Received: 13 November 2022 | Revised: 30 January 2023 | Accepted: 21 February 2023

DOI: 10.1002/jdd.13210

ADEA THE VOICE OF DENTAL EDUCATION WILEY

ORIGINAL ARTICLE

What is the impact of veterans affairs rotations in oral and maxillofacial surgery residency?

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Abstract

Purpose: Oral and maxillofacial surgery (OMS) residencies commonly affiliate with Veterans Affairs Medical Centers (VAMC) to extend care for veterans. This study quantifies the surgical experience of residents at the Corporal Michael J. Crescenz (CMC) VAMC in Philadelphia, Pennsylvania and determines the number of programs affiliated with VA Medical Centers, to enumerate the educational benefits and improve veteran healthcare.

Methods: The dental project manager logs from 2012 through 2021 of the CMC VAMC operating room were analyzed, and cases were categorized into 12 groups. The implant cases from 2012 through 2021 were quantified. Program affiliations were determined using a VA Office of Academic Affiliation report.

Results: There were 1359 procedures (760 cases) performed. Dentoalveolar ($n = 967$) was the most common category, and extractions ($n = 384$) were the most common procedure. The least cases and procedures were performed in 2012 ($n = 14$; $n = 23$). The most cases were performed in 2019 ($n = 137$), and the most procedures were performed in 2019 and 2021 ($n = 255$). There were 3133 implants placed. There are 40 OMS programs affiliated with VA Medical Centers; more dual degree ($n = 24$) than single degree ($n = 16$) programs having an affiliation.

Conclusion: The CMC VAMC offers robust dentoalveolar experience and is increasing in surgical volume, representing the expected needs of an aging veteran population. An increasing budget and millions of eligible veterans indicates VA medical centers nationally will continue to provide valuable surgical experiences.

KEYWORDS
education, implantology, oral and maxillofacial surgery, patient demographics, quality improvement

1 | INTRODUCTION

At most institutions, oral and maxillofacial surgery (OMS) residency training includes rotations at multiple hospital and/or dental school-based sites for training. Some residency programs are affiliated with Veterans Affairs (VA) Medical Centers, hospitals under the umbrella of the VA Health Administration. For instance, the Corporal Michael J. Crescenz (CMC) VA Medical Center (VAMC) in Philadelphia, Pennsylvania, has affiliations with the University of Pennsylvania, allowing for rotations of OMS residents through the VA OMS service.

The VA Health Administration is a subsidiary of the Department of VA and is the largest healthcare system in the country, composed of almost 1300 medical facilities. Of these facilities, there are 171 medical center hospitals and 1112 outpatient centers.[1] VA medical centers provide services in most medical specialties, ranging from primary care to orthopedic surgery, as well as dental services including general dentistry and OMS. Veterans are eligible for VA medical care if they served on active duty for longer than 24 months or were discharged due to disability or hardship; there are currently over nine million veterans who receive healthcare through the VA every year.[1] The 2021 budget of the Veterans Health Administration was $90.64 billion and was increased to $98.33 billion for 2022.[2]

Although the affiliation between residency training programs and VA Medical Centers is seemingly common, there is currently no published data enumerating the frequency, benefits, and outcomes of these relationships. This historical analysis seeks to outline the contributions of VA medical center rotations to OMS resident education, using the CMC VAMC and University of Pennsylvania OMS residency as a focus of study. The specific aims of this analysis are to determine the number of OMS residency programs affiliated with VA medical centers, to determine the quantity and types of procedures performed by OMS residents in the operating room at the CMC VAMC, to quantify the implant experience gained by OMS residents at the CMC VAMC, and to identify the role of these rotations in the broader context of resident education. Most importantly, the overall goal for this analysis is to identify strengths and weaknesses of this affiliation in order to improve how we serve the veteran population, and to help others do the same.

2 | METHODS

This study was submitted to the CMC VAMC IRB and upon administrative review was determined not to constitute research activities. No further research regulatory review was required; this study is IRB exempt.

The number and type of OMS programs affiliated with VA Medical Centers were determined by assessing a report sourced from the VA Office of Academic Affiliation. The affiliated programs were stratified by program type. Four-year programs where graduates earn a certificate were categorized as single degree; 5- and 6-year programs where graduates also earn a medical degree were categorized as dual degree.

Next, the number and type of procedures performed by OMS residents at the CMC VAMC operating room were determined by reviewing the dental project manager logs from 2012 through 2021. Only cases performed in the operating room were included. Log entries listing multiple different procedures under the same case were recorded as separate procedures. For example, a log entry listing a tooth extraction and an implant placement were recorded separately as two separate procedures, despite being performed during the same case. Log entries listing multiple of the same procedure were recorded as a single procedure. For example, an entry listing extraction of different teeth would be recorded together as a single extraction procedure. The totals and percentages of each type of procedure were determined. The procedures were then grouped into the following categories: dentoalveolar, facial cosmetic, pathology, temporomandibular joint (TMJ), infections, soft tissue, trauma, prosthetics, resections, nerve grafting, orthognathic, and other.

Finally, the numbers of implants placed, and implant cases treated by OMS residents at the CMC VAMC were determined by reviewing the dental project manager from 2012 through 2021. Both clinic and operating room cases were included in the analysis. The totals and percentages were determined by year and for the overall period.

3 | RESULTS

Of the 100 accredited OMS residency programs, 40 (40%) were found to have affiliations with VAMCs.[3] Of the affiliated programs, 24 were dual degree programs and 16 were single degree programs. Note that 52.2% of dual degree programs reported an affiliation, while 29.6% of single degree programs reported an affiliation.

In Philadelphia, the University of Pennsylvania OMS residency program is affiliated with the CMC VAMC. The CMC VAMC hosts one senior resident in the OMS department at a time. The department maintains two attending oral and maxillofacial surgeons to supervise all resident activities. Since 2019, surgeries have been performed in the operating room 2 days per week, and patients are seen in the clinic Monday through Friday. Prior to 2019, surgeries were performed in the operating room 1 day per week. From 2012 through 2021, a total of 760 surgical cases were performed in the operating room, yielding a total of 1359 procedures; there was an average of 1.78 procedures performed per surgical case.

Dentoalveolar procedures constituted the majority of the procedures performed (n = 967; 71.2%), while pathology (n = 81; 6.0%), trauma (n = 68; 5.0%), soft tissue (n = 60; 4.4%), facial cosmetics (n = 60; 4.4%), TMJ (n = 55; 4.0%), and infections (n = 46; 3.4%) constituted relatively equal, lower proportions of the total procedures (Figure 1).

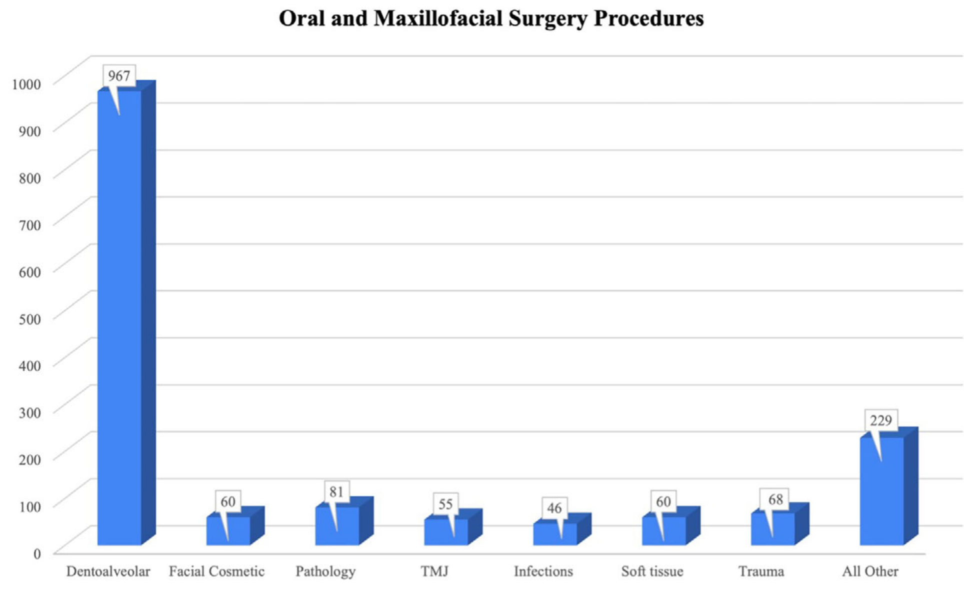

FIGURE 1 OMS procedures performed from 2012 to 2021. *TMJ*: temporomandibular joint. *All other*: prosthetics, resections, nerve grafting, orthognathic, other.

Out of the dentoalveolar procedures, extractions were the most common (n = 384; 39.6%), followed by bone grafting (n = 166; 17.1%), implant placement (n = 142; 15.0%), and alveoloplasty (n = 122; 12.6%) (Table 1). Outside of dentoalveolar procedures, excisions (n = 43), biopsies (n = 37), fracture repairs (n = 36), and soft tissue grafts (n = 35) were the next most common procedures performed. The highest number of cases were performed in 2019 (n = 137), followed by 2021 (n = 134); both 2019 and 2021 recorded 255 total procedures performed and were the highest amounts overall. The least number of cases and procedures were performed in 2012 (n = 14; n = 23) (Figure 2).

In total, there were 3,133 implants placed in 1088 cases over the 10-year period; 946 cases were performed in the clinic and 142 were performed in the operating room. The fewest implants were placed in 2016 (n = 177), and the most were placed in 2019 (n = 598); the fewest implant cases were treated in 2020 (n = 56) and the most were treated in 2019 (n = 168) (Figure 3). There was an average of 2.9 implants placed per implant case.

4 | DISCUSSION

There are currently 100 Commission on Dental Accreditation (CODA) accredited OMS residency programs; 54 are single degree programs, and the remaining 46 are dual degree programs.[4] The number of residency programs found to be affiliated with VA Medical Centers (n = 40) was smaller than expected. This observation could be an effect of having multiple programs in the same city, such as in New York City. There are 15 total OMS residency programs in the New York City metropolitan area,[*,4] yet only four VA Medical Centers[5]; only Brooklyn Hospital Center, Long Island Jewish Medical Center, Mount Sinai, and New York University have VA Medical Center affiliations. This trend could also be due to a lack of time available for additional resident rotations or a lack of VA Medical Centers within a reasonable distance, among other reasons. Further, the number of dual degree residencies affiliated with a VA Medical Center (n = 24) was higher than the number of single degree residencies (n = 16). This is significant when considering there are 12 more single degree than dual degree programs. A possible explanation for this trend is the necessity for dual degree programs to be affiliated with a medical school or university medical system. According to the VA Office of Academic Affiliation, 97% of medical schools have affiliations with a VA medical center,[6] indicating that most dual degree programs reside in a medical system with existing affiliations to the VA. This contrasts with single degree programs that can reside within a non-university medical system, which may be less likely to have affiliations with the VA. More research should be done to further examine these trends.

The University of Pennsylvania constitutes one of the affiliated dual degree institutions and this analysis indicates that the VAMC rotations primarily provide extensive

[*] Brookdale HMC, Harlem HC, Kings County HMC, Lincoln Medical HC, Montefiore MC, Mount Sinai/Jacobi/Albert Einstein COM, Mount Sinai HMC, Nassau University MC, New York MC, New York Presbyterian Hospital, New York Presbyterian/Weill Cornell, New York University, NYC Health/Woodhull, The Brooklyn HC, Long Island Jewish Medical Center/Zucker SOM

TABLE 1 Procedures sorted by category

Category	Procedure	Number
Dentoalveolar	Extraction	384
	Alveoloplasty	122
	Tori removal	51
	Bone graft	166
	Vestibuloplasty	28
	Sinus augmentation	36
	Implant	142
	Front of mouth lowering	6
	Alveolar ridge augmentation	2
	Explant	15
	Tuberosity reduction	4
	Coronectomy	2
	Exostosis removal	3
	Apicoectomy	3
	Guided bone regeneration	1
	Crown lengthening	1
	Root amputation	1
Facial cosmetic	Rhinoplasty	5
	Brow lift	7
	CO_2 laser resurfacing	17
	Septorhinoplasty	7
	Blepharoplasty	12
	Scar revision	6
	Bone Recontouring	2
	Septoplasty	1
	Otoplasty	1
	Genioplasty	1
	Alar reduction	1
Pathology	Biopsy	37
	Excision	43
	Polyp removal	1
TMJ	Arthroscopy	15
	Arthroplasty	9
	Trigger point injection	10
	Arthrocentesis	9
	Discectomy	3
	Eminoplasty	1
	Joint replacement	2
	Coronoidectomy	1
	Silastic implants	2
	Meniscectomy	2
	Condylectomy	1
Infections	Debridement	14
	Fistula	14
	Abscess	2
	Incision and drainage	16
Soft tissue	Soft tissue graft	35
	Uvulectomy	4
	Frenectomy	2
	Tissue flaps	17
	Fat pad transfer	1
	Uvulopalatoplasty	1
Trauma	Hardware removal	25
	Fracture repair	36
	Laceration repair	3
	Foreign body removal	1
	Hemorrhage control	1
	Wound drainage	2
Prosthetics	Obturator	2
	Maxillary stent	1
	Immediate dentures	1
Resections	Partial mandible resection	4
	Ostectomy	4
Nerve graft	Nerve graft	2
Orthognathic	Osteotomy	3
Other	Tracheostomy	1
	Exploration under anesthesia	3
	Debulk FFF	1

Abbreviations: FFF, fibula free flap; TMJ, temporomandibular joint.

dentoalveolar surgery experience to residents. In addition to dentoalveolar procedures encompassing the majority of operations performed ($n = 967$; 71.2%), the dentoalveolar category also has the largest range of different procedures ($n = 17$), showing that residents are exposed to depth and breadth. The trend toward a predominance of dentoalveolar surgery could be explained by the demographics of VA patients. According to a 2015 report, 52.2% of veterans who utilize VA healthcare services are aged 65 years or older.[7] The most abundantly performed procedures (extractions, alveoloplasty, bone grafting, implants) are all frequently utilized to prepare patients for prosthetic insertion, which is commonly required in older patients with an aging dentition.

Although implants were only the third most abundant procedure performed ($n = 142$) in the operating room, the analysis of the dental project manager logs indicates robust resident experience in implant placement. Over the same 10-year period, there were 946 implant cases performed in the OMS clinic at the CMC VAMC ($n = 1088$ cases overall; $n = 3{,}133$ total implants). This discrepancy between cases performed in each location (clinic vs. operating room) indicates that at the CMC VAMC, implants are predominantly

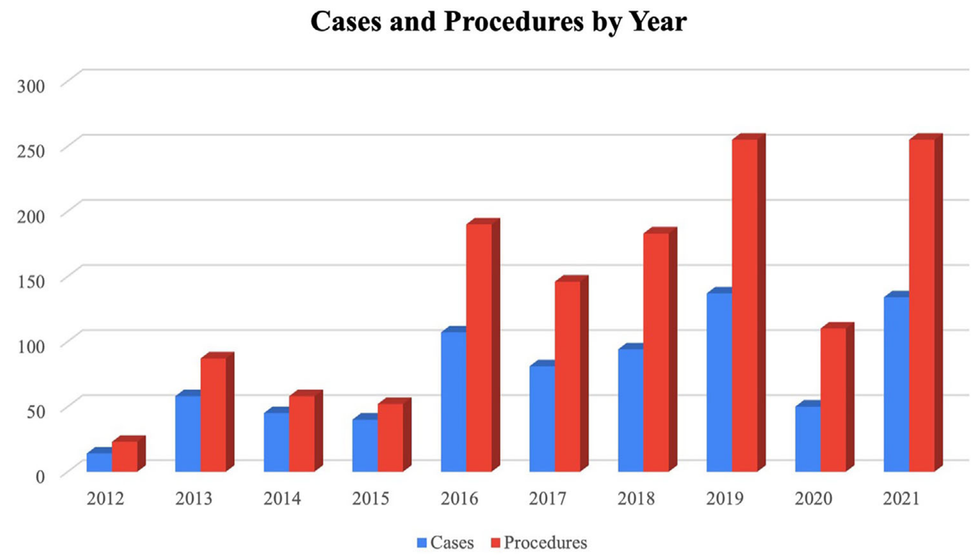

FIGURE 2 Surgical volume stratified by year, 2012–2021.

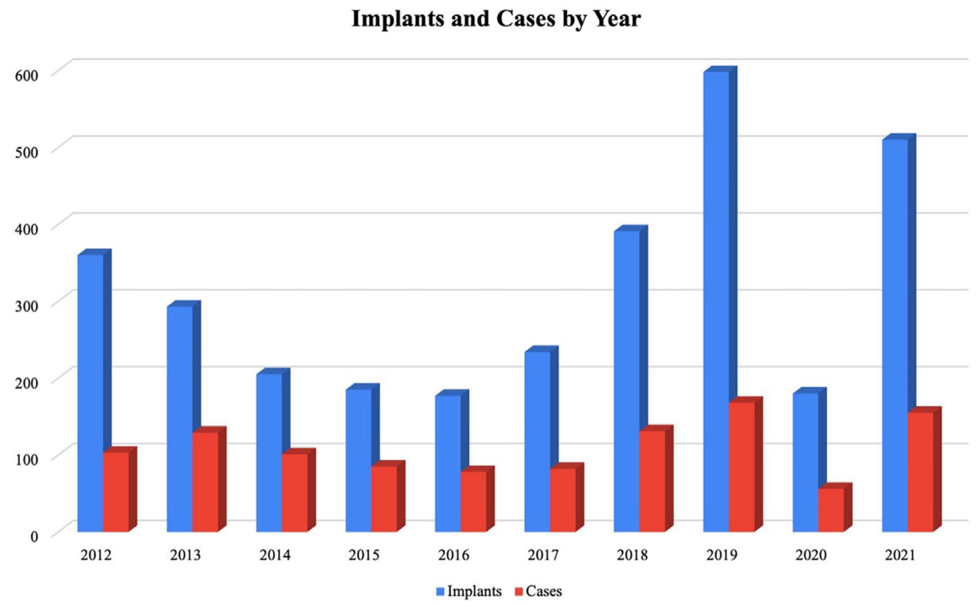

FIGURE 3 Implant and implant case volume stratified by year, 2012–2021.

an outpatient procedure as in most practice settings. Many of the operating room cases that included an implant procedure also included procedures such as alveoloplasty, vestibuloplasty, and bone grafting, suggesting that implant cases were often performed in the operating room when coupled with complex or more invasive procedures.

On the other end of the spectrum, there were relatively few major maxillofacial skeletal procedures such as orthognathic surgery ($n = 3$) and bony resections ($n = 8$). The low volume of orthognathic surgery could similarly be attributed to the patient demographics of VA patients when considering the average age of orthognathic surgery patients tends to be in the mid-20s age range,[8,9] significantly younger than an average VA patient. Further, there are strict medical and dental requirements to join the military, which would further limit the pool of potential orthognathic patients in the veteran population. For example, disqualifying factors include "Current diseases or pathology of the jaws or associated tissues that prevent the jaws' normal functioning…" and "Current severe malocclusion, which interferes with normal chewing or requires immediate and protracted treatment, or a relationship between the mandible and maxilla that prevents satisfactory future prosthodontic replacement."[10]

Despite the low volume of orthognathic surgery and bony resections, there were a higher number of surgical maxillofacial fracture repairs. Of the 68 trauma procedures performed, 36 (53%) were repairs of mandibular, zygomatic, nasal, and orbital fractures, although the most common overall was open reduction and internal fixation of mandibular fractures. Following this trend, there were 25 cases of hardware removal. However, outside of fracture repair and hardware removal, there were relatively few trauma procedures performed overall.

Facial cosmetic surgery represents an up-and-coming category of procedures performed by the OMS department at the CMC VAMC. The first facial cosmetic procedure at CMC VAMC was performed in 2017, and there were a total of 60 procedures performed over the entire time period, making it the fifth most common surgical category despite only being performed for half of the time period analyzed. The most common procedure was CO_2 laser skin resurfacing ($n = 17$) followed by blepharoplasty ($n = 12$). The introduction of this category of procedures followed the arrival of a new attending surgeon, indicating the scope of resident education at the VA is dictated by the training and scope of the attending surgeons.

Overall, the surgical volume at the VA has been trending upwards since 2012. The most cases were performed in 2019, which directly coincides with the increase to two operating room days per week. A major outlier to this trend is the year 2020, but this is explained by the onset of the COVID-19 pandemic; all elective procedures were halted for the month of March 2020. Further, the pandemic likely caused apprehension in some patients, leading to a delay in scheduling planned procedures and contributing to the overall decrease in case load.

In the context of resident education, the volume and breadth of procedures performed at the CMC VAMC have a multifactorial impact on fulfilling the minimum clinical requirements for OMS residents set by CODA. In terms of outpatient OMS experience, standard 4, section 7 of the Accreditation Standards for Advanced Dental Education Programs in Oral and Maxillofacial Surgery outlines the requirements; "The program must ensure a progressive and continuous outpatient surgical experience … (including) dentoalveolar surgery, the placement of implant devices, management of traumatic injuries and pathologic conditions including temporomandibular disorders and facial pain, augmentations and other hard and soft tissue surgery, including surgery of the mucogingival tissues."[11] Although the CMC VAMC provides robust experience in dentoalveolar surgery to OMS residents, most procedures included in this analysis were performed in the operating room, despite commonly being performed in outpatient settings. Thus, the strength of the outpatient experience at the CMC VAMC is highlighted in this analysis through the high volume of implants placed in the clinic setting. In terms of major maxillofacial surgery, the CMC VAMC rotations provide more modest contributions to meeting case load requirements. For senior residents, CODA mandates that "… residents must perform 175 major OMS procedures … there must be at least 20 procedures in each category of surgery. The categories of major surgery are defined as: (1) trauma (2) pathology (3) orthognathic surgery (4) reconstructive and cosmetic surgery."[11] As illustrated in Table 1, there were smaller volumes of each category of major surgery performed over the 10-year period. This indicates that while residents do gain experience in these surgical categories, it is not a significant contribution toward meeting minimum residency requirements and the experience comes secondary to the education in outpatient procedures.

On the patients' side, the major strengths of the OMS affiliation with the CMC VAMC are the volume of dentoalveolar procedures, as they reflect the surgical demand of an aging veteran population, and the scope of procedures performed. In a broader context, the major potential weakness of the OMS residency and VA medical center affiliation is the relatively low number of programs with this relationship. As previously enumerated, less than half of all OMS residencies have rotations with VA medical centers. Ideally, the number of affiliated programs should increase in the future to reflect the growing veteran population and expand their access to care.

5 | CONCLUSION

The CMC VAMC represents an increasingly busy surgical rotation for OMS residents at the University of Pennsylvania. It is very strong in dentoalveolar surgery experience in terms of both volume and breadth of procedures, particularly preprosthetic surgery such as extractions, implants, alveoloplasty, and bone grafting. Importantly, these are all procedures that are expected and necessary for an aging population, indicating the VA rotation for OMS residents is fulfilling the major surgical needs of the average VA patient demographic. Overall, there were 40 total OMS residency programs found to have affiliations with VA Medical Centers, and there are more dual degree than single degree programs engaging in this partnership. With an increasing budget to the Veterans Health Administration, rotations at VA Medical Centers will continue to provide valuable surgical experience for residents and increased access to care for millions of veterans in America.

DISCLAIMER

The views expressed in this article are those of the authors and do not necessarily reflect the position or policy of the Department of Veterans Affairs, the US Government, or the authors' affiliated professional organizations or educational institutions.

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How to cite this article: Hershberger MW, Sierra-Vasquez D, Ford B, Panchal N. What is the impact of veterans affairs rotations in oral and maxillofacial surgery residency? *J Dent Educ*. 2023;87:939–945. https://doi.org/10.1002/jdd.13210