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The Utilization of Comprehensive Dentists in an Army Setting

A Thesis

Presented to the Faculty of the Advanced Education in General Dentistry, Two-Year Program,

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And the Uniformed Services University of the Health Sciences – Post Graduate Dental College

In Partial Fulfillment of the Requirements for the Degree of

Master of Science in Oral Biology

By

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April 2016

The Utilization of Comprehensive Dentists in an Army Setting

A REPORT ON

The perceptions of procedures completed by comprehensive dentists who have completed a 2-year Advanced Education in General Dentistry (AEGD-2), general dentists with 1-year Advanced Education in General Dentistry (AEGD-1), and general dentists with no post-graduate education. Also studies on the perceptive barriers that exist that may prevent procedures from being performed in the Army Dental Care System.

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ABSTRACT

Purpose: The purpose of this study is to formally review the utilization of comprehensive dentists in the Army and compare them to Army general dentists who serve a similar role. The purpose of this study is also to review the potential barriers that may exist to completing dental procedures as perceived by Army dentists.

Methods: A survey was sent to all comprehensive dentists, general dentists that have completed a one year AEGD, and all general dentists with no post-graduate education in the Army. This is a review of the information collected by survey. The online survey was sent via email to Army dentists in all Army Dental treatment facilities. The results of the survey were analyzed with descriptive statistics. The results of the survey were also analyzed with a Spearman Rank Correlation Analysis to identify any correlation to the responses from each group. The Spearman Rank Correlation Analysis was also performed to identify if barriers exist to being able to perform specific procedures as seen by a group. Army dental providers (general dentists, 1-year AEGD graduates, and comprehensive dentists) were the primary subjects in this survey. This online survey was sent out to find any evidence of whether or not degree of training has an impact on the time, cost, and level of care rendered in Army dental clinics, and to determine if there is statistical evidence that barriers exist to the performing of specific procedures.

Results: There is an apparent linear correlation between the years of advanced education completed and the perception of number of procedures being completed. As the years of education increased the number of procedures completed increased. The desire to complete additional procedures appeared to have the opposite relationship so that as time in training increased, the desire to complete more procedures decreased. The overall perceived barrier to completing the advanced procedures was a lack of training, followed by no barriers. A lack of funding was the least perceived barrier.

Conclusions: There is a difference to the perceived dental services performed by Army general dentist and Army comprehensive dentists. There is a linear relationship between time spent in advanced training and the provider's perception of procedures being completed. There is also an inverse correlation between time spent in advanced training and desire to perform more services. Finally the barriers to the delivery of dental care differ between general dentist and comprehensive dentist.

ACKNOWLEDGMENTS

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INTRODUCTION

The United States Army provides a unique venue for the delivery of dental care. In addition to general dentists, it employs a range of specialists, including periodontists, endodontists, oral surgeons, orthodontists, and prosthodontists. Comprehensive dentistry is a recognized specialty in the U.S. Army with an emphasis on wide-ranging care. Upon completion of dental school, an Army general dentist is given the designation of 63A, often referred to as alphas for the Army's phonetic alphabet. An additional one-year training program (AEGD) is available to dentists who are recently graduated from dental school. If completed the dentists are given the additional designation of 63A9D but are still referred to as alphas. A dentist must complete a 2-year Advanced Education in General Dentistry (AEGD-2) to earn a designation of 63B (bravo) or comprehensive dentist.

While many of the procedures completed by comprehensive and general dentist overlap, comprehensive dentists, because of their advanced training are allowed to perform additional procedures such as implant placement and crown lengthening surgeries. Beside the "alpha" and "bravo" designators, there is a credentialing process that must be completed by all Army dentists that specifies which procedures a provider is privileged to do. This is usually done by evaluating certifications such as dental license or having completed board testing. As part of the credentialing system the Army employs a privileging system that delineates the procedures that can be done by providers. A credentials committee meets to decide which privileges are recommended for a provider based on the individual provider's level of education, ability to demonstrate competence in that field, and which privileges are requested. A provider must be

both credentialed and privileged to complete a procedure; one does not automatically enable the other [1]. Hypothetically a comprehensive dentist and a general dentist could be granted the same privileges despite the difference in training. While the privileges granted to the comprehensive dentists are fairly universal as outlined in the core privileges for that specialty, it is unknown what procedures are routinely being completed by comprehensive dentist that are not normally completed by general dentist. There are many other factors that may influence what procedure a dentist may complete such as availability of materials, needs of the dental population, and mission of the clinic where they are assigned.

This study is intended to show that comprehensive dentistry training has a valuable place in the Army Dental Corps strategic vision of world-class warrior-focused dental care, and should provide insight into the procedures completed by 63 Bravos in the Army Dental Care System. The Army faces many challenges in its delivery of world-class dental care. We serve a population that maintains optimal physical and mental health to perform their duty as soldiers in the United States Army. Army Regulation 40-501 provides standards of medical fitness, to include dental fitness that must be met and maintained by our soldiers with the help of military dentistry and medicine. These standards in AR 40-501 provide fitness standards for enlistment, retention and separation. A soldier's medical and dental fitness is recorded and tracked in their individual medical readiness (IMR).

Dental fitness is defined in the Army Regulations known as AR 40-3 and AR 40-35. Dental fitness is separated into readiness and wellness as well as two other non-deployable

classifications (see figure 1) [2]. Dental readiness is fundamental to maintaining unit readiness and reducing non-combat dental casualties during deployments.

In the 2008 Army recruit oral health study [3] to determine the dental classification of incoming recruits showed that 52% of the incoming recruits were a dental class 3. This implies a significant need for well-trained dentists to improve the oral conditions of the new recruits to the armed forces. Also in 2008 York [4] showed that in the first four years of military service, on average patients had 3.66 teeth requiring operative treatment, 1.66 teeth requiring extraction, and 0.08 teeth requiring endodontic treatment. In 2013 the Army Dental Command (DENCOM) introduced the Go First Class (GFC) program with a goal of making 95% of Soldiers class 1. This program encourages patients to have their exam and prophylaxis and perhaps simple restorative procedures completed in the same appointment. [5] Patients are encouraged to schedule these appointments to have the majority of their need treated in a single visit.

Classification	Description
Class 1 **Wellness**	Soldier has had a complete dental exam within the past year. Soldier does not require any dental care.
Class 2 **Readiness**	Soldier requires some type of dental care or re-check: - Simple filling - Dental cleaning - Simple wisdom tooth extraction
Class 3 **NON DEPLOYABLE**	Soldier requires dental care **as soon as possible** for one or more of the following conditions: - A dental emergency is likely to occur if the condition is not corrected - Badly decayed teeth - Severe gum disease - Root canal - Painful or diseased wisdom tooth **Soldier is not deployable.**
Class 4 **NON DEPLOYABLE**	Soldier requires a complete dental exam. Disease status is unknown. **Soldier is not deployable.**

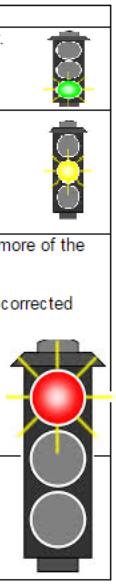


Figure 1: DRCs basics combined with MEDPROs coloring system in relation to readiness and wellness

GFC is designed to have simple treatments readily offered. Often procedures that require more time to complete are delayed due to time constraints of the patient. Frequent trainings, schoolings, permanent change of station (PCS), and deployments can interfere with

the ideal treatment plan. Additionally the ideal treatment may not be performed because of any number of roadblocks including not having the necessary materials, the essential tools, or the required training to complete the procedure.

Sometimes prosthodontic care, periodontal surgeries, orthodontic treatment, and complex oral surgeries are required to bring the soldier to a DRC 1. This can become a problem on smaller posts where specialist may not be readily available. Specialty care in the Army is provided in many locations. Specialists provide treatment for patients with complex needs and have extensive training in their respective fields of expertise. The United States Army recognizes many of the same dental specialties as the civilian sector and the American Dental Association (ADA) [(6)]. However, unlike the civilian side and the ADA, the U.S. Army does recognize the comprehensive dentist as a specialty provider focused on comprehensive care. The training that a comprehensive dentist must complete is composed of operative dentistry, oral surgery, periodontics, prosthodontics, endodontics, orthodontics, pediatric dentistry, and oral pathology. A qualified specialist in each of these fields provides the education, training and oversight for comprehensive dentists in their respective areas of expertise.

PURPOSE

The purpose of this study is to review which procedures are perceived by the practitioner as regularly being completed. These questions will be directed to three groups of respondents: Army comprehensive dentists (63B) who have completed a 2-year Advanced Education in General Dentistry (AEGD-2), Army general dentists (63A9D) who have completed a 1-year Advanced Education in General Dentistry (AEGD) and Army general dentists (63A) who have no additional training beyond dental school. This study will evaluate the perception of dental services rendered by specialty trained dentists and compare them to the perceptions of those dentists who have not completed an advanced program. This study will also provide insight into possible barriers to treatment as perceived by the providers.

HYPOTHESES

Study questions: Are there differences in perception between the different levels of education? What are the possible barriers that may prevent providers from performing the procedures in the Army Dental Care System and making care rendered in the Army Dental Care System more effective?

Null hypotheses:

1. There are no perceived differences to the dental services performed by Army general dentists (63A9D, 63A) and comprehensive dentists (63B).

2. There are no perceived differences among the services general or comprehensive dentists would like to perform.

3. There are no perceived barriers to care reported by general or comprehensive dentists.

MATERIALS AND METHODS

A 49-questions survey was developed for the online survey website Survey Monkey (www.surveymonkey.com). The links to the survey along with instructions were emailed to all comprehensive and general dentists on active duty. Appendix A has a copy of the email sent. The first two questions pertained to demographics. Questions 3-19 were queries as to what procedures were commonly being performed and the answers were given on a five-part Likert scale of "1" being they strongly agree that they perform those procedures on a regular bases, or "5" being they strongly disagree that they perform those procedures on a regular bases. Questions 20-34 were queries as to what procedures they would like to perform more often. The answers were also given on a five-part Likert scale of "1" being they strongly agree that they would like to perform more of those procedures, or "5" being they strongly disagree that they would like to perform more of those procedures. The final section of the questionnaire was related to perceived barriers to completing the procedures mentioned in the previous two sections. Appendix B includes all of the questions.

A similar survey was conducted by Clark in 2002[7] where practicing general dentists were compared to prosthodontists in specific procedures. This study was referenced in creating survey questions for this study.

The data was exported to Microsoft Excel and all respondent identifiable information was removed. After the data was collected, it was statistically analyzed with descriptive statistics and a Spearman Rank Correlation Analysis.

In this study, the independent variable is dental education level (general dentist (63A), 1-year AEGD graduate (63A9D), 2-year AEGD graduate (63B)). The dependent variables are the possible perceptions of the dentists. The measuring instrument is a Likert scale survey (1 =

strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree, 5 = strongly agree). Additionally a multiple choice question was included pertaining to the perceived barriers that exist to completing some of the previously questioned procedures. The possible answers to the barriers questions were: 1- No barriers, 2- Lack of equipment, 3- Lack of Patients, 4- Lack of time, 5- Lack of leader support, 6- Lack of funding, 7- Lack of training.

The null hypotheses tested are:

1. There are no perceived differences to the dental services performed by Army general dentists (63A) and comprehensive dentists (63B).
2. There are no perceived differences among the services general or comprehensive dentists would like to perform.
3. There are no perceived barriers to care reported by general or comprehensive dentists.

A general analysis was performed. We used the online power analysis program at the University of British Columbia to estimate the sample size needed for a power of 80% with a level of confidence of 95% (http://www.stat.ubc.ca/~rollin/stats/ssize/n2.html). It was determined that if this survey obtains 200 responses, then the investigator will be able to detect a 0.5 standard deviation effect size for up to 5 responses.

A Spearman rank correlation analysis on deployment and multiple diagnostic codes was done to evaluate statistically significant responses in relation to the dentist education level. See appendix C for full statistical analysis.

RESULTS

Of the roughly 900 potential respondents, 277 actually completed the survey. However not every respondent answered every question. At least 209 subjects answered all questions. With a sample size of 209, the margin of error is 6.8%. In the frequency tables, any two responses to the same question whose valid percentages differ by 6.8% or more are statically significant.

From the three different identifiers there was a pretty even distribution of respondents; 38% were general dentists without any additional training (63A), 34% were general dentists with a 1-year training program (63A9D), and 28% were comprehensive dentists with a 2-year training program (63B).

When identified by how long the practitioner has been in his or her current skill identifier the majority (67%) have been there for less than three years, and 81% have been practicing for less than 6 years, indicating that a large number of respondents are relatively new to their respective designators (see figure 2).

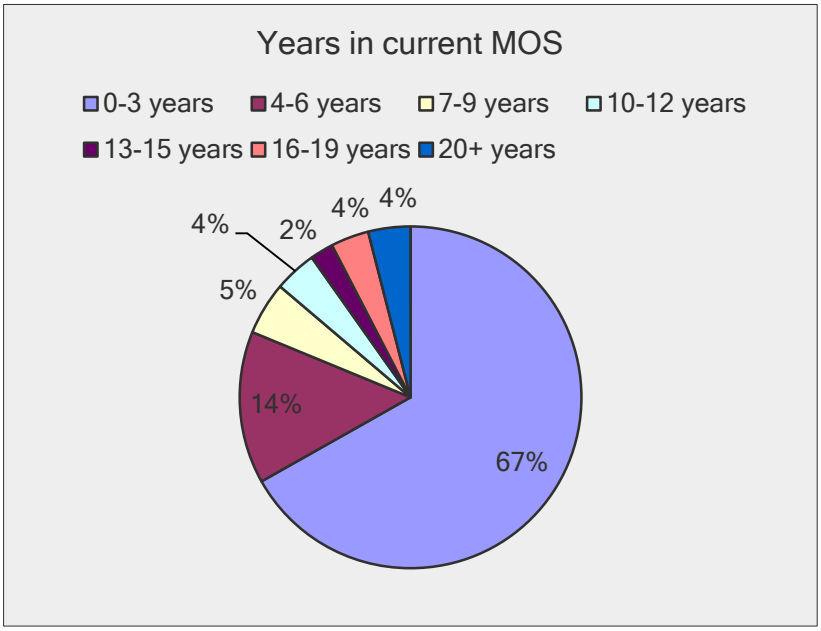


Figure 2: Pie Graph depicting time in current skill identifier.

As a whole population general dentist and comprehensive dentist did not distinguish themselves as performing any of the mentioned procedures with any type of regularity. The small exception was CAD/CAM with a score of 2.59 which is just above neutral on the Likert

scale. CAD/CAM was the only procedure to have an overall agreement score. All other procedures ranked from 3.01 (neither agree nor disagree) to 4.55, which is midpoint between disagree and strongly disagree (see figure 4).

When looking at all groups combined, it is noted that there was a desire to do all procedures more regularly, though with an average score of 2.99 the performance of more pediatric dentistry is closer to the neither agree nor disagree. The rest of the average scores ranged from 2.55 for CT grafts to 1.59 on implant placement for the averages (see figure 5).

When averaging the answers to the questions about frequency of completing the procedures by group, the 63A group responded that they were to the far right of the Likert scale with a 4.4 average of all answers on how often they routinely completed procedures. This indicates that they, in general, did not categorize themselves as doing many of the procedures in question. Their collective answers lay somewhere between disagreeing and strongly disagreeing with the statements. The 63A9D group responded that they were more in the middle than the 63A group with a 3.8 average of all answers on how often they routinely completed procedures, somewhere between “neither agreeing not disagreeing”, and “disagreeing” but closer to the “disagreeing” side. This means that the 63A9D group perceives themselves as still not routinely completing the procedures in question, but doing them more than the 63A group. The 63B group in turn responded that they were even closer to the center of the Likert scale with a 3.4 average of all answers on how often they routinely completed procedures, somewhere between “neither agreeing nor disagreeing”, and “disagreeing” but closer to the more neutral “neither agreeing not disagreeing” than the other two groups. This is

closer to indicating that they do not necessarily routinely perform these procedures, but they still perform them more than the other two groups (see figures 5, 7, 9).

When averaging the desire of the different groups to do more of the procedures in question, the 63A group responded with an average score of 2.05 meaning that in general they agree that they would like to perform more of the procedures that were in the questions than they currently do. The 63A9D group answered similarly with an average score of 2.13 meaning they would also like to do more of the procedures in question. The 63B group was closer to neutral on the scale when asked this question. The average for this group is 2.49 meaning that on average they are more content with the procedures they are completing than the other two groups, but would still like to complete more (see figures 6, 8, 10).

Comparison of individual questions between the three group averages is as follows. The measuring instrument is a Likert scale survey (1 = strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree, 5 = strongly agree). To the question "I routinely perform CAD/CAM restorations," the 63A group averaged a 2.75, the 63A9D averaged a 2.16, and the 63B group averaged a 2.89.

To the question "I routinely perform multiple unit fixed prosthodontics," the 63A group averaged a 3.8, the 63A9D averaged a 3.13, and the 63B group averaged a 2.70.

To the question "I routinely perform pediatric dentistry," the 63A group averaged a 4.66, the 63A9D averaged a 4.38, and the 63B group averaged a 4.18.

To the question "I routinely perform limited orthodontics," the 63A group averaged a 4.74, the 63A9D averaged a 4.45, and the 63B group averaged a 3.70.

To the question “I routinely perform extraction of impacted third molars,” the 63A group averaged a 3.82, the 63A9D averaged a 2.52, and the 63B group averaged a 2.5.

To the question “I routinely use a diode laser in dental treatment,” the 63A group averaged a 4.76, the 63A9D averaged a 4.71, and the 63B group averaged a 4.11.

To the question “I routinely perform connective tissue grafts,” the 63A group averaged a 4.80, the 63A9D averaged a 4.39, and the 63B group averaged a 4.14.

To the question “I routinely perform guided bone regeneration,” the 63A group averaged a 4.76, the 63A9D averaged a 4.41, and the 63B group averaged a 3.88.

To the question “I routinely perform guided tissue regeneration,” the 63A group averaged a 4.77, the 63A9D averaged a 4.34, and the 63B group averaged a 3.99.

To the question “I routinely perform socket preservation,” the 63A group averaged a 4.52, the 63A9D averaged a 3.59, and the 63B group averaged a 3.17.

To the question “I routinely perform clinical crown lengthening,” the 63A group averaged a 4.54, the 63A9D averaged a 3.51, and the 63B group averaged a 3.21.

To the question “I routinely perform molar endo,” the 63A group averaged a 4.37, the 63A9D averaged a 3.29, and the 63B group averaged a 3.05.

To the question “I routinely perform cases under oral sedation,” the 63A group averaged a 4.65, the 63A9D averaged a 3.86, and the 63B group averaged a 3.58.

To the question “I restore implants on a regular basis,” the 63A group averaged a 4.41, the 63A9D averaged a 3.83, and the 63B group averaged a 3.11.

To the question “I place implants on a regular basis,” the 63A group averaged a 4.85, the 63A9D averaged a 4.69, and the 63B group averaged a 3.96.

In general to the set of questions referring to procedures the groups would like to do more of, the 63A group averaged a 2.05 essentially agreeing that they would like to do more of the procedures in question. The 63A9D group was not far behind with an average of 2.13. The 63B group averaged a 2.49 making it the most content of the three groups, but still indicating a desire to do more of the procedures mentioned.

Comparison of individual answers to questions regarding desire to do more procedures between the three group averaged is as follows. To the question "I would like to perform more CAD/CAM restorations," the 63A group averaged a 1.71, the 63A9D averaged a 1.80, and the 63B group averaged a 2.11.

To the question "I would like to perform more multiple unit fixed prosthodontics," the 63A group averaged a 1.87, the 63A9D averaged a 1.97, and the 63B group averaged a 2.47.

To the question "I would like to perform more pediatric dentistry," the 63A group averaged a 2.73, the 63A9D averaged a 2.95, and the 63B group averaged a 3.34.

To the question "I would like to perform more limited orthodontics," the 63A group averaged a 2.3, the 63A9D averaged a 2.37, and the 63B group averaged a 2.78.

To the question "I would like to perform more extraction of impacted third molars," the 63A group averaged a 2.15, the 63A9D averaged a 2.26, and the 63B group averaged a 2.26.

To the question "I would like to use a diode laser more in dental treatment," the 63A group averaged a 1.98, the 63A9D averaged a 2.44, and the 63B group averaged a 2.21.

To the question "I would like to perform more connective tissue grafts," the 63A group averaged a 2.33, the 63A9D averaged a 2.48, and the 63B group averaged a 2.92.

To the question “I would like to perform more guided bone regeneration,” the 63A group averaged a 2.17, the 63A9D averaged a 2.37, and the 63B group averaged a 2.47.

To the question “I would like to perform more guided tissue regeneration,” the 63A group averaged a 2.20, the 63A9D averaged a 2.37, and the 63B group averaged a 2.55.

To the question “I would like to perform more socket preservation,” the 63A group averaged a 1.81, the 63A9D averaged a 1.71, and the 63B group averaged a 2.07.

To the question “I would like to perform more clinical crown lengthening,” the 63A group averaged a 1.84, the 63A9D averaged a 1.89, and the 63B group averaged a 2.42.

To the question “I would like to perform more molar endo,” the 63A group averaged a 2.30, the 63A9D averaged a 2.25, and the 63B group averaged a 2.67.

To the question “I would like to perform more cases under oral sedation,” the 63A group averaged a 1.93, the 63A9D averaged a 2.10, and the 63B group averaged a 2.36.

To the question “I would like to restore more implants,” the 63A group averaged a 1.49, the 63A9D averaged a 1.39, and the 63B group averaged a 1.95.

To the question “I would like to place more implants,” the 63A group averaged a 1.8, the 63A9D averaged a 1.75, and the 63B group averaged a 1.95.

The results for the barriers to performing the procedures appeared to focus on a lack of training, which overall was a substantial factor. The second most common overall answer was that there were no barriers to performing the procedures in question. The lack of funding barrier was almost never a problem and was easily the lowest overall answer to the barrier questions (see figure 3).

Most of the barriers are self-explanatory, such as lack of funding and lack of time. A lack of leadership support, however, could be taken to mean several different things. Depending on the needs of each DENTAC, a lack of leader support could mean that leaders are allocating time and resources to completing urgent needs, such as getting a brigade ready for deployment or performing exams and operative for a brigade that recently returned from deployment.

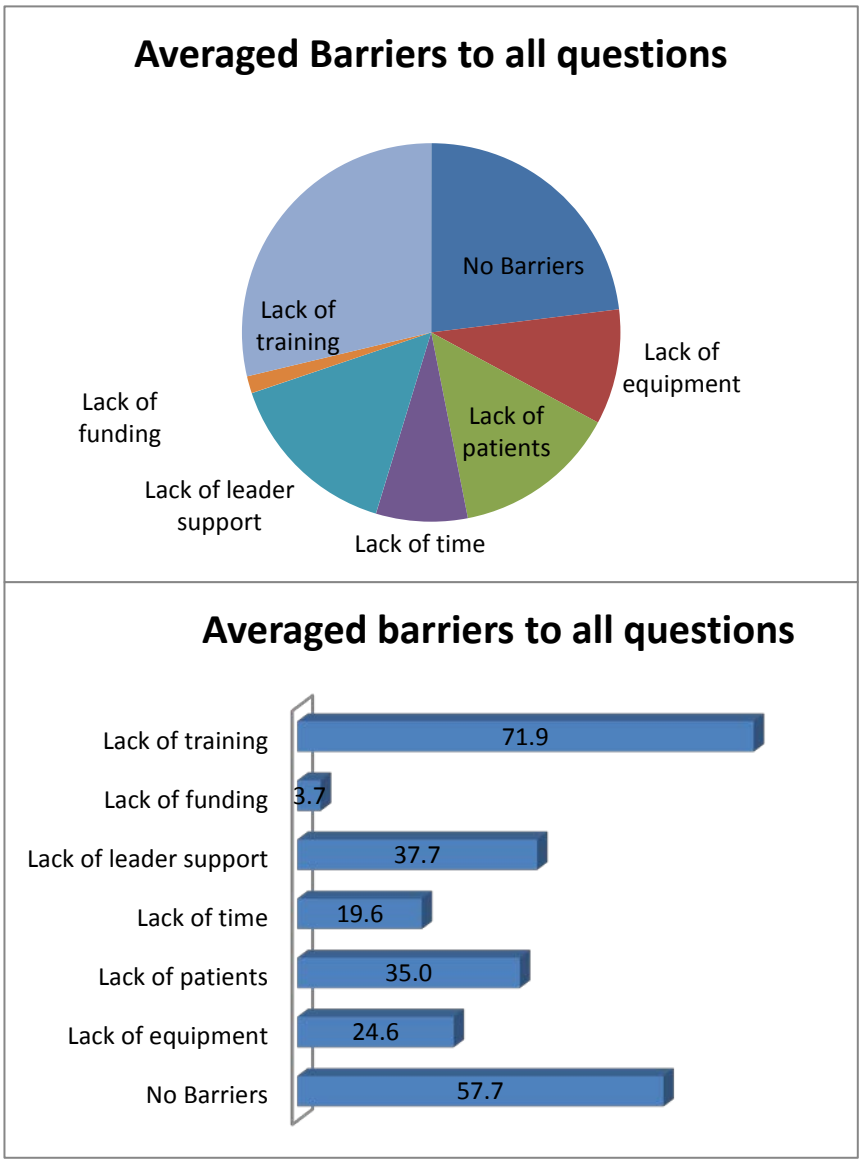


Figure 3: Pie and Bar graphs depicting the averaged answers to all barrier questions asked.

Lack of leadership support may also refer to a leader not allowing procedures to be completed by general dentist because there are sufficient specialists available to complete the procedures in question. Practitioners may also feel like there is a lack of leader support if they are not being credentialed to complete some of their desired procedure. There may be additional view on what can comprise a lack of leader support.

When looking more closely at some of the individual questions some different patterns emerge.

The first pattern is for the barrier questions “barriers to implant placement”, “barriers to performing guided tissue regeneration”, “barriers to performing guided bone regeneration”, “barriers to performing connective tissue grafts”, “barriers to using diode lasers”, and “barriers to limited orthodontics”; the largest barrier appeared to be a lack of training, roughly 48%. This is not too surprising as these are highly specialized procedures that are not often performed by a general dentist. These are, however, procedures that are included in the training for the 63B group (see figures 12-17).

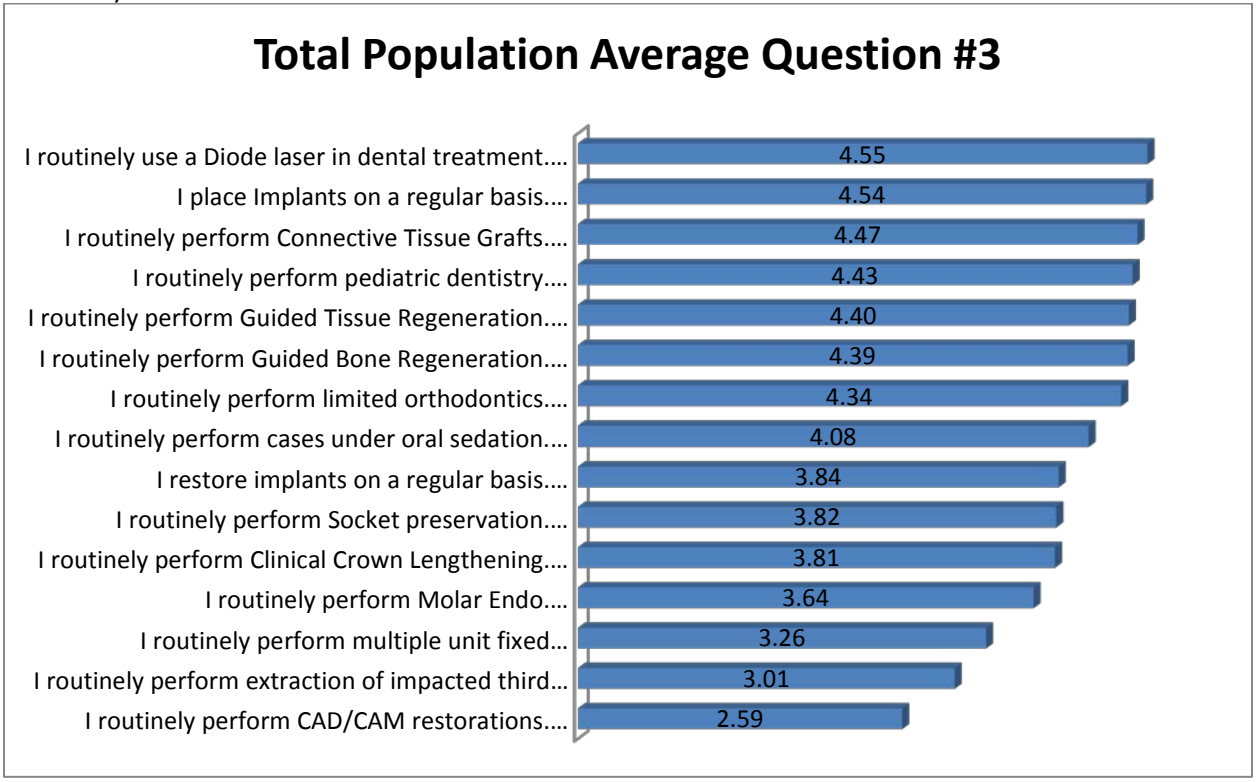
For the questions about “barriers to multiple unit fixed prosthodontics”, “barriers to performing impacted third molar extractions”, and “barriers to performing CAD/CAM restorations”, the majority, about 49%, answered that there are no barriers to performing these procedures (see figures 18-20).

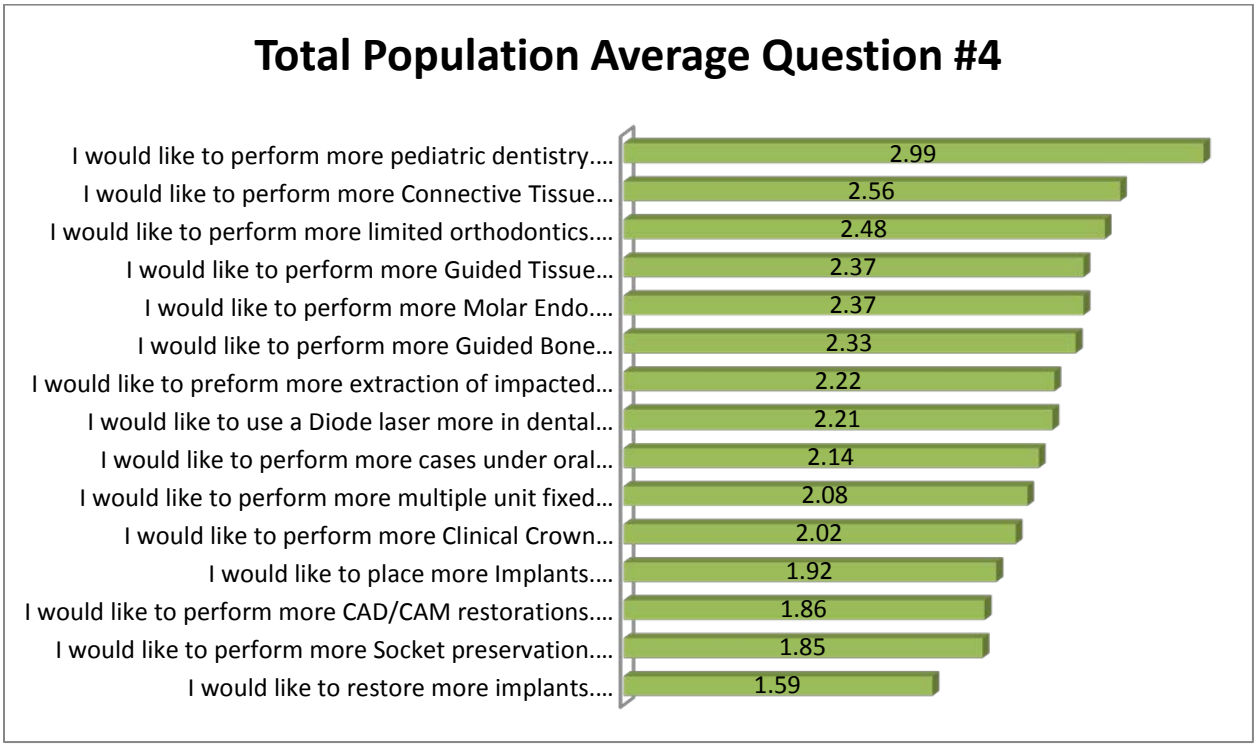
For the questions referring to “barriers to restoring implants” and “barriers to performing clinical crown lengthening”, there was no distinct front runner. The majority of the answers were no barriers 22% of the time, lack of training 21% of the time, lack of leader support 21% of the time, and lack of patients 17% of the time (see figures 21, 22).

For the questions referring to “barriers to performing oral sedation cases”, “barriers to completing molar endodontics”, and “barriers to performing ridge preservation”, lack of training and no barriers were the two most common answers. The majority of the answers were no barriers 26% of the time, lack of training 23% of the time (see figures 23-25).

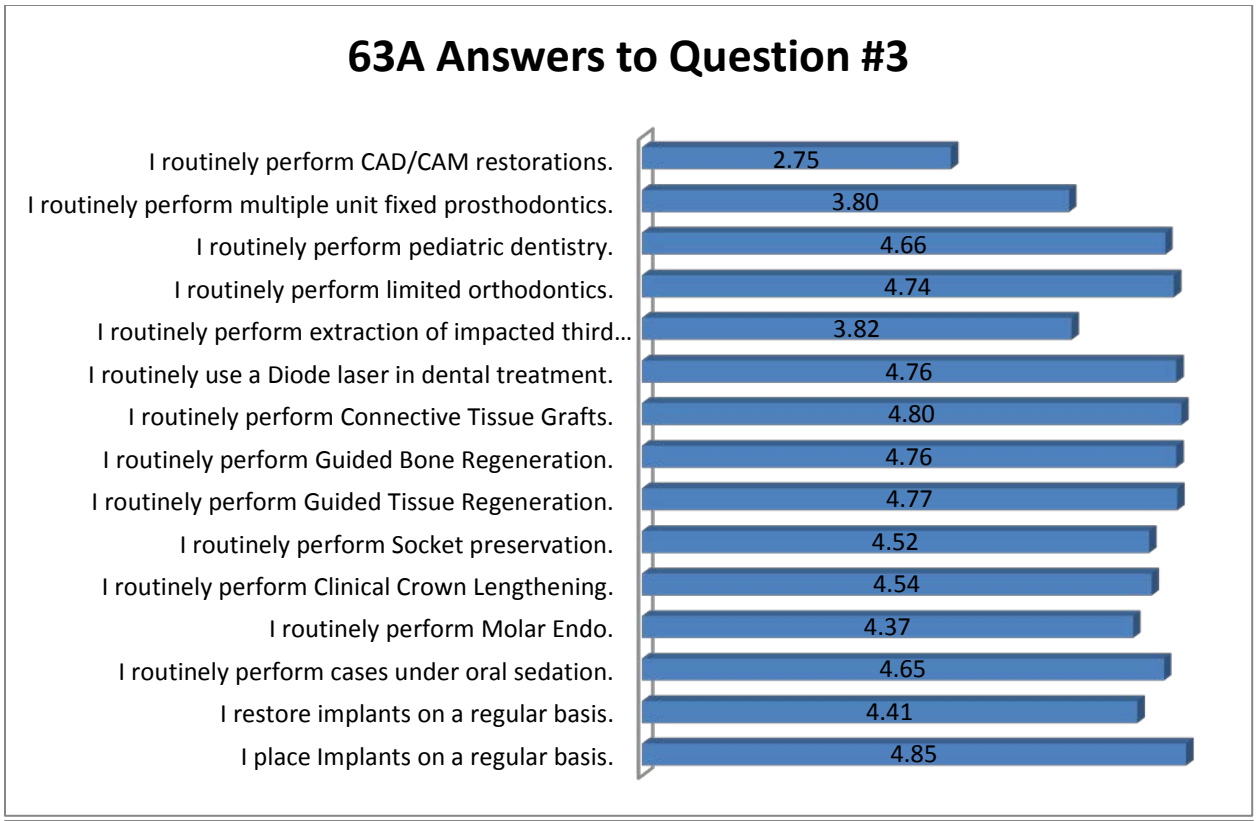
For the final barrier question, barriers to performing pediatric dentistry, the largest number, 62% of respondents, answered a lack of patients. This is not surprising because military dentists generally do not see family members (see figure 26).

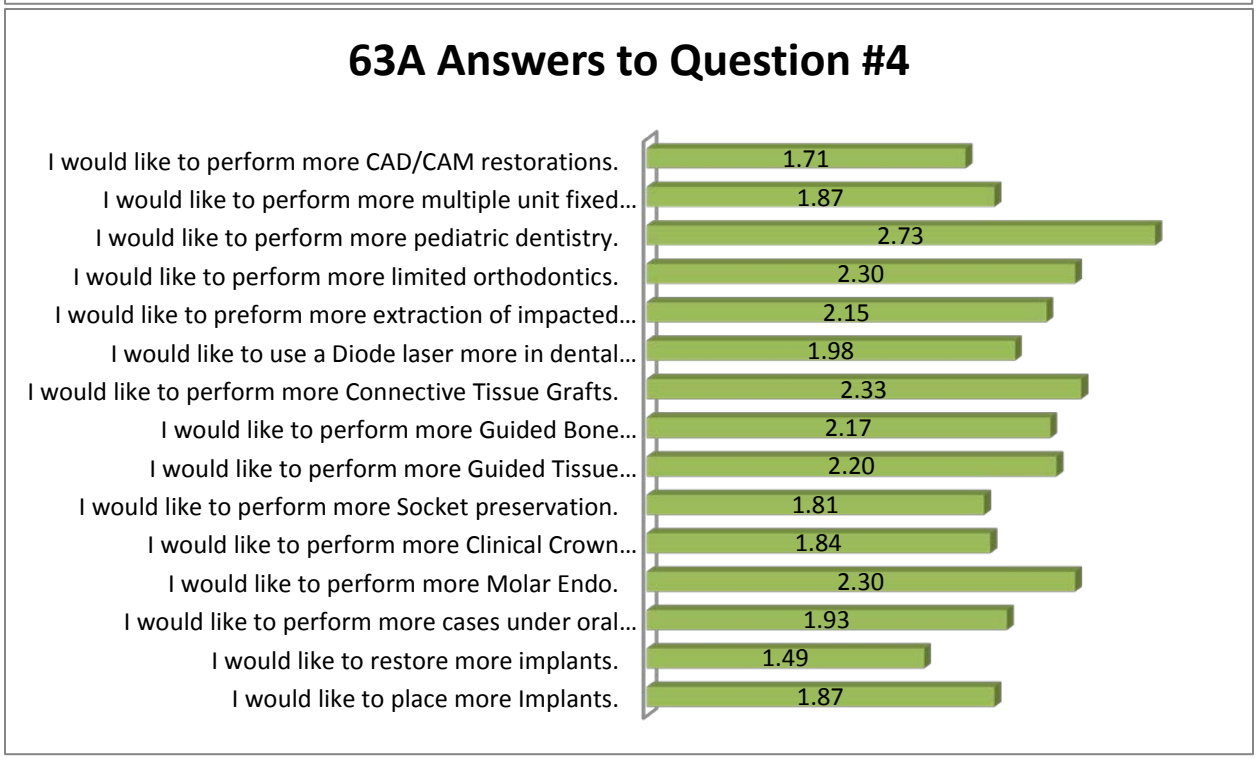
TABLES/FIGURES



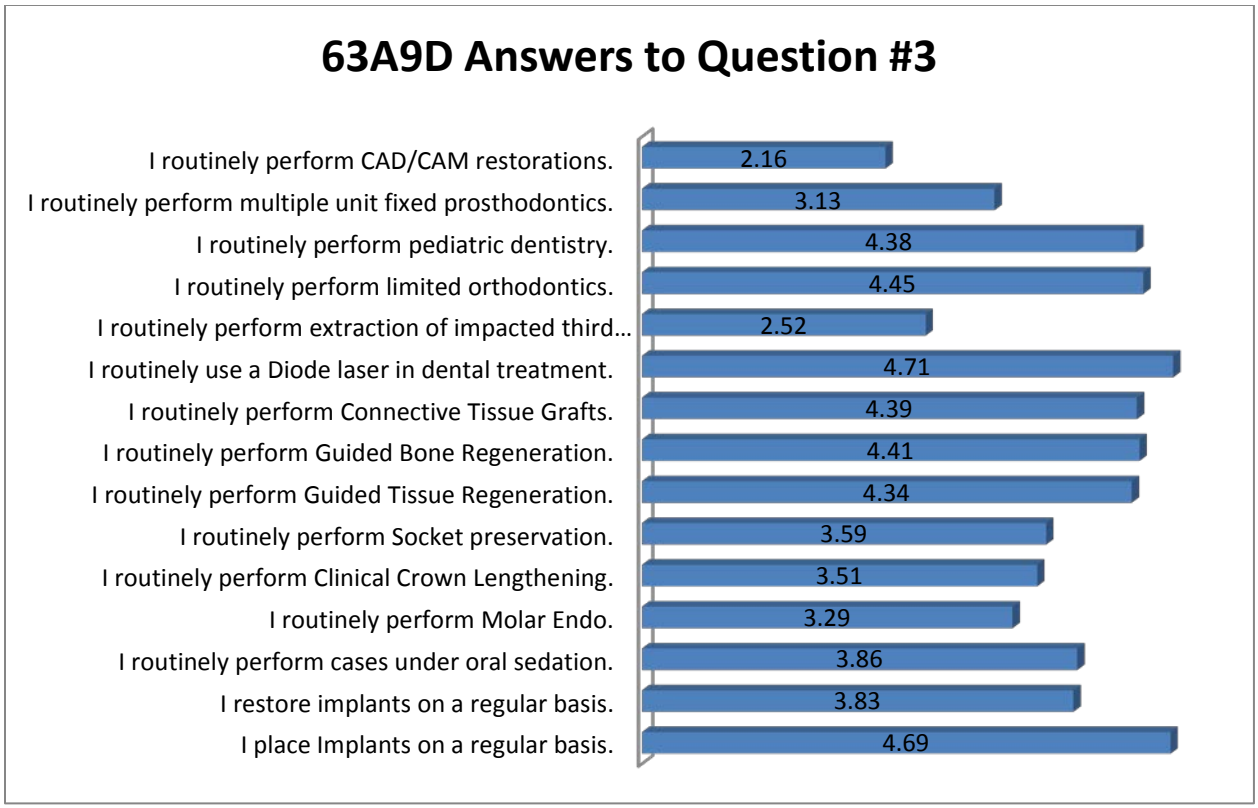


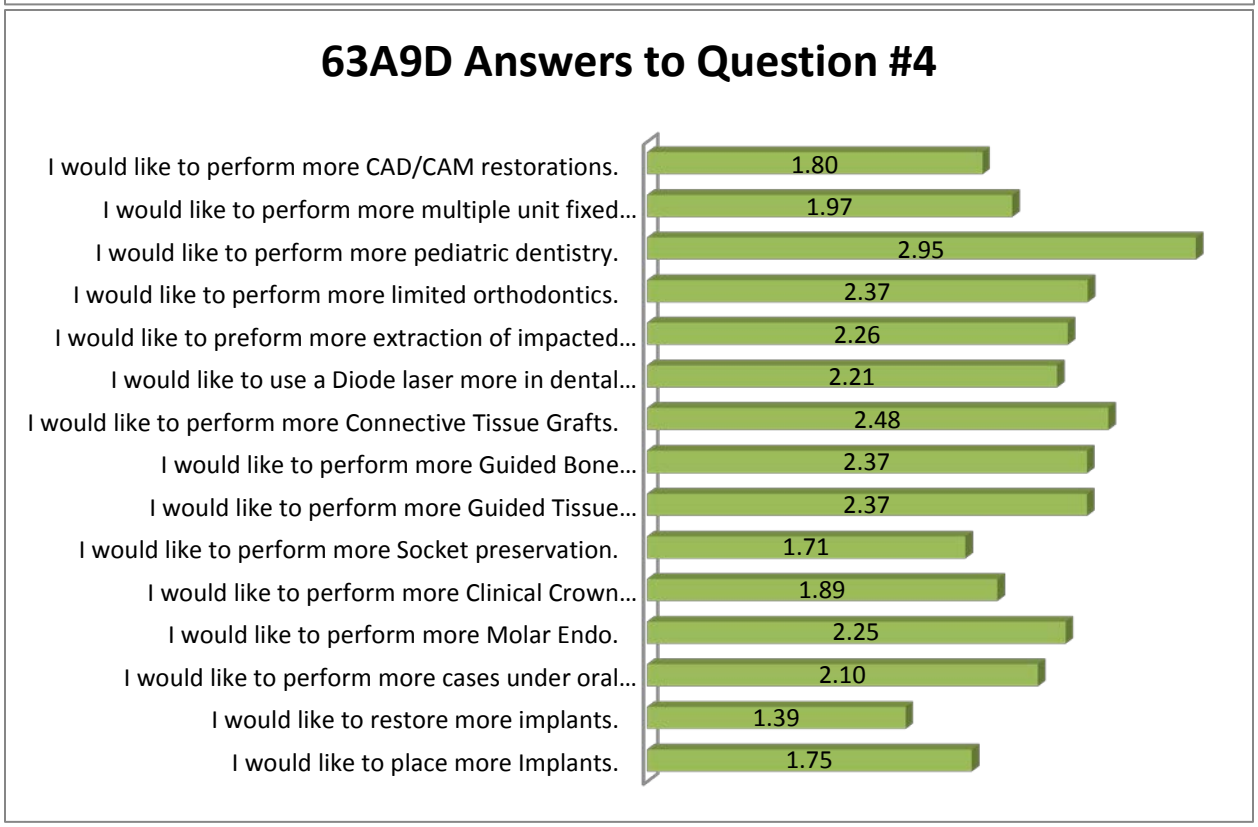
Figures 4, 5: bar graphs showing the responses as a total population to the proposed questions. In both instances the Likert scale is 1 for strongly agree and 5 for strongly disagree.



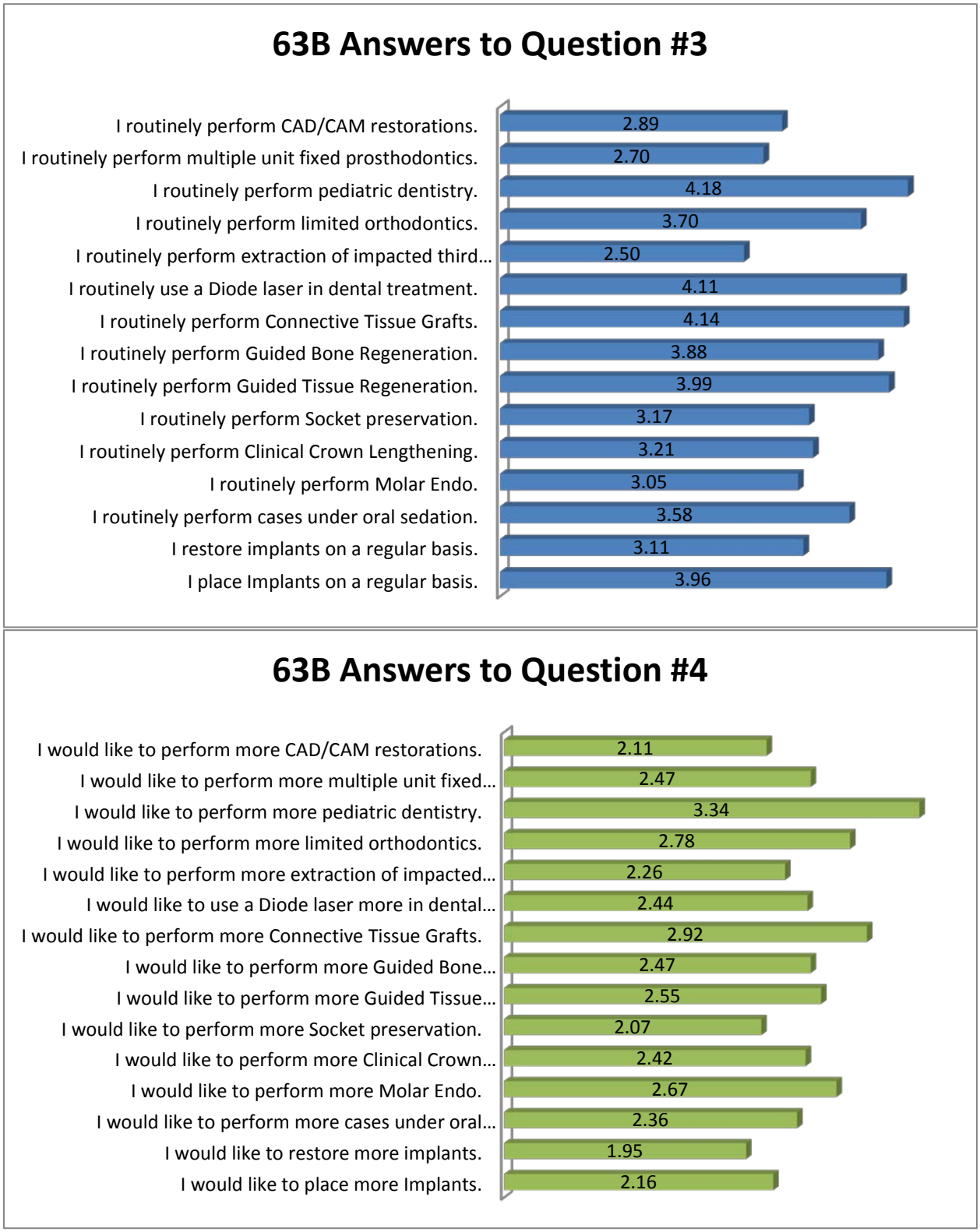


Figures 6, 7: bar graphs showing the 63A responses as a group to the proposed questions. In both instances the Likert scale is 1 for strongly agree and 5 for strongly disagree.

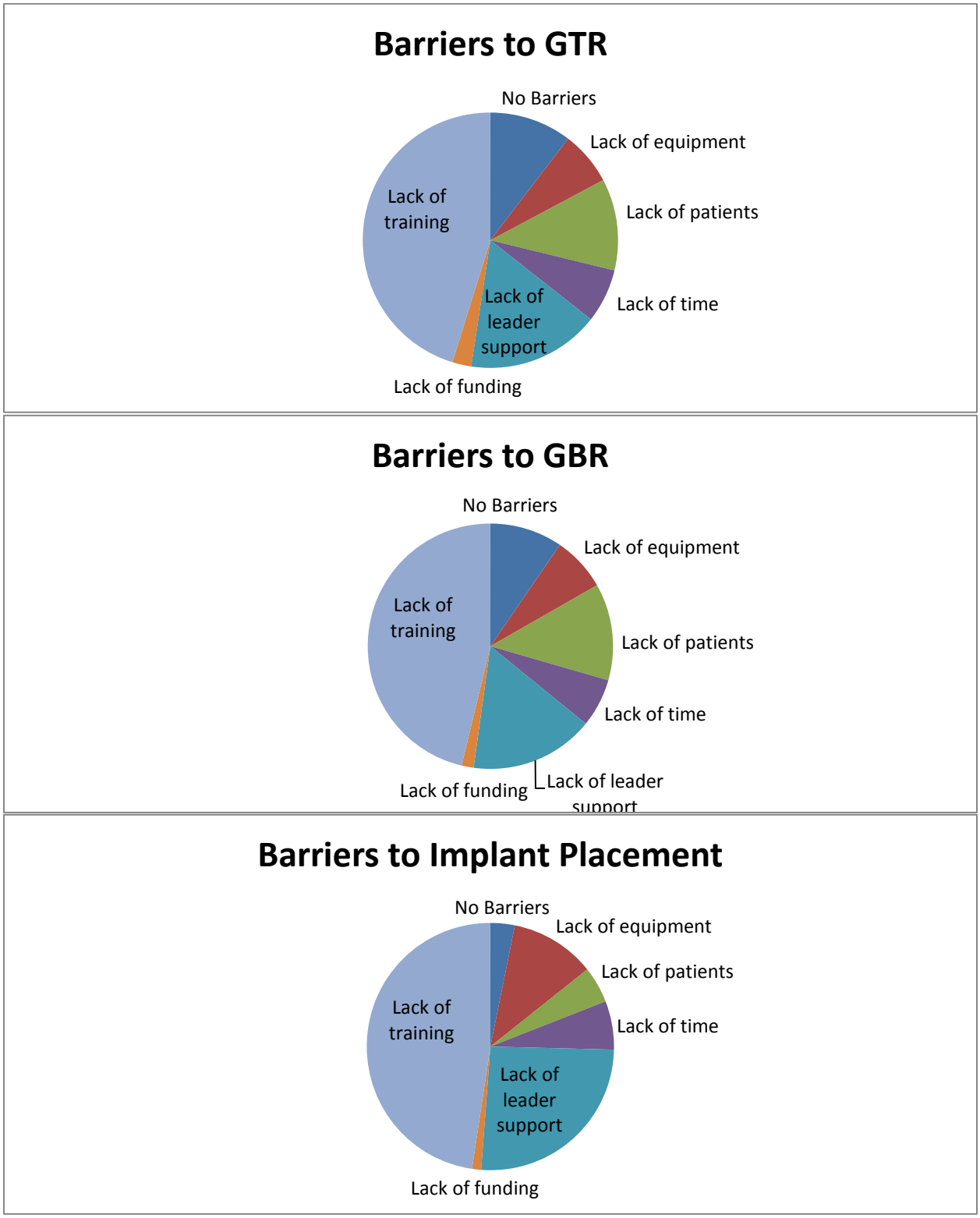




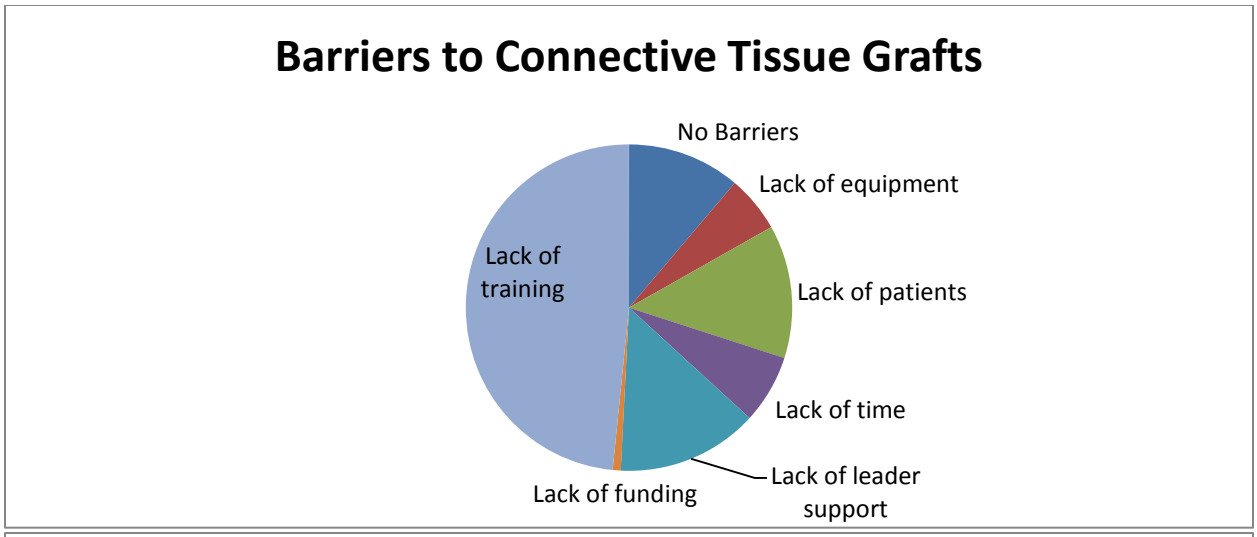
Figures 8, 9: bar graphs showing the 63A9D responses as a group to the proposed questions. In both instances the Likert scale is 1 for strongly agree and 5 for strongly disagree.

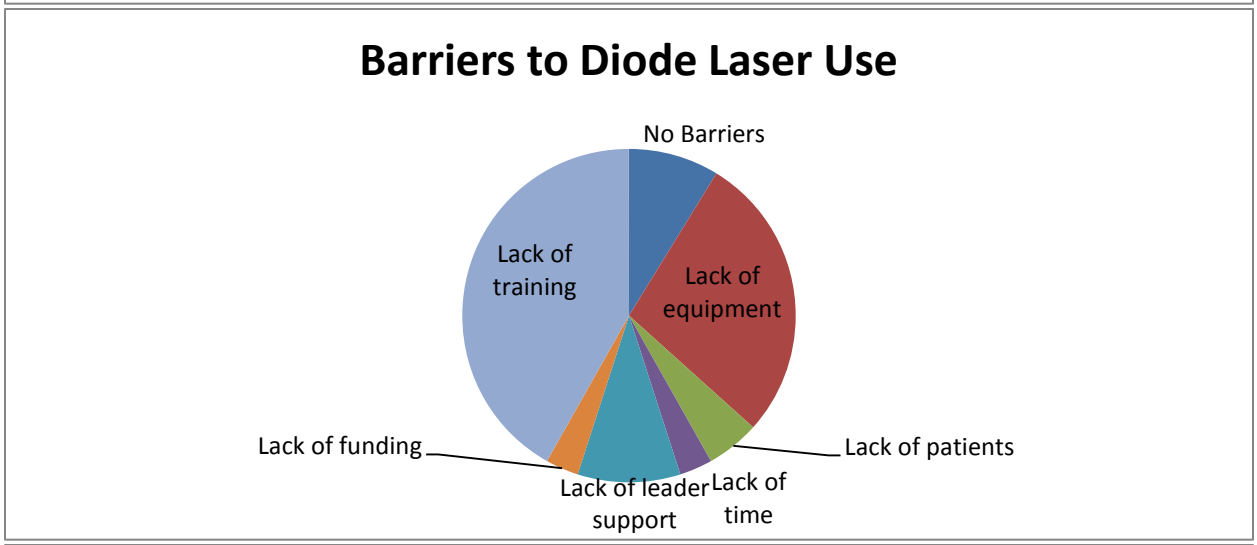


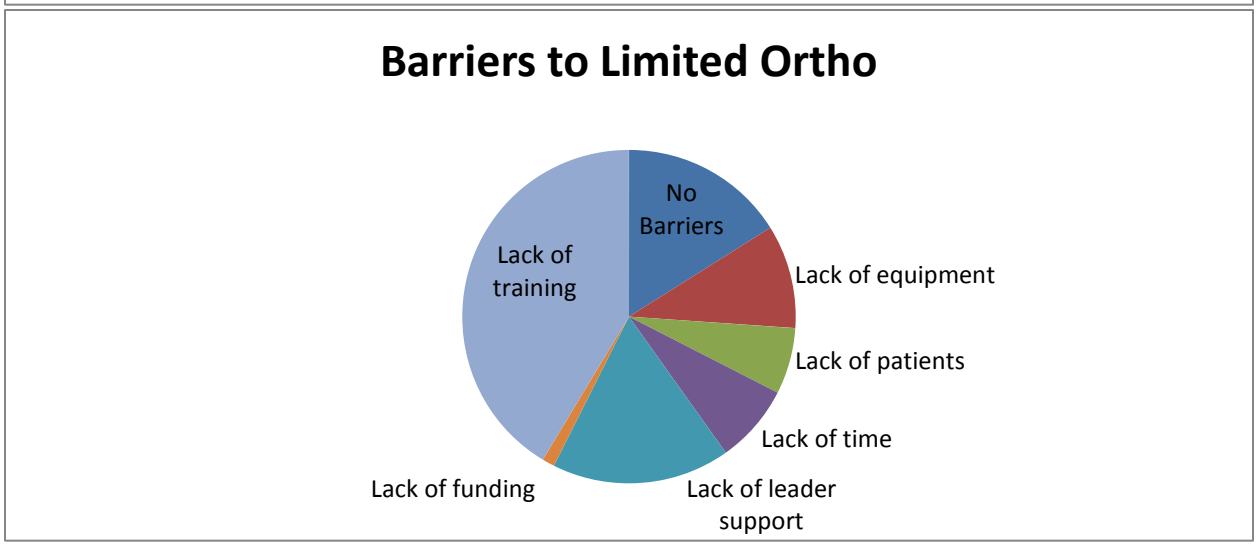
Figures 10, 11: bar graphs showing the 63B responses as a group to the proposed questions. In both instances the Likert scale is 1 for strongly agree and 5 for strongly disagree.



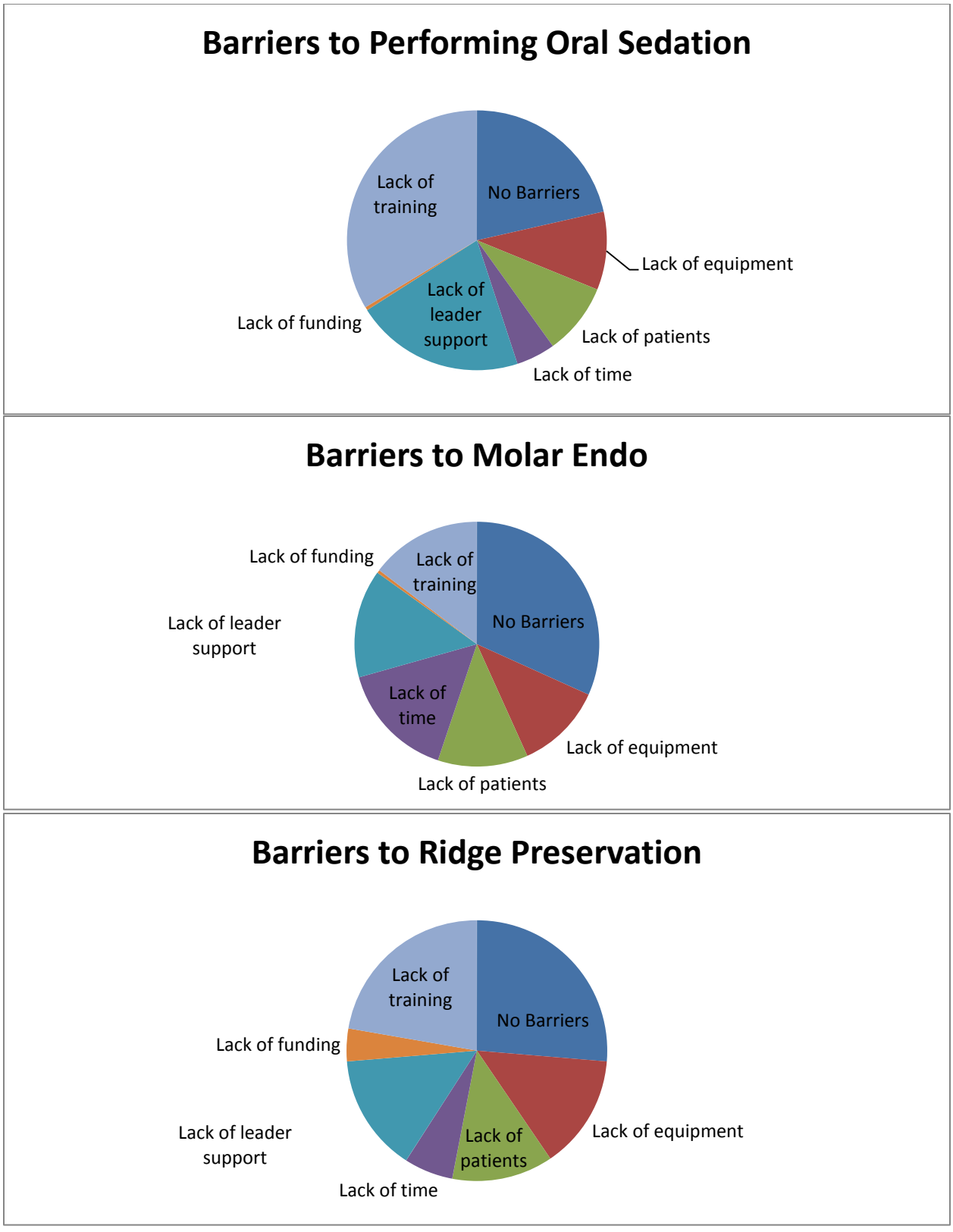
Figures 12, 13, 14: Pie graphs showing many of the barriers to these procedures with the highest selection being a lack of training.



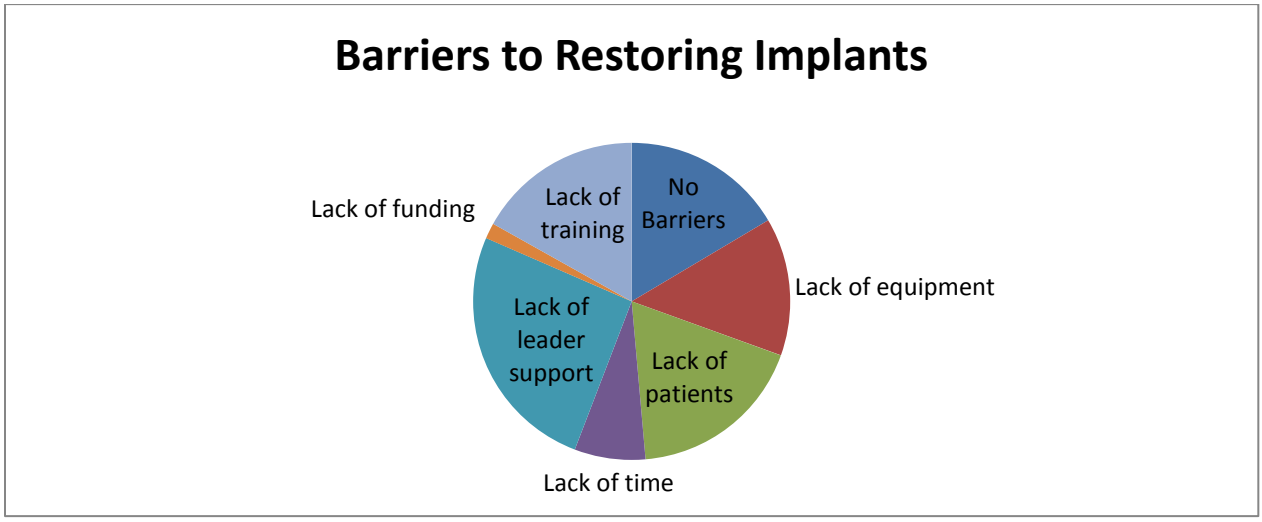


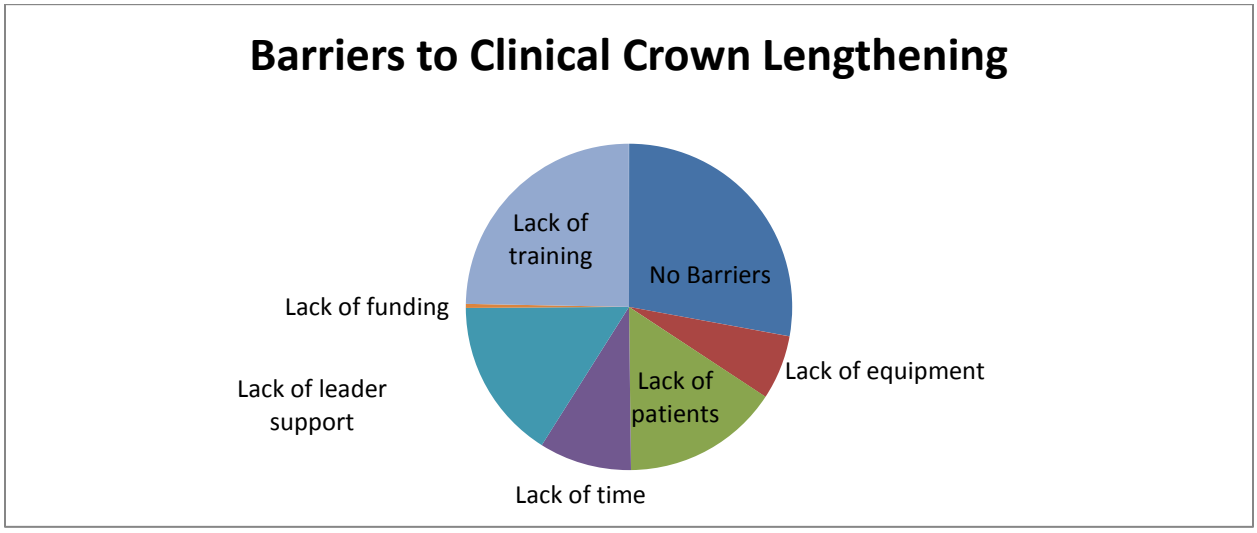


Figures 15, 16, 17: Pie graphs showing many of the barriers to these procedures with the highest selection being a lack of training.

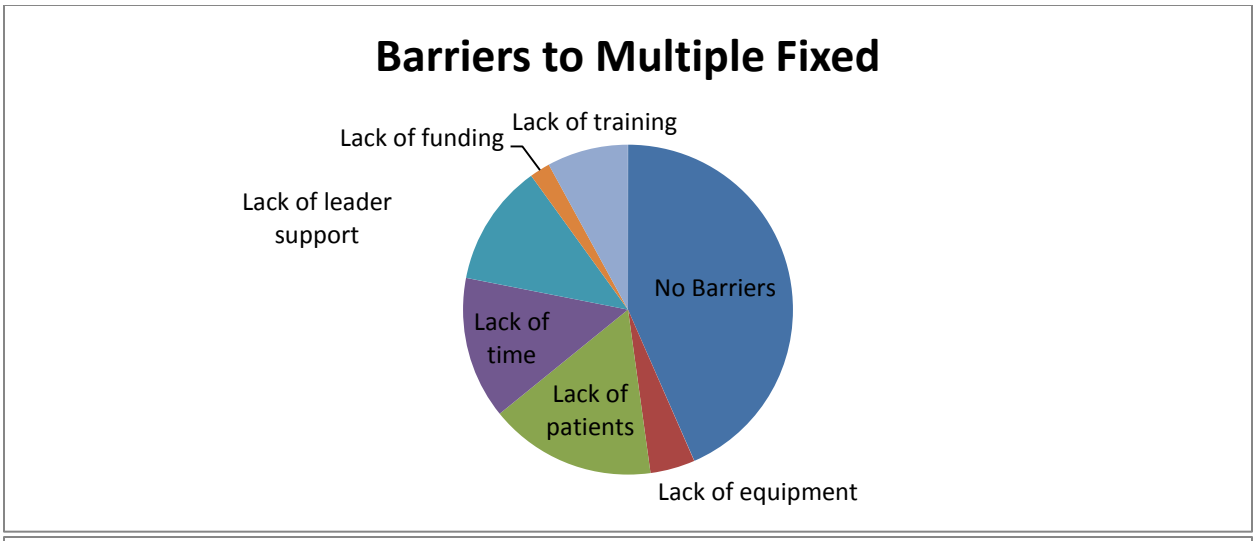


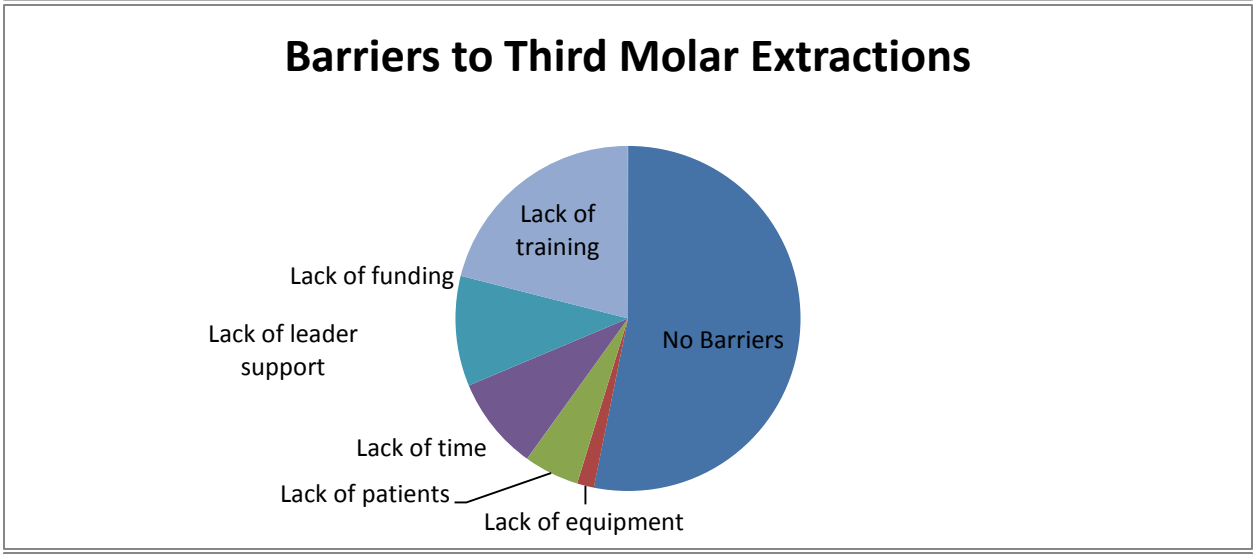
Figures 18, 19, 20: Pie graphs showing many of the barriers to these procedures with the highest selection being a lack of training or no barriers.

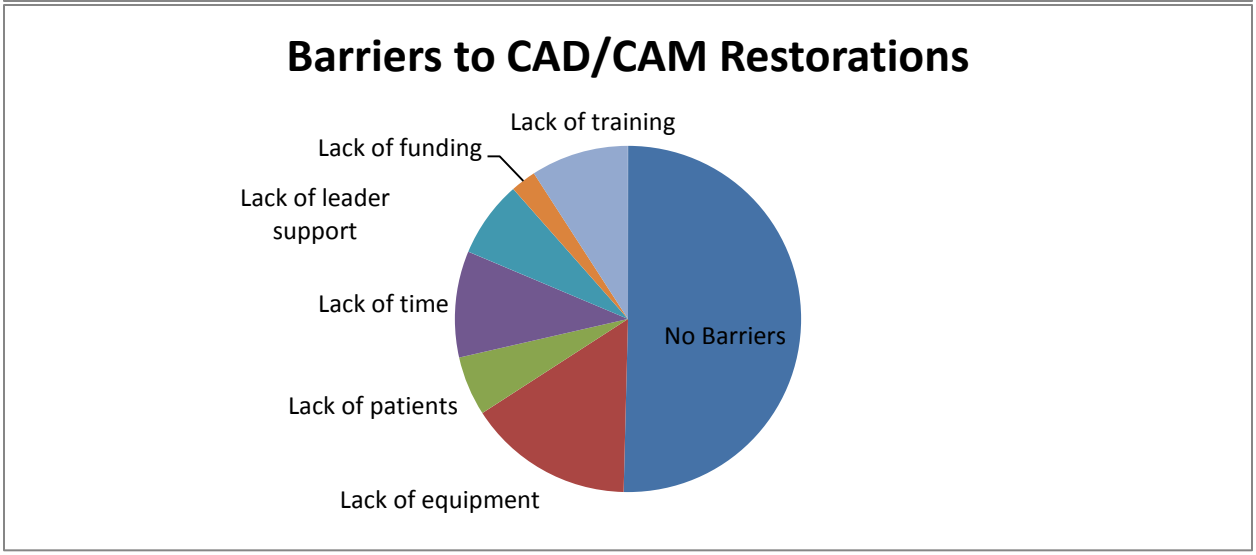




Figures 21, 22: Pie graphs showing many of the barriers to these procedures with no distinct front runner.







Figures 23, 24, 25: Pie graphs showing many of the barriers to these procedures with the highest selection being no barriers to performing the procedures.

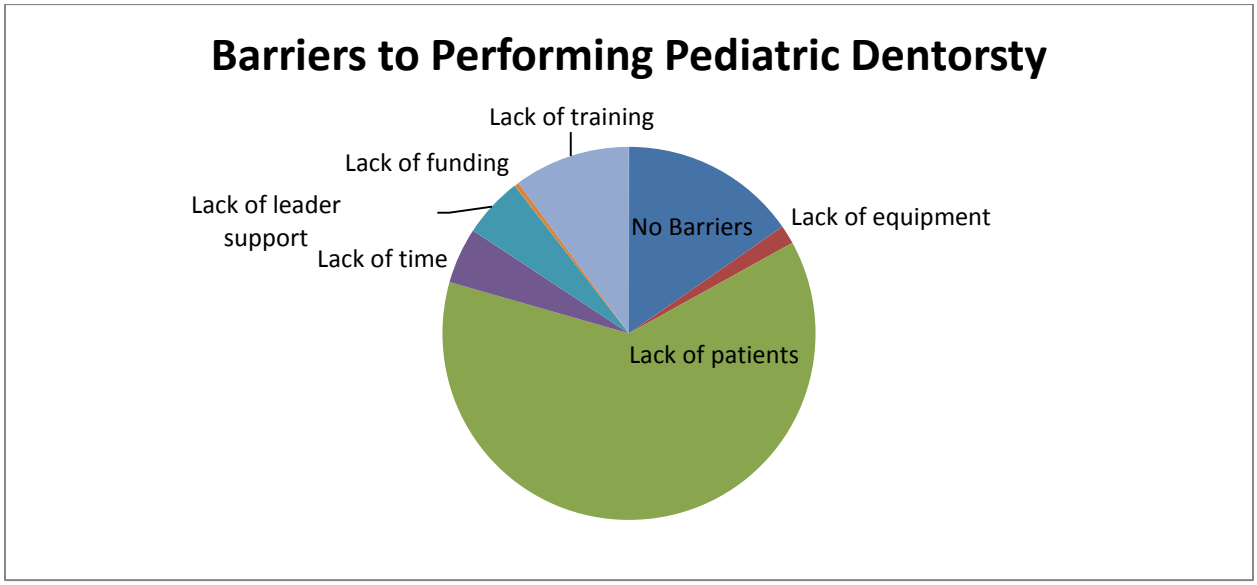


Figure 26: Pie graphs showing many of the barriers to performing pediatric dentistry with the majority being a lack of patients.

DISCUSSION

In general one would expect that as the level of education rises the number of complicated procedures performed would also increase. This was the overall trend with the data that was collected. The data points (blue line) shown in figure 27 show a linear trend being described by the equation y= ½x+1.6 with x being the number of years of additional education after dental school and y being the perception of procedures being completed based on the Likert scale. While the data in nearly linear it is difficult to extrapolate an exact linear trend due to the fact that there are only three data points. Since there are no training programs that are longer than two years this data trend must be accepted for the limited number of years in training. It is likely that were programs available that extended beyond the two years that the trend would level off.

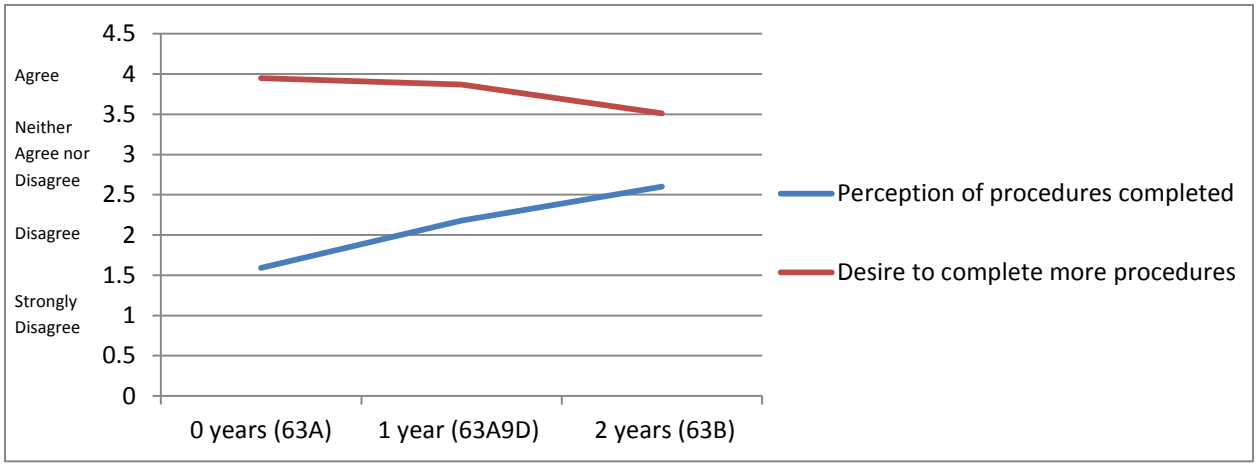


Figure 27: Graph showing the correlation between responses and skill identifier. In the blue line perception of procedures completed there appears to be a general correlation between time in training and the frequency of overall procedures being completed. In the second line the desire to complete more procedures there is a trend of wanting to complete more procedures is inversely related to time in training though not as linear as the first line. In this case the "x" axis is number of years of education completed after dental school, and the "y" axis is the Likert scale with 5 being strongly agree and 1 being strongly disagree.

The desire to complete more procedures appeared to have the opposite relationship to time in training. This is expected as well; as more procedures are being completed, there would be a decrease in the desire to complete more procedures.

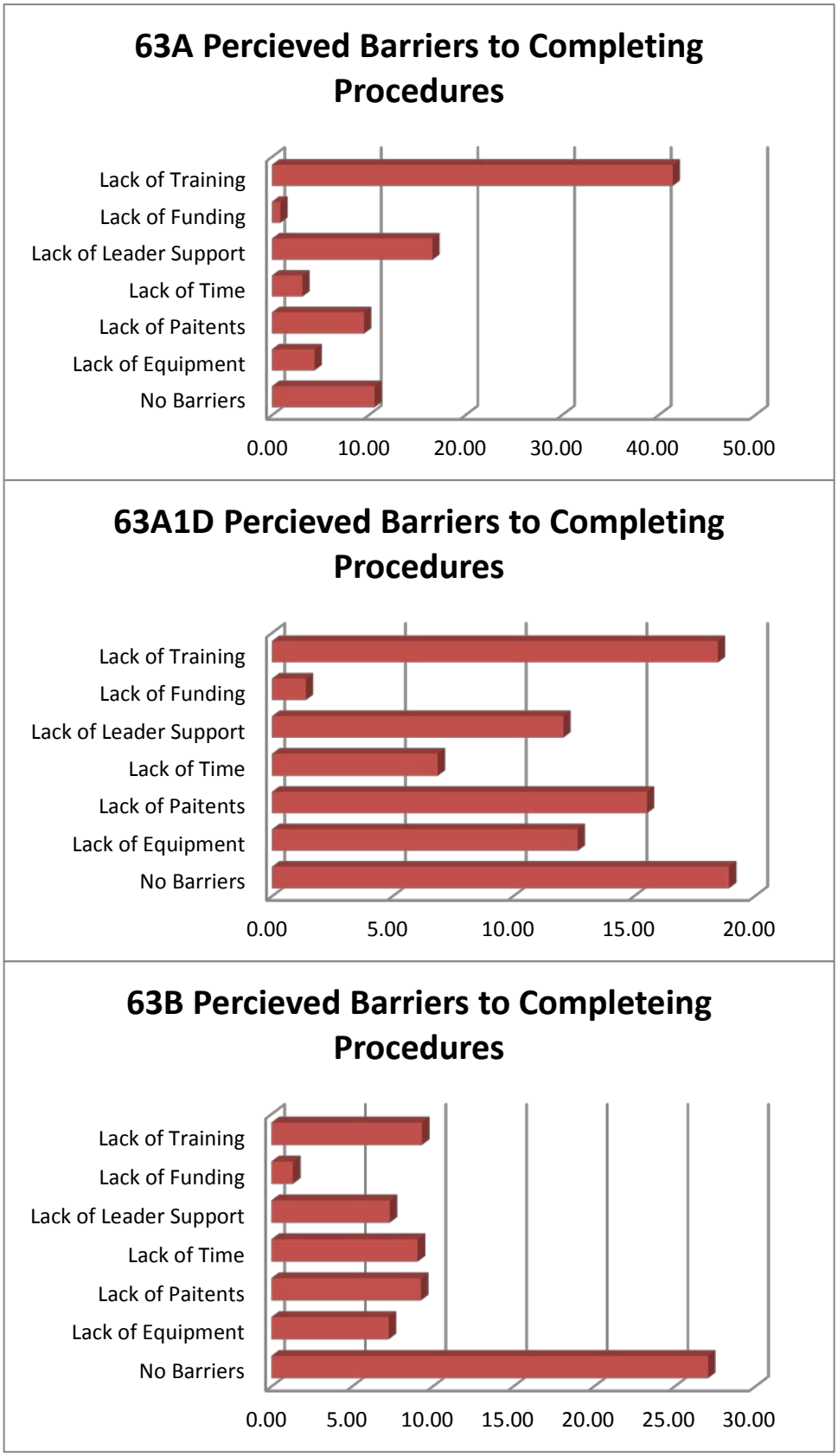
When evaluating individual procedures there was one notable exception to the trend of time in education and perception of procedures completed. This exception was the use of CAD/CAM. The 63A group averaged a 2.75, the 63A9D averaged a 2.16, and the 63 Bravo group averaged a 2.89. The perception here is that both the 63A group and the 63A9D are performing more CAD/CAM restorations than the 63B. This was the only question answered where the alpha groups perceived themselves as doing more procedures than the bravo group. This may be due to the fact that on average the 63A and 63A9D groups are both relatively new to the profession with 63A averaging 3.19 years in current MOS, and 63A9D with 2.9 years in current MOS. CAD/CAM technology use in the Army is also relatively new, and it is likely that newer practitioners have received training to do CAD/CAM procedures. Alternatively the 63B group has been practicing in their MOS for on average 8.4 years and have likely not received the training for the newer CAD/CAM technology. There may also be the possibility that the 63B group has already established their practice and see no need to incorporate the CAD/CAM systems into their practice. Meanwhile the 63A and 63A9D groups may be more accepting of the CAD/CAM technology. Using CAD/CAM also eliminates having to have the prosthesis fabricated by the ADL, which can be a daunting task if the provider is not familiar with the submission protocols outlined in the TB MED 148. [8] The answers to the follow-up question of "I would like to perform more CAD/CAM restorations" the 63A group averaged a 1.71, the 63A9D averaged a 1.80, and the 63 Bravo group averaged a 2.11. This data set followed the trend for

that question group. Whatever the reason for the deviation in data, the trend for CAD/CAM will likely resemble the other trends given time as more doctors integrate the technology into their practice.

A study of CAD/CAM usage in the Army by Kroll in 2015 [9] showed that 60.68% of Army providers have never received training on how to integrate CAD/CAM technology into their daily clinical practice, and the lack of hands-on training on CAD/CAM materials and usage of the CAD/CAM machines were emphasized as the key learning points needed by all providers. Of respondents, 92.53% of providers would utilize CAD/CAM more often if training was readily available, and 15.98% of dental providers in the Army have received no training on CAD/CAM technology.

The third molar extraction question was also a unique situation with the data indicating that both 63A9Ds and 63Bs as perceiving that they are extracting wisdom teeth with similar regularity. Both groups answered at about 2.5 on average for their perceptions of how frequently they remove impacted third molars. This was the only data set that showed this type of deviation from the norm, that despite the advanced education of the 63B that they perceive they are removing impacted wisdom teeth at the same rate as the 63A9D. When a Spearman rank correlation analysis on deployment and multiple diagnostic codes was applied, the highest direct correlation of all the data sets was between the skill identifier and extraction of impacted third molars ($rho = 0.463$, $p < 0.001$, $n = 255$). When compared to the 63A who had an average of 3.82 it is evident that with a little training, extraction of third molars is done relatively frequently.

When separating the perceived barriers into the three different provider groups, another interesting observation can be made. With the 63A group the most common perceived barrier is the lack of training. For the 63A9D group there was no distinct category for perceived barriers though lack of barriers and lack of training received the highest counts. For the 63B group as a whole the most common perception was that there are no barriers to completing the procedures. The only answer that stood out as



Figures 28, 29, 30: Bar graphs showing averaged answers to perceived barriers by groups.

common among all three provider groups was that a lack of funding did not appear to a perceived barrier. This implies that perceptions among general practitioners and comprehensive dentists alike are that the Army Dental Corps supports practitioners with adequate funds for equipment, instruments, and materials.

When referring to perceived barriers to individual procedures many of the respondents answered that a lack of training was the biggest barrier. This was especially true for the more specialized procedures such as guided tissue regeneration (GTR), guided bone regeneration (GBR), connective tissue grafts (CT graft), implant placement, and to a lesser extent, limited orthodontics and diode laser usage. The first three of those listed are generally performed by a periodontist, even in the civilian sector. In a 2005-06 survey of dental procedures conducted by the American Dental Association (ADA) of the estimated 902,540 procedures, 100% of GTR, GBR, and CT grafts were done by periodontists [(6)]. It is interesting to note that any or all of the three procedures are completed by an Army comprehensive dentist, although not on a regular basis.

In the same ADA study they found that on average, in one year general dentists placed 24 implants, oral surgeons placed 99 implants, periodontist placed 120 implants, and prosthodontist placed 91 implants. While this study is a bit dated, it shows that civilian general dentists placed a fair number of implants every year, even if it was only a fraction of what specialists placed. This project showed that the greatest perceived barriers to implant placement is lack of training and a lack of leader support. A survey of general dentists in 2012 by Lang-Hua[(10)] showed that there were varying opinions about how, where and when to place

implants, and that those opinions were not necessarily in line with evidence-based knowledge. There are several other aspects to possible barriers to implant placement. The Army has a stricter policy for implant placement than the civilian sector. An implant board is utilized to evaluate patients for possible implant placement. The use of tobacco products automatically disqualifies one from receiving implants, until they can demonstrate they discontinued use of the products. Other factors such as poor patient oral hygiene, limited time on station, and presence of bony defects may limit access for patients to receive implants in certain situations. While in training, comprehensive dentists are expected to demonstrate competency in implant placement over the two-year training period. One view on implants may be that implants are expensive to place, expensive to restore, expensive to maintain, and require motivated, understanding patients who are interested in their own oral health and are willing to maintain the expensive oral prosthesis to ensure long-term success. Along with expense and fully invested patient concerns, significant provider time must be devoted to ensure success of these procedures. It may be this view that gave lack of leadership support the second most common response behind lack of training. These issues may not be as common in the civilian sector since patients are paying for the implants, are invested in their success, and the providers are well compensated for the time doing these procedures.

Performing limited orthodontics was another area with lack of training being the highest response; the next two about equal were lack of leader support and no barriers. In private practices according to the ADA survey, general practitioners on average saw 5 comprehensive orthodontic patients per year and no limited orthodontic cases. Compare this to orthodontists who saw 2,124 comprehensive cases but only 217 limited cases per year. This data is consistent

with what was found in this study that general and comprehensive dentist in the Army are not completing a large number of limited orthodontics cases. This trend is reflected in the survey question “I routinely perform limited orthodontics.” The average score on the Likert scale was a 4.08, meaning that on average respondents disagreed with the statement.

Restoring implants, clinical crown lengthening, oral sedation, molar endodontics, and ridge preservation all showed that there was high variation to the perceived barriers to providing services. For these statements lack of training, lack of leader support, lack of patients, lack of equipment, and no barriers all appear with regularity. The one noteworthy item for these perceived barriers is that none of them noted a lack of funds for a perceived barrier.

There were three statements where no barriers were the most common response. These areas were multiple unit fixed prosthodontics, impacted third molar extraction, and CAD/CAM restorations. These were also the three areas that the total population perceived that they were routinely completing the most procedures. CAD/CAM was the only topic that was reportedly performed on a routine basis with an average score of 2.59 meaning that respondents slightly agree with the statement, “I routinely perform CAD/CAM restorations.” All other statements regarding the perceptions of routinely performed procedures ranged from 3.01 (neither agree nor disagree) to 4.55 (strongly disagree).

The largest outlier in the group of barrier questions was the questions to performing pediatric dentistry. The main response was a lack of patients followed distantly by no barriers. Since military dentist rarely see patients other than service members, it is not surprising that a lack of patients was the number one response. Interestingly the statement, “I would like to

perform more pediatric dentistry" received the least amount of enthusiasm. The average response to the question was 2.99 meaning that average provider "neither agreed nor disagreed with the statement." Of all the desire questions asked in this study, the desire to perform more pediatric dentistry question scored the lowest across all three groups.

CONCLUSION

The first null hypothesis that there are no perceived differences to the dental services performed by Army General Dentists (63A) and Comprehensive Dentists (63B) has been rejected.

The second null hypothesis that there are no perceived differences among the services General or Comprehensive Dentists would like to perform has been rejected.

The third null hypothesis that there are no perceived barriers to care reported by General or Comprehensive Dentists has been rejected.

This study has shown that there is a perceived difference to the dental services performed by Army general dentists and Army comprehensive dentists. This project demonstrates a linear relationship between time spent in advanced training and a providers' perception of procedures being completed. This project also showed an inverse relationship between time spent in advanced training and desire to perform additional procedures. As the years in training increased, the desire to do more procedures decreased. Finally there are perceived barriers to delivery of care that differ between general dentists and comprehensive dentists. The general dentist with no advanced training noted a lack of training as the largest barrier to performing advanced procedures. General dentists with one year of additional training saw nearly equal parts lack of training and no barriers followed closely by lack of patients, lack of equipment, and lack of leader support. The comprehensive dentists, however, generally observed no barriers to performing the advanced procedures in question.

References

1. Army Regulation 40–68 Medical Services Clinical Quality Management (22 May 2009). Washington DC: DEPARTMENT OF THE ARMY.
2. Army Regulation 40–3 Medical Services: Medical, Dental, and Veterinary Care (23 April 2013). Washington DC: DEPARTMENT OF THE ARMY.
3. Moss D. The 2008 Army Recruit oral health survey results. U.S. Army Medical Department Journal [serial online]. January 2011; 62-67.
4. York, A. K., Moss, D. L., & Martin, G. (2008). A longitudinal study of dental experience during the first four years of military experience. Military medicine, 173, 38-41.
5. U.S Army Dental Command. Go First Class. Web. 13 Feb 2015. http://armygfc.info/
6. American Dental Association. "Survey Center. 2005-06 Survey of dental services rendered." Chicago: American Dental Association (2007).
7. Clark D, Oyen O, Feil P. The use of specific dental school--taught restorative techniques by practicing clinicians. International Journal of Prosthodontics [serial online]. January 2002; 15(1):42. Available from: Dentistry & Oral Sciences Source, Ipswich, MA. Accessed December 29, 2014.
8. TB MED 148 DISEASE PREVENTION AND CONTROL U.S. ARMY DENTAL LABORATORY PROSTHODONTIC SERVICE. (2011). Washington DC: DEPARTMENT OF THE ARMY.
9. Kroll, Michael A. The Impact of Computer Aided Design and Computer Aided Manufacturing on Prosthodontic Care Rendered in Army Dental Clinics. A Thesis Presented to the Faculty of the Advanced Education in General Dentistry, Two-Year Program, United States Army Dental Activity, Fort Hood, Texas. April 2015

10. Lang-Hua B, Lang N, Lo E, McGrath C. Attitudes of general dental practitioners towards implant dentistry in an environment with widespread provision of implant therapy. Clinical Oral Implants Study [serial online]. March 2013; 24(3):278-284. Available from: Dentistry & Oral Sciences Source, Ipswich, MA. Accessed December 29, 2014.

Appendix A: Email to Study Population

Study Title: Utilization of Comprehensive Dentist in an Army Setting

US Army General and Comprehensive Dentists,

We are contacting you to invite you to participate in a study using an anonymous survey that will evaluate services you currently perform, services you would like to perform, and perceived barriers to care/service you would like to perform. Below you will find a SurveyMonkey link that will take you to a 50-question survey which should take you approximately 10-15 minutes to complete.

Participation in this study is optional; you DO NOT have to participate. You may choose NOT to participate without negative consequence. By filling out this survey, you are providing your consent to participate in this study.

Who Will See the Study Results? Information gained from your participation in this study may be published in dental literature, discussed for educational purposes, and may be used to assist with planning future dental curriculum. As no identifiable information is collected, you will not be personally identified; all information will be presented as anonymous data.

Click on this link to begin your survey:
SurveyMonkey Link Here

Thank you in advance for your participation

If you have any questions, comments, or concerns about the study please contact:

Overall Principal Investigator: CPT Brent Talbot

Phone Number: 254-553-7954

Email: brent.a.talbot.mil@mail.mil

Appendix B: Dental Perceptions Survey **(SurveyMonkey)**

1. What is your skill identifier? If you are in a residency please select that skill identifier
    a. 63A
    b. 63A9D
    c. 63B

2. How long have you been practicing at your current identifier?
    a. 0-3 years
    b. 4-6 years
    c. 7-9 years
    d. 10-12 years
    e. 13-15 years
    f. 16-19 years
    g. 20+ years

3-19: **Services Performed**

	Strongly Agree	Agree	Neither Agree or Disagree	Disagree	Strongly Disagree
I place Implants on a regular basis.	○	○	○	○	○
I restore implants on a regular basis.	○	○	○	○	○
I routinely preform cases under oral sedation.	○	○	○	○	○
I routinely preform Molar Endo.	○	○	○	○	○
I routinely preform Clinical Crown Lengthening.	○	○	○	○	○
I routinely preform Socket preservation.	○	○	○	○	○
I routinely preform Guided Tissue Regeneration.	○	○	○	○	○
I routinely preform Guided Bone Regeneration.	○	○	○	○	○

I routinely preform Guided Tissue Regeneration.					
I routinely preform Guided Bone Regeneration.					
I routinely preform Connective Tissue Grafts.					
I routinely use a Diode laser in dental treatment.					
I routinely preform extraction of impacted third molars.					
I routinely preform limited orthodontics.					
I routinely preform pediatric dentistry.					
I routinely preform multiple unit fixed prosthodontics.					
I routinely preform CAD/CAM restorations.					

20-34: Services Would Like to Perform.

	Strongly Agree	Agree	Neither Agree or Disagree	Disagree	Strongly Disagree
I would like to place more Implants.					
I would like to restore more implants.					
I would like to perform more cases under oral sedation.					
I would like to perform more Molar Endo.					
I would like to perform more Clinical Crown Lengthening.					
I would like to perform more Socket preservation.					
I would like to perform more Guided Tissue Regeneration.					
I would like to perform more Guided Bone Regeneration.					

I would like to perform more Connective Tissue Grafts.					
I would like to use a Diode laser more in dental treatment.					
I would like to preform more extraction of impacted third molars.					
I would like to perform more limited orthodontics.					
I would like to perform more pediatric dentistry.					
I would like to perform more multiple unit fixed prosthodontics.					
I would like to perform more CAD/CAM restorations.					

35-49: What are the barriers that prevent you from completing the desired procedures?

	No Barriers	Lack of equipment	Lack of patients	Lack of time	Lack of leader support	Lack of funding	Lack of training
Place Implants.							
Restore implants.							
Oral sedation.							
Molar Endo.							
Clinical Crown Lengthening.							
Socket preservation.							
Guided Tissue Regeneration.							
Guided Bone Regeneration.							
Connective Tissue Grafts.							
Diode laser more in dental treatment.							
Extraction of impacted third molars.							
Limited orthodontics.							
Pediatric dentistry.							
Multiple unit fixed prosthodontics.							
CAD/CAM restorations.							

Appendix C Complete Statistical analysis

Data analysis. In this study, the investigator will survey general (63A) and comprehensive (63B) dentists in the Army to determine what procedures are being performed by comprehensive dentists that are not being performed by general dentists. The survey contains 45 Likert scale questions on dental procedures. The independent variable is military occupational specialty (general dentist, comprehensive dentist). The dependent variables are 45 questions on dental procedures. The null hypothesis is that there will be no difference in responses between general and comprehensive dentists. The alternative hypothesis is that there will be a difference in responses between general and comprehensive dentists. The appropriate analysis will be Spearman rank correlation to screen for the most significant relationships between military occupational specialty and responses, followed by multiple logistic regression analysis with backward elimination on the five most significant responses, followed by independent sample t-tests corrected for multiple comparisons. If the data are not normally distributed, the equivalent non-parametric tests will be used.

Sample size estimate/power analysis. A survey conducted this year among the same population obtained responses from 151 general (63A) and 91 comprehensive (63B) dentists, a total of 214 responses. We used the sample size calculator at http://www.stat.ubc.ca/~rollin/stats/ssize/n2.html to determine the power. If this survey obtains 200 responses (100 per group), then the investigator will be able to detect a 0.5 standard deviation effect size for up to 5 responses.

Descriptive statistics. Descriptive statistics are shown in Table 1. At least 209 subjects answered all questions. With a sample size of 209, the margin of error is 6.8%. In the frequency tables, any two responses to the same question whose valid percentages differ by 6.8% or more are statically significant.

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
!!!	277	71401445	71401445	71401445.00	.000
!!!	277	17-Sep-2015	05-Oct-2015	19-Sep-2015	03 00:02:31.336
What is your skill identifier? If you are in a residency please select that skill identifier	270	1	3	1.91	.810
How long have you been practicing at your current identifier?	277	1	7	1.87	1.624
I place Implants on a regular basis.	258	1	5	4.53	.887
I restore implants on a regular basis.	257	1	5	3.84	1.377
I routinely perform cases under oral sedation.	258	1	5	4.08	1.231
I routinely perform Molar Endo.	258	1	5	3.64	1.335
I routinely perform Clinical Crown Lengthening.	256	1	5	3.81	1.261
I routinely perform Socket preservation.	256	1	5	3.82	1.239
I routinely perform Guided Tissue Regeneration.	256	1	5	4.40	.834
I routinely perform Guided Bone Regeneration.	257	1	5	4.39	.904
I routinely perform Connective Tissue Grafts.	256	1	5	4.47	.761
I routinely use a Diode laser in dental treatment.	257	1	5	4.56	.804
I routinely perform extraction of impacted third molars.	256	1	5	3.00	1.504
I routinely perform limited orthodontics.	257	1	5	4.34	1.034
I routinely perform pediatric dentistry.	255	1	5	4.42	.944
I routinely perform multiple unit fixed prosthodontics.	256	1	5	3.26	1.418
I routinely perform CAD/CAM restorations.	257	1	5	2.59	1.498

I would like to place more Implants.	256	1	5	1.92	1.136
I would like to restore more implants.	256	1	5	1.59	.858
I would like to perform more cases under oral sedation.	256	1	5	2.14	1.130
I would like to perform more Molar Endo.	256	1	5	2.38	1.299
I would like to perform more Clinical Crown Lengthening.	256	1	5	2.02	1.013
I would like to perform more Socket preservation.	256	1	5	1.85	.946
I would like to perform more Guided Tissue Regeneration.	256	1	5	2.37	1.214
I would like to perform more Guided Bone Regeneration.	256	1	5	2.34	1.216
I would like to perform more Connective Tissue Grafts.	256	1	5	2.56	1.291
I would like to use a Diode laser more in dental treatment.	256	1	5	2.21	1.225
I would like to perform more extraction of impacted third molars.	255	1	5	2.22	1.153
I would like to perform more limited orthodontics.	255	1	5	2.48	1.307
I would like to perform more pediatric dentistry.	253	1	5	2.99	1.430
I would like to perform more multiple unit fixed prosthodontics.	256	1	5	2.07	1.137
I would like to perform more CAD/CAM restorations.	256	1	5	1.86	1.015
Place Implants.	251	1	7	5.34	1.891
Restore implants.	248	1	7	3.83	2.008

Oral sedation.	246	1	7	4.30	2.370
Molar Endo.	251	1	7	3.27	2.096
Clinical Crown Lengthening.	250	1	7	3.78	2.297
Socket preservation.	246	1	7	3.68	2.298
Guided Tissue Regeneration.	249	1	7	5.00	2.159
Guided Bone Regeneration.	250	1	7	5.02	2.153
Connective Tissue Grafts.	249	1	7	5.02	2.204
Diode laser more in dental treatment.	250	1	7	4.56	2.376
Extraction of impacted third molars.	251	1	7	3.06	2.457
Limited orthodontics.	248	1	7	4.68	2.324
Pediatric dentistry.	247	1	7	3.25	1.580
Multiple unit fixed prosthodontics.	250	1	7	2.85	1.961
CAD/CAM restorations.	251	1	7	2.52	2.005
Valid N (list wise)	209				

What is your skill identifier? If you are in a residency please select that skill identifier

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	102	36.8	37.8	37.8
	2	91	32.9	33.7	71.5
	3	77	27.8	28.5	100.0
	Total	270	97.5	100.0	
Missing	System	7	2.5		
Total		277	100.0		

How long have you been practicing at your current identifier?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	186	67.1	67.1	67.1
	2	39	14.1	14.1	81.2
	3	14	5.1	5.1	86.3
	4	11	4.0	4.0	90.3
	5	6	2.2	2.2	92.4
	6	10	3.6	3.6	96.0
	7	11	4.0	4.0	100.0
	Total	277	100.0	100.0	

I place Implants on a regular basis.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	2	.7	.8	.8
	2	16	5.8	6.2	7.0
	3	9	3.2	3.5	10.5
	4	46	16.6	17.8	28.3
	5	185	66.8	71.7	100.0
	Total	258	93.1	100.0	
Missing	System	19	6.9		
Total		277	100.0		

I restore implants on a regular basis.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	21	7.6	8.2	8.2
	2	39	14.1	15.2	23.3
	3	24	8.7	9.3	32.7
	4	50	18.1	19.5	52.1
	5	123	44.4	47.9	100.0
	Total	257	92.8	100.0	
Missing	System	20	7.2		
Total		277	100.0		

I routinely perform cases under oral sedation.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	12	4.3	4.7	4.7
	2	29	10.5	11.2	15.9
	3	26	9.4	10.1	26.0
	4	50	18.1	19.4	45.3
	5	141	50.9	54.7	100.0
	Total	258	93.1	100.0	
Missing	System	19	6.9		
Total		277	100.0		

I routinely perform Molar Endo.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	19	6.9	7.4	7.4
	2	47	17.0	18.2	25.6
	3	38	13.7	14.7	40.3
	4	59	21.3	22.9	63.2
	5	95	34.3	36.8	100.0
	Total	258	93.1	100.0	
Missing	System	19	6.9		
Total		277	100.0		

I routinely perform Clinical Crown Lengthening.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	12	4.3	4.7	4.7
	2	41	14.8	16.0	20.7
	3	37	13.4	14.5	35.2
	4	60	21.7	23.4	58.6
	5	106	38.3	41.4	100.0
	Total	256	92.4	100.0	
Missing	System	21	7.6		
Total		277	100.0		

I routinely perform Socket preservation.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	9	3.2	3.5	3.5
	2	42	15.2	16.4	19.9
	3	43	15.5	16.8	36.7
	4	54	19.5	21.1	57.8
	5	108	39.0	42.2	100.0
	Total	256	92.4	100.0	
Missing	System	21	7.6		
Total		277	100.0		

I routinely perform Guided Tissue Regeneration.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	2	.7	.8	.8
	2	7	2.5	2.7	3.5
	3	25	9.0	9.8	13.3
	4	75	27.1	29.3	42.6
	5	147	53.1	57.4	100.0
	Total	256	92.4	100.0	
Missing	System	21	7.6		
Total		277	100.0		

I routinely perform Guided Bone Regeneration.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	4	1.4	1.6	1.6
	2	9	3.2	3.5	5.1
	3	23	8.3	8.9	14.0
	4	68	24.5	26.5	40.5
	5	153	55.2	59.5	100.0
	Total	257	92.8	100.0	
Missing	System	20	7.2		
Total		277	100.0		

I routinely perform Connective Tissue Grafts.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	1	.4	.4	.4
	2	4	1.4	1.6	2.0
	3	24	8.7	9.4	11.3
	4	72	26.0	28.1	39.5
	5	155	56.0	60.5	100.0
	Total	256	92.4	100.0	
Missing	System	21	7.6		
Total		277	100.0		

I routinely use a Diode laser in dental treatment.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	2	.7	.8	.8
	2	9	3.2	3.5	4.3
	3	12	4.3	4.7	8.9
	4	55	19.9	21.4	30.4
	5	179	64.6	69.6	100.0
	Total	257	92.8	100.0	
Missing	System	20	7.2		
Total		277	100.0		

I routinely perform extraction of impacted third molars.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	50	18.1	19.5	19.5
	2	72	26.0	28.1	47.7
	3	27	9.7	10.5	58.2
	4	41	14.8	16.0	74.2
	5	66	23.8	25.8	100.0
	Total	256	92.4	100.0	
Missing	System	21	7.6		
Total		277	100.0		

I routinely perform limited orthodontics.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	5	1.8	1.9	1.9
	2	19	6.9	7.4	9.3
	3	21	7.6	8.2	17.5
	4	50	18.1	19.5	37.0
	5	162	58.5	63.0	100.0
	Total	257	92.8	100.0	
Missing	System	20	7.2		
Total		277	100.0		

I routinely perform CAD/CAM restorations.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	82	29.6	31.9	31.9
	2	68	24.5	26.5	58.4
	3	29	10.5	11.3	69.6
	4	30	10.8	11.7	81.3
	5	48	17.3	18.7	100.0
	Total	257	92.8	100.0	
Missing	System	20	7.2		
Total		277	100.0		

I routinely perform pediatric dentistry.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	6	2.2	2.4	2.4
	2	9	3.2	3.5	5.9
	3	19	6.9	7.5	13.3
	4	58	20.9	22.7	36.1
	5	163	58.8	63.9	100.0
	Total	255	92.1	100.0	
Missing	System	22	7.9		
Total		277	100.0		

I would like to place more Implants.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	127	45.8	49.6	49.6
	2	61	22.0	23.8	73.4
	3	41	14.8	16.0	89.5
	4	16	5.8	6.3	95.7
	5	11	4.0	4.3	100.0
	Total	256	92.4	100.0	
Missing	System	21	7.6		
Total		277	100.0		

I routinely perform multiple unit fixed prosthodontics.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	33	11.9	12.9	12.9
	2	59	21.3	23.0	35.9
	3	47	17.0	18.4	54.3
	4	43	15.5	16.8	71.1
	5	74	26.7	28.9	100.0
	Total	256	92.4	100.0	
Missing	System	21	7.6		
Total		277	100.0		

I would like to restore more implants.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	149	53.8	58.2	58.2
	2	77	27.8	30.1	88.3
	3	21	7.6	8.2	96.5
	4	4	1.4	1.6	98.0
	5	5	1.8	2.0	100.0
	Total	256	92.4	100.0	
Missing	System	21	7.6		
Total		277	100.0		

I would like to perform more cases under oral sedation.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	93	33.6	36.3	36.3
	2	75	27.1	29.3	65.6
	3	58	20.9	22.7	88.3
	4	18	6.5	7.0	95.3
	5	12	4.3	4.7	100.0
	Total	256	92.4	100.0	
Missing	System	21	7.6		
Total		277	100.0		

I would like to perform more Socket preservation.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	108	39.0	42.2	42.2
	2	100	36.1	39.1	81.3
	3	32	11.6	12.5	93.8
	4	10	3.6	3.9	97.7
	5	6	2.2	2.3	100.0
	Total	256	92.4	100.0	
Missing	System	21	7.6		
Total		277	100.0		

I would like to perform more Molar Endo.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	86	31.0	33.6	33.6
	2	63	22.7	24.6	58.2
	3	56	20.2	21.9	80.1
	4	27	9.7	10.5	90.6
	5	24	8.7	9.4	100.0
	Total	256	92.4	100.0	
Missing	System	21	7.6		
Total		277	100.0		

I would like to perform more Guided Tissue Regeneration.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	80	28.9	31.3	31.3
	2	65	23.5	25.4	56.6
	3	61	22.0	23.8	80.5
	4	36	13.0	14.1	94.5
	5	14	5.1	5.5	100.0
	Total	256	92.4	100.0	
Missing	System	21	7.6		
Total		277	100.0		

I would like to perform more Clinical Crown Lengthening.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	94	33.9	36.7	36.7
	2	90	32.5	35.2	71.9
	3	50	18.1	19.5	91.4
	4	16	5.8	6.3	97.7
	5	6	2.2	2.3	100.0
	Total	256	92.4	100.0	
Missing	System	21	7.6		
Total		277	100.0		

I would like to perform more Guided Bone Regeneration.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	82	29.6	32.0	32.0
	2	68	24.5	26.6	58.6
	3	60	21.7	23.4	82.0
	4	30	10.8	11.7	93.8
	5	16	5.8	6.3	100.0
	Total	256	92.4	100.0	
Missing	System	21	7.6		
Total		277	100.0		

I would like to perform more Connective Tissue Grafts.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	71	25.6	27.7	27.7
	2	58	20.9	22.7	50.4
	3	61	22.0	23.8	74.2
	4	44	15.9	17.2	91.4
	5	22	7.9	8.6	100.0
	Total	256	92.4	100.0	
Missing	System	21	7.6		
Total		277	100.0		

I would like to perform more limited orthodontics.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	71	25.6	27.8	27.8
	2	79	28.5	31.0	58.8
	3	43	15.5	16.9	75.7
	4	36	13.0	14.1	89.8
	5	26	9.4	10.2	100.0
	Total	255	92.1	100.0	
Missing	System	22	7.9		
Total		277	100.0		

I would like to use a Diode laser more in dental treatment.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	92	33.2	35.9	35.9
	2	78	28.2	30.5	66.4
	3	44	15.9	17.2	83.6
	4	24	8.7	9.4	93.0
	5	18	6.5	7.0	100.0
	Total	256	92.4	100.0	
Missing	System	21	7.6		
Total		277	100.0		

I would like to perform more pediatric dentistry.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	54	19.5	21.3	21.3
	2	47	17.0	18.6	39.9
	3	50	18.1	19.8	59.7
	4	52	18.8	20.6	80.2
	5	50	18.1	19.8	100.0
	Total	253	91.3	100.0	
Missing	System	24	8.7		
Total		277	100.0		

I would like to perform more extraction of impacted third molars.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	85	30.7	33.3	33.3
	2	78	28.2	30.6	63.9
	3	56	20.2	22.0	85.9
	4	23	8.3	9.0	94.9
	5	13	4.7	5.1	100.0
	Total	255	92.1	100.0	
Missing	System	22	7.9		
Total		277	100.0		

I would like to perform more multiple unit fixed prosthodontics.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	104	37.5	40.6	40.6
	2	69	24.9	27.0	67.6
	3	55	19.9	21.5	89.1
	4	16	5.8	6.3	95.3
	5	12	4.3	4.7	100.0
	Total	256	92.4	100.0	
Missing	System	21	7.6		
Total		277	100.0		

I would like to perform more CAD/CAM restorations.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	119	43.0	46.5	46.5
	2	79	28.5	30.9	77.3
	3	41	14.8	16.0	93.4
	4	9	3.2	3.5	96.9
	5	8	2.9	3.1	100.0
	Total	256	92.4	100.0	
Missing	System	21	7.6		
Total		277	100.0		

Place Implants.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	8	2.9	3.2	3.2
	2	28	10.1	11.2	14.3
	3	12	4.3	4.8	19.1
	4	16	5.8	6.4	25.5
	5	65	23.5	25.9	51.4
	6	3	1.1	1.2	52.6
	7	119	43.0	47.4	100.0
	Total	251	90.6	100.0	
Missing	System	26	9.4		
Total		277	100.0		

Restore implants.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	41	14.8	16.5	16.5
	2	35	12.6	14.1	30.6
	3	45	16.2	18.1	48.8
	4	18	6.5	7.3	56.0
	5	64	23.1	25.8	81.9
	6	4	1.4	1.6	83.5
	7	41	14.8	16.5	100.0
	Total	248	89.5	100.0	
Missing	System	29	10.5		

Restore implants.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	41	14.8	16.5	16.5
	2	35	12.6	14.1	30.6
	3	45	16.2	18.1	48.8
	4	18	6.5	7.3	56.0
	5	64	23.1	25.8	81.9
	6	4	1.4	1.6	83.5
	7	41	14.8	16.5	100.0
	Total	248	89.5	100.0	
Missing	System	29	10.5		
Total		277	100.0		

Oral sedation.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	53	19.1	21.5	21.5
	2	24	8.7	9.8	31.3
	3	22	7.9	8.9	40.2
	4	11	4.0	4.5	44.7
	5	52	18.8	21.1	65.9
	6	1	.4	.4	66.3
	7	83	30.0	33.7	100.0
	Total	246	88.8	100.0	
Missing	System	31	11.2		
Total		277	100.0		

Molar Endo.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	80	28.9	31.9	31.9
	2	29	10.5	11.6	43.4
	3	30	10.8	12.0	55.4
	4	39	14.1	15.5	70.9
	5	36	13.0	14.3	85.3
	6	1	.4	.4	85.7
	7	36	13.0	14.3	100.0
	Total	251	90.6	100.0	
Missing	System	26	9.4		

Restore implants.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	41	14.8	16.5	16.5
	2	35	12.6	14.1	30.6
	3	45	16.2	18.1	48.8
	4	18	6.5	7.3	56.0
	5	64	23.1	25.8	81.9
	6	4	1.4	1.6	83.5
	7	41	14.8	16.5	100.0
	Total	248	89.5	100.0	
Missing	System	29	10.5		
Total		277	100.0		

Restore implants.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	41	14.8	16.5	16.5
	2	35	12.6	14.1	30.6
	3	45	16.2	18.1	48.8
	4	18	6.5	7.3	56.0
	5	64	23.1	25.8	81.9
	6	4	1.4	1.6	83.5
	7	41	14.8	16.5	100.0
	Total	248	89.5	100.0	
Missing	System	29	10.5		
Total		277	100.0		

Clinical Crown Lengthening.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	70	25.3	28.0	28.0
	2	16	5.8	6.4	34.4
	3	39	14.1	15.6	50.0
	4	23	8.3	9.2	59.2
	5	40	14.4	16.0	75.2
	6	1	.4	.4	75.6
	7	61	22.0	24.4	100.0
	Total	250	90.3	100.0	
Missing	System	27	9.7		
Total		277	100.0		

Guided Tissue Regeneration.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	26	9.4	10.4	10.4
	2	17	6.1	6.8	17.3
	3	29	10.5	11.6	28.9
	4	17	6.1	6.8	35.7
	5	42	15.2	16.9	52.6
	6	6	2.2	2.4	55.0
	7	112	40.4	45.0	100.0
	Total	249	89.9	100.0	
Missing	System	28	10.1		
Total		277	100.0		

Socket preservation.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	65	23.5	26.4	26.4
	2	35	12.6	14.2	40.7
	3	31	11.2	12.6	53.3
	4	15	5.4	6.1	59.3
	5	36	13.0	14.6	74.0
	6	10	3.6	4.1	78.0
	7	54	19.5	22.0	100.0
	Total	246	88.8	100.0	
Missing	System	31	11.2		

Guided Bone Regeneration.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	24	8.7	9.6	9.6
	2	18	6.5	7.2	16.8
	3	32	11.6	12.8	29.6
	4	16	5.8	6.4	36.0
	5	41	14.8	16.4	52.4
	6	4	1.4	1.6	54.0
	7	115	41.5	46.0	100.0
	Total	250	90.3	100.0	
Missing	System	27	9.7		

Restore implants.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	41	14.8	16.5	16.5
	2	35	12.6	14.1	30.6
	3	45	16.2	18.1	48.8
	4	18	6.5	7.3	56.0
	5	64	23.1	25.8	81.9
	6	4	1.4	1.6	83.5
	7	41	14.8	16.5	100.0
	Total	248	89.5	100.0	
Missing	System	29	10.5		
Total		277	100.0		

Restore implants.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	41	14.8	16.5	16.5
	2	35	12.6	14.1	30.6
	3	45	16.2	18.1	48.8
	4	18	6.5	7.3	56.0
	5	64	23.1	25.8	81.9
	6	4	1.4	1.6	83.5
	7	41	14.8	16.5	100.0
	Total	248	89.5	100.0	
Missing	System	29	10.5		
Total		277	100.0		

Connective Tissue Grafts.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	28	10.1	11.2	11.2
	2	14	5.1	5.6	16.9
	3	33	11.9	13.3	30.1
	4	17	6.1	6.8	36.9
	5	35	12.6	14.1	51.0
	6	2	.7	.8	51.8
	7	120	43.3	48.2	100.0
	Total	249	89.9	100.0	
Missing	System	28	10.1		
Total		277	100.0		

Extraction of impacted third molars.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	133	48.0	53.0	53.0
	2	4	1.4	1.6	54.6
	3	13	4.7	5.2	59.8
	4	22	7.9	8.8	68.5
	5	26	9.4	10.4	78.9
	7	53	19.1	21.1	100.0
	Total	251	90.6	100.0	
Missing	System	26	9.4		
Total		277	100.0		

Diode laser more in dental treatment.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	21	7.6	8.4	8.4
	2	70	25.3	28.0	36.4
	3	13	4.7	5.2	41.6
	4	8	2.9	3.2	44.8
	5	25	9.0	10.0	54.8
	6	8	2.9	3.2	58.0
	7	105	37.9	42.0	100.0
	Total	250	90.3	100.0	
Missing	System	27	9.7		

Limited orthodontics.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	40	14.4	16.1	16.1
	2	25	9.0	10.1	26.2
	3	16	5.8	6.5	32.7
	4	19	6.9	7.7	40.3
	5	43	15.5	17.3	57.7
	6	3	1.1	1.2	58.9
	7	102	36.8	41.1	100.0
	Total	248	89.5	100.0	
Missing	System	29	10.5		

Extraction of impacted third molars.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	133	48.0	53.0	53.0
	2	4	1.4	1.6	54.6
	3	13	4.7	5.2	59.8
	4	22	7.9	8.8	68.5
	5	26	9.4	10.4	78.9
	7	53	19.1	21.1	100.0
	Total	251	90.6	100.0	
Missing	System	26	9.4		
Total		277	100.0		

Pediatric dentistry.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	38	13.7	15.4	15.4
	2	4	1.4	1.6	17.0
	3	154	55.6	62.3	79.4
	4	12	4.3	4.9	84.2
	5	13	4.7	5.3	89.5
	6	1	.4	.4	89.9
	7	25	9.0	10.1	100.0
	Total	247	89.2	100.0	
Missing	System	30	10.8		
Total		277	100.0		

Multiple unit fixed prosthodontics.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	108	39.0	43.2	43.2
	2	11	4.0	4.4	47.6
	3	41	14.8	16.4	64.0
	4	35	12.6	14.0	78.0
	5	30	10.8	12.0	90.0
	6	5	1.8	2.0	92.0
	7	20	7.2	8.0	100.0
	Total	250	90.3	100.0	
Missing	System	27	9.7		
Total		277	100.0		

CAD/CAM restorations.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	126	45.5	50.2	50.2
	2	39	14.1	15.5	65.7
	3	14	5.1	5.6	71.3
	4	25	9.0	10.0	81.3
	5	18	6.5	7.2	88.4
	6	6	2.2	2.4	90.8
	7	23	8.3	9.2	100.0
	Total	251	90.6	100.0	
Missing	System	26	9.4		
Total		277	100.0		

Spearman rank correlation analysis on deployment and multiple diagnostic codes. The results are shown in Table 2. Statistically significant correlations are shown in bold type on a gray background. There were two inverse correlation coefficients with absolute values greater than or equal to 0.5, clinical crown lengthening (rho = -0.621, $p < 0.001$, n = 244) and socket preservation (rho = -0.596, $p < 0.001$, n = 240). The highest direct correlation was between skill identifier and extraction of impacted third molars (rho = 0.463, $p < 0.001$, n = 255).

Table 2. Spearman rank correlation analysis.

Correlations							
Spearman's rho		How long have you been practicing at your current identifier?	I place Implants on a regular basis.	I restore implants on a regular basis.	I routinely perform cases under oral sedation.	I routinely perform Molar Endo.	I routinely perform Clinical Crown Lengthening.
What is your skill identifier?	Correlation Coefficient	.338	-.393	-.366	-.356	-.452	-.452
	Sig. (2-tailed)	**.000**	**.000**	**.000**	**.000**	**.000**	**.000**
	N	270	252	251	252	250	250

Spearman's rho		I routinely perform Socket preservation.	I routinely perform Guided Tissue Regeneration.	I routinely perform Guided Bone Regeneration.	I routinely perform Connective Tissue Grafts.	I routinely use a Diode laser in dental treatment.	I routinely perform extraction of impacted third molars.
What is your skill identifier?	Correlation Coefficient	-.455	-.380	-.373	-.381	-.295	-.372
	Sig. (2-tailed)	**.000**	**.000**	**.000**	**.000**	**.000**	**.000**
	N	250	250	251	250	251	250

Spearman's rho		I routinely perform limited orthodontics.	I routinely perform pediatric dentistry.	I routinely perform multiple unit fixed prosthodontics.	I routinely perform CAD/CAM restorations.	I would like to place more Implants.	I would like to restore more implants.
What is your skill identifier?	Correlation Coefficient	-.389	-.278	-.320	.028	.100	.222
	Sig. (2-tailed)	**.000**	**.000**	**.000**	.664	.114	**.000**
	N	251	249	250	251	250	250

Spearman's rho		I would like to perform more cases under oral sedation.	I would like to perform more Molar Endo.	I would like to perform more Clinical Crown Lengthening.	I would like to perform more Socket preservation.	I would like to perform more Guided Tissue Regeneration.	I would like to perform more Guided Bone Regeneration.
What is your skill identifier?	Correlation Coefficient	.160	.140	.220	.145	.133	.121
	Sig. (2-tailed)	**.011**	**.026**	**.000**	**.022**	**.036**	.057
	N	250	250	250	250	250	250

Spearman's rho		I would like to perform more Connecti ve Tissue Grafts.	I would like to use a Diode laser more in dental treatment.	I would like to perform more extraction of impacted third molars.	I would like to perform more limited orthodontics.	I would like to perform more pediatric dentistry.	I would like to perform more multiple unit fixed prosthodontics.
What is your skill identifier?	Correlation Coefficient	.186	.157	.080	.168	.168	.228
	Sig. (2-tailed)	.003	**.013**	.210	**.008**	**.008**	**.000**
	N	250	250	249	249	247	250

Spearman's rho		I would like to perform more CAD/CA M restorations.	Place Implants.	Restore implants.	Oral sedation.	Molar Endo.	Clinical Crown Lengthening.
What is your skill identifier?	Correlation Coefficient	.153	-.429	-.371	-.375	-.406	**-.621**
	Sig. (2-tailed)	**.016**	**.000**	**.000**	**.000**	**.000**	**.000**
	N	250	245	242	241	245	244

Spearman's rho		Socket preservation.	Guided Tissue Regeneration.	Guided Bone Regeneration.	Connective Tissue Grafts.	Diode laser more in dental treatment.	Extraction of impacted third molars.
What is your skill identifier?	Correlation Coefficient	**-.596**	-.442	-.424	-.431	-.246	-.463
	Sig. (2-tailed)	**.000**	**.000**	**.000**	**.000**	**.000**	**.000**
	N	240	243	244	243	244	245

Spearman's rho		Limited orthodontics.	Pediatric dentistry.	Multiple unit fixed prosthodontics.	CAD/CAM restorations		
What is your skill identifier?	Correlation Coefficient	-.422	-.088	-.214	-.021		
	Sig. (2-tailed)	**.000**	.174	**.001**	.744		
	N	242	241	244	245		

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References:

Agresti A, Coull BA, Approximate is better than “exact” for interval estimation of binomial proportions, The American Statistician 52:119-126, 1998.