7000-7999), implant restorations (D6000-6199) and fixed prosthodontics (D6200-6999). In each of these categories, the number of procedures completed on non-AD patients was higher than on the AD population. Surgical services decreased each fiscal year in the AD patient population but increased each year in the non-AD patient population.

On average, prosthodontists completed 53.2 exams per year on AD patients. Assuming 4 exam columns and 7 patients per day for prophy technicians, this indicates prosthodontists were requested to help on exams an average of 1.9 days per year. Prosthodontists completed an average of 14.2 exams on non-active duty patients. This may be a reasonable estimate for the number of new non-active duty patients accepted for treatment per year. This could also represent exams for family members prior to permanent change of station, or who were scheduled on the DTF's exam books for other reasons.

All Air Force dentists and specialists participate in some capacity in covering sick call. This responsibility falls largely on the general dentists; however, specialists also contribute on a smaller scale. Although these procedures are not necessarily part of the day to day needs of the prosthodontic patient population, it is important that prosthodontists

An Assessment of Air Force Prosthodontic Practice Trends and Influencing Factors

are able to provide these services. This is relevant not only for covering sick call, but also in deployed locations. An important metric within the military medical system is the concept of “readiness”, which is an evaluation of a service member’s deployability. Members must be classified as DRC 1 or 2 in order to be deployed. There are checks and balances in place to treat members ahead of deployment, however, deployed members still have emergencies at forward operating bases, which can cost upwards of \$1000 per incidence, or \$1.8M per month during Operation Iraqi Freedom.¹³ When dental emergencies happen, the deployed dental provider must be equipped to handle them.

When looking at productivity of all Air Force prosthodontists per fiscal year, the numbers are fairly consistent. Support manning and technology are primary drivers of productivity. DHA Dental manpower model uses 1.66 assistants (4Y0X1) per dentist, plus 1 hygienist (4Y0X1H) per 3K beneficiaries, and 1 dentist per 750 beneficiaries (per Air Force Medical Readiness Agency). Therefore, a clinic with 3K beneficiaries would merit 4 dentists, 7 assistants, and 1 hygienist. This is a ratio of 2 support staff to 1 dentist, less than a reported average of 2.7, but more than the reported threshold of 1.75 to achieve the largest increase in productivity¹⁴⁻¹⁵. If there are not enough assistants, one would expect productivity to be less efficient than optimal due to increased administrative burden. As reported by respondents, administrative burden is indeed a significant driver of increased work hours (less efficiency). An increase in well-trained lab technicians and a higher assistant to prosthodontist ratio may increase productivity.

When looking at the average productivity for a single prosthodontist per year, the categories with the highest number of procedures were fixed and implant restorations for both the AD and non-AD patient populations. These were also the categories with the

An Assessment of Air Force Prosthodontic Practice Trends and Influencing Factors

highest production in terms of DWVs. There was a higher number of removable procedures on the non-AD patient population, which can most likely be attributed to the fact that retirees make up a large portion of that patient group. The number of implants placed per year increased each fiscal year, with an expected jump from 2016 to 2019 following the change in CODA requirements.

CONCLUSIONS

Most survey respondents had 6-11 years in service, rank O-4, with a primary duty of clinical care with AEGD teaching responsibility. The majority were trained in the Air Force, placed <10 implants in residency, perform 1-5 full mouth rehabilitations per year, and do <25% of their own labwork.

The majority of prosthodontists (56%) work greater than 50 hours per week, and as work hours increase, the trend is an increase in the time spent on leadership responsibilities, with a decrease in proportion of time on clinical work.

There was no strong predilection on satisfaction with the number of lab techs and local lab support. A majority (59%) report satisfaction with regional and area dental lab support. However, the other 41% of respondents had strong negative comments for specific shortcomings, such as unacceptable turnaround time, inconsistent product quality, and inability to handle complex cases.

There is a slight trend towards dissatisfaction with currently available technology, and negative comments included outdated equipment and software, barriers to getting upgraded hardware and software, and local network connectivity. Respondents also report an increased need for hands-on training in digital workflows and surgical skills.

An Assessment of Air Force Prosthodontic Practice Trends and Influencing Factors

Most prosthodontists report confidence in the training received in residency and ability to handle emergency procedures, but feel the need to see non-active duty patients to practice the full extent of their training and skill set. However, most of the work was completed on active-duty patients.

Prosthodontists report their access to care is good (<28 days), with oral surgeons' and periodontists' slightly better. Most report the number of prosthodontists at their clinic is the right amount, but 30% report it is too low.

There is a downward trend in the number of general dentists in the AFDC, while the number of prosthodontists has remained consistent. Although prosthodontists make up only 6-7% of the AFDC's restorative dental providers, they provide comprehensive care for AD and non-AD patients. While the bulk of annual exams for AD patients are done by general dentists, each prosthodontist averages 53.2 exams per year on AD patients. They also average 1.7 emergency encounters per year per provider.

Despite a decrease in total patient encounters across the AFDC each fiscal year, the percentage of encounters completed by prosthodontists remained consistent.

The highest number of procedures completed each year across the AFDC are in the following treatment categories: restorative, surgical services, implant restorations, and fixed prosthodontics. These are the procedures needed most often by the AD patient population.

The number of patient encounters across the AFDC is trending downward, and the percent of those encounters by prosthodontists remains consistent. Productivity for prosthodontists increased for 2016 and decreased for 2019. The number of procedures on

An Assessment of Air Force Prosthodontic Practice Trends and Influencing Factors

active duty patients decreased, while the number of procedures for non-active duty increased for 2016, then decreased for 2019.

Prosthodontists produce an average of \$332,414.68 per provider per year. The majority of that production comes from fixed and implant restorations. Although implant placement and removable prostheses account for a smaller portion of procedure counts and production, they are vital for skill maintenance of a well-rounded prosthodontist.

The practice of prosthodontics is rapidly advancing; in order to maintain a standard of excellence and maintain or even increase productivity, it is imperative that providers have the support necessary to keep up their skill sets and continue to bring technical and digital innovations to the AFDC.

An Assessment of Air Force Prosthodontic Practice Trends and Influencing Factors

REFERENCES

1. <https://www.ada.org/en/ncrds/b/dental-specialties>
2. Hudson, J. D. (2014). Advanced prosthodontic training in the United States of America. *Journal of Prosthodontic Research*, 58(3), 145-149. doi:10.1016/j.jpor.2014.04.007
3. Knoernschild, K. L., Taylor, T. D., Wiens, J. P., Eckert, S. E., & McGarry, T. J. (2018). American Board of Prosthodontics: 70 years of specialty certification. *The Journal of Prosthetic Dentistry*, 119(5), 683-686. doi:10.1016/j.prosdent.2018.04.001
4. <https://www.prosthodontics.org/about-acp/>
5. Engelmeier R. L. (1997). A brief history of U.S. Air Force prosthodontics. *Journal of the history of dentistry*, 45(2), 71-78.
6. Personal Communication, Col Cade Salmon, USAF Prosthodontics Program Director. Aug 2020.
7. Rudd, K. D. (1966). The training of a prosthodontist. *The Journal of Prosthetic Dentistry*, 16(4), 685-695. doi:10.1016/0022-3913(66)90147-8
8. CODA Accreditation Standards for Advanced Dental Education Programs in Prosthodontics
9. Nash, K. D., & Benting, D. G. (2014). Private practice of prosthodontists in the United States: results from the 2008 & 2011 surveys of prosthodontists. *Journal of Prosthodontics*, 23(1), 10-20. <https://doi.org/10.1111/jopr.12122>
10. Nash, K. D., & Benting, D. G. (2019). Private Practice of Prosthodontists in the United States: Results from the 2017 Survey of Prosthodontists and Trends Since 2001. *Journal of Prosthodontics*, 28(1), 49-63. <https://doi.org/10.1111/jopr.12923>
11. Wright, R. F., Dunlop, R. A., Kim, F. M., & Douglass, C. W. (2008). A survey of program directors: trends, challenges, and mentoring in prosthodontics. Part 1. *Journal of Prosthodontics*, 17(1), 69-75. <https://doi.org/10.1111/j.1532-849X.2007.00243.x>
12. Wright, R. F., Dunlop, R. A., Kim, F. M., Weber, H. P., & Donoff, R. B. (2008). A survey of deans: trends, challenges, and mentoring in prosthodontics. Part 2. *Journal of Prosthodontics*, 17(2), 149-155. <https://doi.org/10.1111/j.1532-849X.2007.00248.x>
13. Colthirst, Paul M., Rosann Berg et al. "Operational Cost Analysis of Dental Emergencies for Deployed U.S. Army Personnel During Operation Iraqi Freedom," *Military Medicine* 2013; 178(4):427-31.
14. Jurasic MM, Gretchen Gibson et al. "Leading determinants of efficient dental care delivery." *J Public Health Dent* 2013;73:195-203.
15. Conrad DA, Rosanna Shuk-Yin Lee, et al. "Estimating Determinants of Dentist Productivity: New Evidence." *J Public Health Dent* 2010;70(4): 262-68.
16. Nash and Benting, 2019.
17. Jurasic et al, 2013.

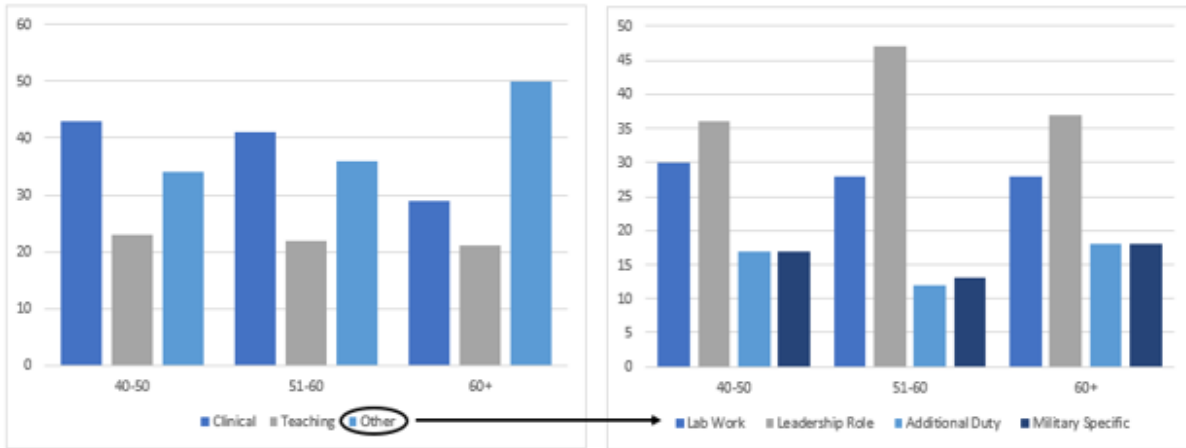
An Assessment of Air Force Prosthodontic Practice Trends and Influencing Factors

FIGURE 1			
Category	Answer Choices	n	%
Years in Service	< 6	4	9
	6-11	20	44
	12-17	12	27
	≥ 18	9	20
Rank	O-3	2	5
	O-4	20	45
	O-5	13	30
	O-6	9	20
Primary Duty Type	Clinical	20	48
	Teaching	11	26
	Admin w/ Pt Care	10	24
	Admin w/o Pt Care	1	2
Position	Pros/MF Pros Faculty	6	14
	AEGD-1/2 Faculty	17	41
	CONUS Non-Educator	8	19
	OCONUS Non-Educator	11	26
Residency Graduation Year	Before 2000	1	2
	2001-2005	3	8
	2006-2010	6	15
	2011-2015	12	30
	2016-2020	14	35
	2021	4	10
Residency Program	Air Force	32	74
	Civilian	11	26
Implants Placed During Residency	≤ 10	29	69
	11-29	10	24
	30-49	2	5
	≥ 50	1	2
Implants Placed per Year	0	23	56
	1-5	7	17
	6-10	8	20
	11-15	2	5
	16-20	1	2
	> 20	0	0
Full Arch Rehabilitations per Year	1-5	35	85
	6-10	6	15
	11-15	0	0
	16-20	0	0
	> 20	0	0
What percentage of lab work are you doing yourself?	< 25%	26	63
	25-49%	8	20
	50-75%	3	7
	> 75%	4	10

An Assessment of Air Force Prosthodontic Practice Trends and Influencing Factors

FIGURE 2

Prosthodontist Allocation of Time at Work per Week



An Assessment of Air Force Prosthodontic Practice Trends and Influencing Factors

FIGURE 3

On a scale of 1-5 (1=strongly disagree to 5=strongly agree), how would you respond to the following statements:

Question	Answer Choices	n	%
"I am satisfied with the number of lab techs at my base."	1 - strongly disagree	6	14
	2 - disagree	9	22
	3 - neither agree nor disagree	9	22
	4 - agree	13	32
	5 - strongly agree	4	10
"I am satisfied with local laboratory support."	1 - strongly disagree	3	7
	2 - disagree	9	22
	3 - neither agree nor disagree	10	24
	4 - agree	16	39
	5 - strongly agree	3	7
"I am satisfied with regional and area dental lab support."	1 - strongly disagree	1	2
	2 - disagree	4	10
	3 - neither agree nor disagree	12	29
	4 - agree	22	54
	5 - strongly agree	2	5
"I am satisfied with currently-available technology in my clinic (CBCT, digital scanners, restorative planning software, etc.)."	1 - strongly disagree	7	17
	2 - disagree	12	29
	3 - neither agree nor disagree	6	15
	4 - agree	14	34
	5 - strongly agree	2	5
"The conditions in my clinic allow me to practice to the fullest extent of my credentials."	1 - strongly disagree	5	12
	2 - disagree	17	41
	3 - neither agree nor disagree	10	24
	4 - agree	9	22
	5 - strongly agree	0	0
"I need to treat non-AD patients to practice to the fullest extent of my credentials."	1 - strongly disagree	2	5
	2 - disagree	5	12
	3 - neither agree nor disagree	5	12
	4 - agree	18	44
	5 - strongly agree	11	27
"My prosthodontic training prepared me to confidently perform all prosthodontic procedures."	1 - strongly disagree	0	0
	2 - disagree	0	0
	3 - neither agree nor disagree	3	7
	4 - agree	22	54
	5 - strongly agree	16	39

An Assessment of Air Force Prosthodontic Practice Trends and Influencing Factors

FIGURE 4

Question	Answer Choices	n	%
My access to care (ATC) is generally ___.	Good (< 14 days)	14	35
	Satisfactory (14-28 days)	24	60
	Poor (> 28 days)	2	5
My ATC has the following effect on readiness.	Significantly increases readiness	7	17
	Somewhat increases readiness	28	68
	Somewhat decreases readiness	6	15
	Significantly decreases readiness	0	0
In my clinic, ATC for general dentists is generally ___.	Good (< 14 days)	15	36
	Satisfactory (14-28 days)	15	37
	Poor (> 28 days)	11	27
Compared to the periodontist(s) I am stationed with, my ATC is generally ___.	Better	5	12
	About the Same	23	56
	Worse	10	24
	N/A, not stationed w/ a periodontist	3	7
Compared to the oral surgeon(s) I am stationed with, my ATC is generally ___.	Better	2	5
	About the Same	16	39
	Worse	13	32
	N/A, not stationed w/ an oral surgeon	10	24
The number of prosthodontists in my clinic is:	Too high	0	0
	The right amount	29	71
	Too low	12	29
What is your comfort level with emergency procedures (surgical, endo, etc.) required for sick call?	Extremely confident	4	10
	Very confident	12	29
	Somewhat confident	14	34
	Not very confident	9	22
	Not at all confident	2	5
What is your comfort level with emergency procedures required if you were in a situation without other specialists stationed with you?	Extremely confident	3	7
	Very confident	13	32
	Somewhat confident	13	32
	Not very confident	11	27
	Not at all confident	1	2
What type of training do you think would most enhance your ability to treat your patients? (Select all that apply)	Digital workflow	26	63
	Surgical skills	19	46
	Laboratory skills	11	27
	Other (please specify)	7	17
What format would you prefer for the training?	CBT or Online Resource	2	5
	Virtual Lecture	7	17
	In-person Lecture	2	5
	Hands-on Training	30	73

An Assessment of Air Force Prosthodontic Practice Trends and Influencing Factors

FIGURE 5

Average Number of Restorative Providers per Fiscal Year

FY	General Dentists (47GX)	Prosthodontists (47P3)
2013	752	52
2016	705	55
2019	662	55

Patient Encounters in the AFDC per Fiscal Year

FY	Beneficiary	Total # of Encounters	#(%) of Encounters by Prosthodontists
2013	AD	1,136,104	17,726 (1.6%)
	Non-AD	413,029	12,748 (3.1%)
2016	AD	983,774	15,013 (1.5%)
	Non-AD	375,960	12,289 (3.3%)
2019	AD	944,712	15,034 (1.6%)
	Non-AD	331,173	9,992 (3.0%)

Total Number of Procedures in the AFDC per Fiscal Year by Tx Category

FY	Beneficiary	Restorative	Fixed Prosthodontics	Removable Prosthodontics	Implant Restorations	Implant Placement	Surgical Services	Other
2013	AD	229,634	2,396	1,680	6,608	1,440	132,432	2,686
	Non-AD	771,924	17,973	13,037	23,497	6,351	368,986	3,439
2016	AD	166,105	2,160	1,334	7,901	1,656	120,421	2,188
	Non-AD	869,307	21,047	13,308	46,341	11,353	534,340	4,129
2019	AD	145,020	980	954	7,708	1,470	113,383	7,994
	Non-AD	746,365	9,272	10,272	47,047	11,417	628,492	8,430

Figure 1: AFDC Statistics

- 1a. Number of restorative providers per fiscal year
- 1b. Patient encounters in the AFDC per fiscal year
- 1c. Number of procedures in the AFDC per fiscal year, by tx category

An Assessment of Air Force Prosthodontic Practice Trends and Influencing Factors

FIGURE 6

Number of Exams by Prosthodontists per Fiscal Year

FY	Beneficiary	D0120	Mean
2013	AD	2,967	57
	Non-AD	585	11.8
2016	AD	2,250	41
	Non-AD	1,060	19.3
2019	AD	3,407	62
	Non-AD	660	12

Number of Emergency Encounters by Prosthodontists per Fiscal Year

FY	Beneficiary	# of Encounters
2013	AD	193
	Non-AD	88
2016	AD	98
	Non-AD	63
2019	AD	71
	Non-AD	51

Average Number of CMRP Procedures per Prosthodontist per Fiscal Year

FY	Beneficiary	OMFS Surgery	Perio Surgery	Endo	Pain and Palliative
2013	AD	440	138	91	136
	Non-AD	346	113	39	75
2016	AD	391	121	74	247
	Non-AD	192	135	70	191
2019	AD	399	205	39	335
	Non-AD	308	143	21	105

Figure 2: AF Prosthodontics Statistics

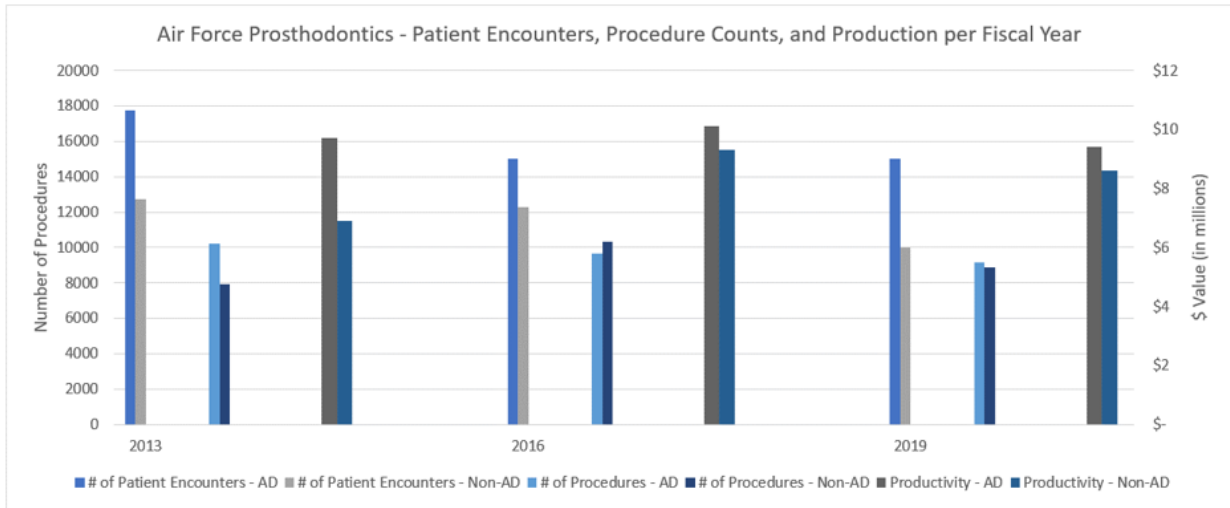
2a. Number of annual exams by prosthodontists per fiscal year

2b. Number of emergency patient encounters by prosthodontists per fiscal year

2c. Number of CMRP procedures by prosthodontists per fiscal year

An Assessment of Air Force Prosthodontic Practice Trends and Influencing Factors

FIGURE 7



Total Number of Patient Encounters, Procedure Counts, and Production of Prosthodontists per Fiscal Year

FY	Beneficiary	Patient Encounters	Procedure Counts	Production
2013	AD	17,726	13,209	\$9,657,273
	Non-AD	12,748	7,946	\$6,853,570
2016	AD	15,013	11,915	\$10,075,428
	Non-AD	12,289	10,349	\$9,317,805
2019	AD	15,034	12,575	\$9,398,089
	Non-AD	9,992	8,887	\$8,593,708

FIGURE 8

Average Productivity of an Air Force Prosthodontist per Year

