# PREDICTING DENTAL MANPOWER REQUIREMENTS FOR THE UNITED STATES AIR FORCE

Case Report 2 submitted in partial fulfillment of the
Residency in Dental Public Health

by
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July 1997

TABLE OF CONTENTS

## LIST OF ABBREVIATIONS

| | |
|---|---|
| AF | Air Force |
| AFB | Air Force Base |
| CI | Confidence Interval |
| CTV | Composite Time Value |
| CTV's | Composite Time Values |
| DOD | Department of Defense |
| FTE | Full Time Equivalent |
| HRSA | Health Resources and Services Administration |
| NDRI | Naval Dental Research Institute |
| N-HANES | National Health and Nutrition Examination Survey |
| TSCOHS | Tri - Service Comprehensive Oral Health Survey |
| Tx | Treatment |
| US | United States |
| USAF | United States Air Force |

A. CASE REPORT ABSTRACT

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## PREDICTING DENTAL MANPOWER REQUIREMENTS FOR THE UNITED STATES AIR FORCE

Using data from the 1994 Tri-Service Comprehensive Oral Health Survey (TSCOHS) the oral health needs of United States Air Force (USAF) personnel, active duty and recruits, were identified. There were 5,596 USAF subjects in this survey, 751 recruits and 4,845 non-recruit active duty. These large stratified, random, samples were from the total number of AF recruits 14,722 and the non-recruit active duty population of 440,123 in the 1994-95 time frame of this study. Oral health needs were evaluated in the following dental disciplines; restorative, oral surgery (exodontia only), periodontics, prosthodontics and endodontics. The average annual productivity levels for USAF dentists was determined from the annual Dental Service Report. The unmet oral health needs at the time of the study were converted into time requirements called Composite Time Values (CTV's). The number of additional providers that would be required to treat this unmet dental need was determined using the following formula:

$$\text{Number of Additional Providers} = \frac{(\text{Total Unmet Tx Need CTV}/\text{Annual CTV Productivity per Provider})(\%\text{Tx Completed})}{\text{Time to deplete Unmet Tx Need Pool}}$$

As the mathematical steps are performed for the above formula, the CTV units cancel, and the result is number of providers per unit of time. The results of this simple model were that an additional 235 dentists would be required to treat 100% of the oral health needs over 5 years as identified in the 1994 TSCOHS for this specific AF population.

## B. NAME OF PROJECT

# PREDICTING DENTAL MANPOWER REQUIREMENTS FOR THE UNITED STATES AIR FORCE

By

Gary C. Martin, B.A., D.D.S., M.P.H.

## C. APPLICANT'S ROLE IN PROJECT

The applicant was responsible for the planning, implementation and conduct of this project.

## D. STATEMENT OF PURPOSE

The purpose of this study is to determine the number of dentists that are required to fully and adequately treat the oral health needs of the active duty population, including new recruits, of the United States Air Force. (USAF) Using data collected from the 1994 Tri-Service Comprehensive Oral Health Survey (TSCOHS) these needs will be analyzed and manpower requirements will be determined by use of a manpower model.

## E. BACKGROUND AND REVIEW OF THE LITERATURE

Is it worthwhile to attempt the task of determining the oral health needs of a population? Is this important when projecting the numbers of dental personnel that are required to maintain or improve the oral health status of a given community? Are these projected numbers of dental personnel more accurate when based on oral health needs? These questions are more complex than one would think and are important not only for dentists, but for other groups of health care professionals. In an attempt to answer them, a review of the literature available on this subject was performed.

The President of the United States and Congress since 1974 have required that the Health Resources and Services Administration (HRSA), Bureau of Health Professions produce a biennial

report on the supply and distribution of health professionals and the numbers required to provide adequate health care for the nation. This includes dentists. This ongoing requirement reveals that there are constituencies which feel it is important to know the numbers of providers and whether the level is appropriate. As we spend more of our GDP on health care, a considerable amount of interest on how many health care personnel are really needed has been generated based especially on the declining improvement of health status as expenditures continue to grow.

Those who have attempted to provide workforce estimates have used various techniques and models. The models have been used mostly for predicting the number of physicians and dentists that will be required in the next 10-20 years. The eight most frequently cited forecasts for physicians were studied by Feil (Feil, Welch, Fisher, 1993). He identified several problems with the "art" of forecasting physician supply and requirements. Problems encountered in forecasting supply include the basic definition of who counts as a physician? Are those who are in administrative positions, research, and teaching who do not spend the majority of their day treating patients to be included? Are residents and part time providers counted? The conclusion of this study was that there is no accepted approach to forecasting physician requirements and in reality they are only "best guesses". Wennberg (1993) proposed that the ideal physician supply should be based on the number of physicians and the specialty mix needed to provide care in an economy in which patients are informed about what is known (and not known) about the outcomes of care, and are free to choose among beneficial options according to their own preferences concerning risks and benefits. This idealistic proposal is not what many would consider mainstream, however it has considerable insight into what the present author believes will become the norm. That is, the patient will have much more control over what treatment they elect to receive. This will require that the outcomes of various treatment options will need to be researched and than defined so that patients can make an informed decision; after all it is their health, their life. This change would

affect, and to an unknown degree is already influencing the types and numbers of health care providers that would be required.

When addressing the future supply of dentists and the demand and need for dental services the methods that have been used are 1) supply models, 2) manpower requirement models, and 3) econometric models. Capilouto (1995) reviewed these methods in detail and arrived at some insightful conclusions.

1. Supply models forecast the number of practicing dentists without explicit recognition of need, demand, or market forces.
2. Manpower requirement models base their supply forecasts on the demand or need for dental care. The Association of State and Territorial Dental Directors have developed an excellent model for assessing oral health needs (Kuthy 1993).
3. Econometric models use interdependent mathematical equations to predict performance of many variables in the dental health care sector of the economy. One of these models includes a simultaneous set of 195 equations that represent the interrelations of the dental health care economic sector and produces forecasts on many variables including the supply of dentists.

Although each of these models has its strengths and weaknesses there are several variables that were not addressed by any of them. The impact of the recent substantial increase in foreign-born students entering dental schools, either with advanced standing or as first year students, has not been evaluated. Even when the need for treatment can be firmly documented, it is difficult to realistically estimate the manpower to treat these needs given the widespread variations in diagnosis and treatment among dentists. A recent example of this variation was seen in the February 1997 Reader's Digest Article "HOW HONEST ARE DENTISTS". The reporter took a set of dental radiographs and visited 50 different dentists across the United States. He received

several widely different treatment plans, both as to specific treatment needed and its cost. These plans ranged from $500 for a crown on tooth #30 to $29,850 for 21 crowns and veneers for the lower six front teeth. This article has generated a significant amount of discussion among dental providers and highlights that there are very wide variations in diagnosis and treatment which can often be difficult to explain and justify. Finally, even when the model gives an accurate forecast, the decision on what to do with these estimates is influenced by current health policy and the political environment

A report in Forbes magazine in 1984 suggested that what's good for America isn't necessarily good for dentists. They reduced work force estimates to a "too many dentists, too little decay, and delivery of unnecessary services formula." In this report little attention was paid to under served populations, basic versus elective care, or the value of preventive services and recalls. The general public perception of dentistry as a declining profession still lingers in spite of more recent and accurate information documenting a positive economic status for dentistry. (Beazoglou et al., 1989) (Douglass, Furino, 1990)

Some may feel that since there is no ideal method for assessing the needs and supply of dental health care personnel, the exercise should be abandoned. Or, if it was still thought necessary, a method should be chosen that requires the least amount of time and effort. The World Health Organization on the other hand considers the monitoring and evaluation of oral health to be important and has developed a needs-based, demand weighted model for predicting workforce requirements (Morgan, 1994). The literature shows that for a defined community, such as the Indian Health Service or for soldiers at a specific location, the use of a needs-based approach for manpower planning can be very effective (Collins et al., 1993) (Goodman, 1990) (Shulman, 1994). The U.S. Air Force is such a community with a population of 365,000 active duty personnel as of May 1997. (Provided by Military Personnel Center, Randolph Air Force Base, Texas) This is

down from the active duty population of 422,320 in 1995.(AF Demographics, 1995) This very decline has implications which can be addressed through manpower planning. The USAF has some unique aspects that will enable an oral health needs assessment to be repeated periodically. This will allow AF providers to optimize the oral health status by being more effective in implementing the appropriate treatment and preventive services to reduce the incidence of specific oral diseases (Vehkalahti, 1994). From a public health standpoint, not only are disease levels identified, but also treatment may be prioritized and evaluators may track movement toward health objectives. Because of this reassessment, the needs-based model will be able to be refined progressively. This present needs assessment provides only prevalence data; thus the use of prevalence data from surveys of the US population (N-HANES II, III) for those individuals ages 10-17, some of whom will be entering the USAF in the next ten years, was also used to predict trends in oral health needs. A definition of a full time dental provider was also included, as well as the counting for administrators, residents, and teaching staff. This assessment allows for the determination of the appropriate quantity and type of dental providers required to ensure optimal oral health for this specific community. It is important to consider not only normative need but also the patient perceived need as discussed in various studies. (Gilbert et al., 1994) (Searcy, Chisick, 1994) (Kay, 1993). Treatment outcomes need to be defined, so patients can actively choose among the beneficial options according to their own preferences concerning risks and benefits. One of the economic barriers to receiving treatment, cost, is removed for active duty military personnel and this allows effective demand to more closely approach the normative need.

In conclusion, it is worthwhile to assess the oral health needs of the US Air Force active duty personnel. The current movement in the USAF to computerized dental health records and use of improved manpower models will allow for frequent analyses of the oral health needs and the resources required to treat these needs. Thus the resources required to make this assessment a

reality are minimal and the health benefits will be specific and measurable. The progressive refinement of the model, albeit without cost sensitivity operating at the individual patient level, has great potential benefit for society at large.

## F. DESCRIPTION OF THE PROJECT

The purpose of this study is to determine the number of dentists that are required to adequately treat the oral health needs of the active duty population, including recruits, of the USAF. Data collected from the 1994 Tri-Service Comprehensive Oral Health Survey was used for determining the oral health needs of USAF personnel. The personnel and subjects involved in this survey were distributed throughout the United States. Those individuals that were stationed at overseas locations were not included in this survey. The actual survey was conducted from April 1994 to January 1995 for active duty personnel and from February to July 1994 for recruits. The total random sample for the active duty subjects was 13,050 and for the recruits 2,711. For a more detailed description of the sampling strategy for the TSCOHS see Appendix 5. The TSCOHS has an enormous amount of data available including utilization data and the perceived need for dental care as reported by the subjects. Several individuals are involved in analyzing this data, but for this project the author has restricted the focus to the oral health needs identified by the TSCOHS. The author began his analysis of the data in July 1996 and was completed in May of 1997.

## G. PROCEDURES AND METHODS

The design of this study is descriptive. The total number of Air Force (AF) subjects who were involved in the 1994 Tri-Service Comprehensive Oral Health Survey (cross-sectional survey) was 5,596. There were 751 AF recruits and 4,845 non-recruit active duty AF subjects. These large samples were representative of the total number of AF recruits (14,722) and the non-recruit

active duty AF population of 440,123. Recruits were sampled using single stage, stratified, random sampling. Non-recruit active duty personnel were sampled using two stage, stratified, random sampling. A detailed description of the sampling strategy and findings of the 1994 TSCOHS are found in NDRI Report No. PR-9502 and PR-9503 (York, Poindexter, Chisick, 1995).

The 1994 Tri-Service Comprehensive Oral Health Survey was well designed and had a very high-response-rate (82%). It is possible that this survey may have under estimated the existing oral health needs of this specific population. Specifically, some of the limitations are that it does not address the needs for Oral Medicine, Orthodontics, Oral Pathology, Pediatric Dentistry, TMD, and Dental Public Health. It also underestimates the Oral Surgery needs because it only addresses exodontia and for Endodontics it did not identify the need for endodontic surgery. For Periodontics the periodontal maintenance phase of periodontal therapy was not included, which again results in an underestimate of this treatment need. However, the data from this survey is by far the best estimate of the oral health needs of AF personnel. The analysis of this data will definitely allow for a more accurate prediction of the manpower required to meet these needs.

The data from the 1994 Tri-Service Comprehensive Oral Health Survey has codes that allow for each subject to be identified as either Air Force, Navy/Marines, or Army. Using the statistical software program STATA the data for Air Force personnel was sorted into a separate database. This new database was used to analyze the specific oral health needs. The needs were evaluated by disciplines as follows; restorative needs, oral surgery (exodontia only), periodontics, prosthodontics, and endodontics. The oral health needs from the 1994 Tri-Service Comprehensive Oral Health Survey were converted into CTV's. (See Appendix 4) The mean CTV requirement for these disciplines was calculated separately for the recruit population and the active duty population.

The productivity levels of the different types of dental specialists were determined from the annual USAF Dental Service Report. This report has data for each dental provider. The data is entered for each month from the dental treatment form that the provider completes for each patient. This form uses a Standardized Code of Dental Procedures which is a modification of the American Dental Association's Code of Dental Procedures and Nomenclature. The military code for dental procedures assigns Composite Time Values (CTV) for each procedure to be used for workload accountability. These codes are than converted to a numeric CTV which is represented on the monthly and annual USAF Dental Service Report. The productivity figures are reported as the mean Composite Time Values produced per provider type per year. Using this data and the productivity levels of USAF oral health care providers one can readily determine the number of providers that will be required to treat these specific levels of oral health needs over a specified period of time.

The model that was used is based on the following formula:

Number of Additional Providers =

$$\frac{\text{(Total Unmet Tx Need CTV/Annual Productivity per Provider)(\%Tx Completed)}}{\text{Time to deplete Unmet Tx Need Pool}}$$

(As the mathematical steps are performed for the above formula, the CTV units cancel, and the result is number of providers per unit of time.)

The following data was entered and affected the calculation for the number of additional providers that will be needed.

1. Target Population
2. % Tx Completed
3. Time (years)
4. Annual CTV Productivity
5. FTE

The **target population** for this model is the U.S. Air Force personnel with the estimated recruit population of 14,722 and the active duty population of 365,000.

The **% tx completed** allows the user to decide how much of the unmet treatment need is to be completed per unit of time. For those patients in dental Class 3 (see definitions Appendix 3), this % tx provided must equal 100% due to the readiness requirement. For this model, % tx provided was equal to 100% for all calculations.

The unmet treatment need cannot be completed at once. This model allows adjustment of the period of **time (years)** for completion of treatment. For this model 5 years was used as the time period.

**Annual CTV Productivity** is determined from past years productivity figures calculated for different provider types in the USAF. The average annual productivity rate was calculated from data supplied by various AF clinics throughout the United States. The productivity for specialists was not calculated due to the lack of data for the various specialties. Approximately 18% of the USAF dentists are specialists, with the majority being involved with teaching at residency programs. The majority of care in the USAF is provided by general dentists and the productivity levels do not appear to be significantly different when compared to the limited data for specialist's productivity. Also, the productivity levels for those general dentists with advanced training of either one or two years is very similar to the general dentists with no additional training. The annual productivity figure used for this model was 8,864 CTV's per provider per year. The **FTE** for this model was fixed at 1.00.

Data from the N-HANES III study which would allow for a comparison to the N-HANES II study to evaluate the trend of the oral health needs of individuals who could enter the USAF in the next 10 years was not available at the time of this report. Correspondence with Dr. Winn at the National Institute of Health (NIH) concerning when this data will be available is ongoing. The

author believes that the trend will be that individuals who will enter the USAF during the next 10 years will have less restorative and prosthodontic needs with their periodontal, oral surgical and prosthodontic needs remaining at approximately the same levels as found in the 1994 TSCOHS. Using data from a 1977 survey of dental needs of active duty AF personnel, restorative needs per 100 individuals was calculated (Christen, 1979). The finding was that 232 restorations were required per 100 AF personnel, with 120 one surface restorations and 112 multiple surfaces. Converting these restorations to CTV's using 3.5 CTV's for one surface restorations and 4.7 CTV's for multiple surfaces results in 420 CTV's/100 individuals for one surface restorations and 526 CTV's/100 individuals for multiple surfaces. Using these rates per 100 individuals and multiplying by the AF active duty population for 1994 of 440,123, the calculation results in a restorative need of 4,163,564 CTV's. If the restorative needs had remained constant from 1977 to the 1994 TSCOHS this would have been the restorative requirement. The actual figure from the 1994 TSCOHS was 490 restorative CTV's/100 individuals which results in a restorative need of 2,156,603 which is considerably less (51.8%) than the predicted value of 4,163,564 if the rate was the same as 1977. This is another indication that the restorative needs of individuals entering the AF are decreasing. However, even though this time frame from 1977-94 showed a significant decrease in the restorative needs this decrease is probably leveling off. The amount of decrease over the next ten years will most likely not be nearly as large.

## H. FINDINGS

The mean CTV's for each clinical discipline for the Air Force's recruits and active duty personnel are shown in Tables 1 & 2. For the recruits, the majority of their oral health needs are in restorative (35%), oral surgery (26%) and periodontics (19%). In the active duty population the majority of their oral health needs are in periodontics (40%) and fixed prosthodontics (35%). A

more detailed analysis of the oral health needs in the various clinical disciplines for the active duty population is shown in Table 3. The percent distribution of restorative CTV found that 58% did not require any restorative treatment and 84% required less than 10 CTV's ( 10 CTV's is equivalent to 3 one surface amalgams or 2 two/three surface amalgams). Over 87% did not require treatment for oral surgery needs. For prosthodontics, 81% did not require prosthodontic treatment and the mean CTV requirement was 12.4, which is equivalent to one single tooth cast restoration. Periodontal CTV requirements reveal that 57% require either a routine prophylaxis or prophylaxis with scaling that can be provided by dental auxiliary personnel. Table 5 reveals that only 1.9% of active duty personnel require endodontic treatment. Of these, 63% require only one tooth to be treated, usually a molar. (64% of those requiring endodontic treatment for one tooth are for molars)

The detailed analysis of the oral health needs in the various clinical disciplines for the recruit population is shown in Table 4. The percent distribution of restorative CTV found that only 12% did not require any restorative treatment and 61% require between 11 and 50 CTV's ( 3 to 10 multiple surface amalgam restorations). Only 42% did not require oral surgery , the mean oral surgery CTV need was 13.3 which is the equivalent of two complicated extractions. 83% did not require prosthodontic treatment and the mean CTV requirement was 8.0 which is slightly less than one single tooth cast restoration. Periodontal CTV requirements reveal that 70% require either a routine prophylaxis or prophylaxis with scaling. Both can be provided by dental auxiliary personnel. Table 5 shows that 7.2% of recruits require endodontic treatment. Of these, 61% require only one tooth to be treated, with 76% of these teeth being a molar.

Using the mean CTV Totals for restorative, periodontics, endodontics, oral surgery and prosthodontics for the recruits and the active duty populations respectively, the number of additional providers required was determined. The model and the calculations are found at Appendix 1. The distribution of additional dentists required to treat 100% of the unmet oral health

needs over a 5 year period for recruits and active duty personnel by clinical discipline are shown below:

**Additional Dentists Required to Fully Treat USAF Oral Health Needs Over 5 Years**

| | Recruits (14,722) | Active Duty (365,000) |
|---|---|---|
| Restorative | 5.9 | 40.4 |
| Periodontics | 1.0 | 49.2 |
| Endodontics | 0.5 | 3.3 |
| Oral Surgery | 4.4 | 25.5 |
| Prosthodontics | 2.7 | 102.0 |
| Total | 14.5 | 220.4 |

To treat 100% of the identified levels of unmet oral health needs of the above populations over a 5 year period, 235 **additional** dentists would be required.

## I. DISCUSSION

Several assumptions were made in using this model that is a modification of the manpower model developed by Dr. Tom Leindecker, Dental Officer US Navy, based on the oral health requirements of US Navy/Marines. The assumptions are as follows:

1. Unmet dental treatment need may be defined by the following equations:

Unmet Dental Tx. Need = Total Dental Tx Need - Met Tx Need
Met Tx Need = (Provider output + Tx needs lost when service members separate)

2. Current provider output + tx need reductions through service member separation is roughly equivalent to the incidence of dental treatment + the treatment needs of new recruits. (Appendix 2)

3. Existing unmet dental treatment need resulted, in part, from an inadequate number of providers over many years.

4. Additional providers would be required to substantially reduce the unmet need deficit.

5. Unmet dental treatment need was identified and quantified by the 1994 Tri-Service Comprehensive Oral Health Survey (TSCOHS).

6. The 1994 TSCOHS estimated the prevalence and distribution of the majority of dental treatment need. (Air Force specific data from the survey were used in this model)

7. The prevalence and distribution of unmet dental need has remained relatively constant since the 1994 survey.

8. Productivity rates from the 11 AFB clinics represent providers throughout the AF.

For a more in depth discussion of these assumptions by Dr. Leindecker see Appendix 2.

Comparing the mean total CTV's for the active duty AF versus the results of all active duty military shows that the mean totals for the AF are less for restorative (4.9 vs. 5.1), periodontics (13.9 vs. 16.5), endodontics (.40 to .60), oral surgery (3.1 vs. 3.9), and removable prosthodontics (.50 vs. .80). The mean total for fixed prosthodontics is higher (12.0 vs. 11.1). The overall mean total CTV for active duty AF is 34.8 versus 38.0 for all active duty military. See Tables 2 & 7.

Comparing the mean total CTV's for the AF recruits versus the results of all Department of Defense (DOD) recruits shows that the mean totals for the AF recruits are less for periodontics (9.8 vs. 10.2), endodontics (1.60 to 2.0), oral surgery (13.3 vs. 16.3), and fixed prosthodontics(7.9 vs. 9.3). The mean total for restorative is higher (17.8 vs. 14.1) and also for removable prosthodontics (.40 vs. .30). The overall mean total CTV for AF recruits is 50.8 versus 52.3 for DOD recruits. See Tables 1 & 6.

From these comparisons it appears that the oral health needs of Air Force personnel are slightly less than those of the DOD as a whole. The Air Force only accepts individuals with a high school degree and this could be a possible factor in explaining this difference.

The results of this manning model shows that the Air Force would need to increase the number of dentists by an additional 235 to treat 100% of the unmet dental needs of Air Force personnel within 5 years. The choices facing DOD Health Affairs is whether to bring in these additional providers or re-distribute the dentists currently serving in the Air Force. Of the 1.093 dentists in the Air Force as of May 1997, there are only 853 full time equivalents (FTE's) that are providing care. This 853 FTE figure was calculated using the number of dentists in training (140), the number of dentists that are teaching in dental residencies where there time is split between providing patient care and instructing residents (110), administrators (22), full time research (5), and dental commanders (88). If the Air Force deleted all their advanced training residencies and sent all residents to civilian programs and did not allow dentists to be commanders this would increase the number of providers by approximately 240 dentists. The author does not believe this choice to be a rational approach and its consequences would include lowering dental productivity indirectly. The manpower model commonly used in the past has been the ratio of 1 active duty dentist for every 500 active duty personnel. With the current 1.093 dentists in the AF and the active duty personnel at 365,000 this gives us a ratio of 365,000/1,093= 334, or 1 dentist for every 334 active duty personnel. With the number of dentists actually providing care (853) this ratio becomes 1 dentist for every 428 active duty personnel. With a smaller active duty force it is critical that their readiness level be kept at an optimal level. The readiness level is optimal for oral health when the personnel are in Dental Classification 1, where personnel are not expected to require any treatment or reevaluation for 12 months. (See definitions Appendix 3) The results of this manning model are that at least an additional 235 dentists are required to completely treat the unmet oral health needs of USAF personnel over a 5 year time period.

## J. CONCLUSIONS

The 1994 TSCOHS provided a detailed picture of the oral health needs of US military personnel. There is unmet dental need in AF personnel, due in part to inadequate numbers of dental providers. The results of this study are that at least an additional 235 dentists would be

required to treat 100% of the unmet oral health needs of USAF personnel over 5 years as identified in the 1994 TSCOHS. Those individuals currently entering the AF and those that will enter in the next 10 years will most likely have less oral health needs when compared to those who have entered in the last 10-15 years. When the next TSCOHS is conducted in 1998-99 the data collected will allow for a comprehensive comparison with the data from the 1994 survey. The data may be analyzed to measure progress on military oral health objectives, determine trends in oral health needs and allow the USAF to focus resources appropriately.

## K. SUGGESTED CHANGES IF THE PROJECT WAS REPEATED

If this project were to be repeated the productivity figures for the different specialists would be a high priority. It was extremely difficult to get enough data to make a calculation as to their productivity levels. This was due in part to the fact that many clinics do not have specialists and many of the 250 specialists are directly involved in teaching residents in the various advanced training programs. It is possible that the difference in productivity levels between specialists and general dentists is small and would not significantly change the number of providers required. However, it would be helpful in predicting the number of specialists required to treat those oral health needs that require a specialist. These needs that require a specialist are decreasing as more advanced trained general dentists are qualified and credentialled to treat conditions that previously were only treated by a dental specialist.

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Table 1

| MEAN COMPOSITE TIME VALUES (CTV) FOR EACH CLINICAL DISCIPLINE (FOR ALL AIR FORCE RECRUITS) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | ESTIMATED POPULATION | REST | PERIO | ENDO | ORAL SURG | FIXED PROS | REM PROS | MEAN TOTAL |
| GENDER | | | | | | | | |
| Male | 11,717 | 17.40 | 9.90 | 1.30 | 14.00 | 7.10 | 0.15 | 51.00 |
| Female | 3,005 | 18.60 | 8.80 | 2.20 | 9.70 | 9.80 | 0.40 | 50.50 |
| | | | | | | | | |
| RACE | | | | | | | | |
| White | 11,552 | 17.60 | 8.80 | 1.30 | 12.20 | 6.60 | 0.13 | 47.50 |
| Black | 2,164 | 18.70 | 13.70 | 2.30 | 17.00 | 12.50 | 0.40 | 65.90 |
| Other | 1,006 | 15.90 | 11.10 | 1.90 | 16.10 | 8.90 | 0.40 | 55.30 |
| | | | | | | | | |
| AGE CATEGORY | | | | | | | | |
| 18-19 years | 7,757 | 17.50 | 8.30 | 1.10 | 13.20 | 5.10 | 0.10 | 46.50 |
| 20-24 years | 6,275 | 18.30 | 11.00 | 1.90 | 13.30 | 10.50 | 0.20 | 56.20 |
| 25-29 years | 576 | 13.10 | 13.60 | 1.20 | 9.90 | 11.70 | 0.60 | 50.90 |
| 30-34 years | 114 | 16.30 | 9.50 | 0.00 | 15.30 | 7.20 | 1.40 | 50.80 |
| | | | | | | | | |
| EDUCATION | | | | | | | | |
| Not HS Graduate | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| High School Graduate | 7,999 | 18.60 | 9.00 | 1.50 | 14.00 | 5.90 | 0.20 | 50.20 |
| Some College | 6,386 | 16.90 | 10.50 | 1.40 | 12.40 | 10.10 | 0.20 | 52.70 |
| College Graduate | 337 | 9.30 | 9.90 | 1.10 | 6.20 | 3.90 | 0.00 | 30.50 |
| | | | | | | | | |
| MEAN TOTAL | 14,722 | 17.80 | 9.80 | 1.60 | 13.30 | 7.90 | 0.40 | 50.80 |
| 95% Confidence Interval | | [16.5-18.8] | [9.0-10.4] | [1.5-1.7] | [12.2-14.1] | [7.5-8.1] | [.39-.49] | [50.2-51.5] |
| | | | | | | | | |
| % of Mean Total CTV | | 35.00 | 19.30 | 3.10 | 26.20 | 15.60 | 0.80 | 100.00 |
| | | | | | | | | |
| MEDIAN TOTAL | | 14.00 | 7.20 | 0.00 | 10.40 | 0.00 | 0.00 | 42.60 |

Table 2

| MEAN COMPOSITE TIME VALUES (CTV) FOR EACH CLINICAL DISCIPLINE (FOR ALL ACTIVE DUTY AIR FORCE) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | ESTIMATED POPULATION | REST | PERIO | ENDO | ORAL SURG | FIXED PROS | REM PROS | MEAN TOTAL |
| **GENDER** | | | | | | | | |
| Male | 376,228 | 4.85 | 14.42 | 0.36 | 3.13 | 11.53 | 0.24 | 34.94 |
| Female | 63,895 | 5.35 | 10.46 | 0.52 | 2.94 | 14.20 | 0.37 | 34.32 |
| **RACE** | | | | | | | | |
| White | 367,011 | 4.85 | 13.08 | 0.38 | 3.04 | 11.05 | 0.18 | 32.93 |
| Black | 54,181 | 5.59 | 18.45 | 0.42 | 3.16 | 17.60 | 0.81 | 47.00 |
| Hispanic | 11,807 | 4.74 | 17.41 | 0.08 | 3.94 | 13.12 | 0.00 | 39.51 |
| Asian | 4,198 | 4.76 | 11.71 | 0.93 | 3.29 | 13.71 | 0.46 | 35.26 |
| Other | 2,926 | 2.93 | 13.33 | 0.33 | 5.54 | 7.35 | 0.33 | 30.67 |
| **AGE CATEGORY** | | | | | | | | |
| 18-19 years | 7,784 | 6.98 | 10.32 | 0.35 | 14.59 | 8.41 | 0.15 | 41.32 |
| 20-24 years | 102,676 | 4.81 | 10.40 | 0.40 | 7.23 | 8.35 | 0.04 | 31.70 |
| 25-29 years | 108,614 | 4.54 | 12.35 | 0.29 | 2.77 | 8.40 | 0.10 | 28.74 |
| 30-34 years | 101,953 | 4.62 | 14.23 | 0.50 | 1.25 | 11.53 | 0.20 | 32.55 |
| 35-39 years | 72,475 | 5.92 | 17.90 | 0.32 | 0.80 | 19.75 | 0.39 | 45.43 |
| 40-44 years | 35,138 | 4.94 | 18.84 | 0.42 | 0.40 | 18.60 | 1.03 | 45.25 |
| >44 years | 11,483 | 4.46 | 16.90 | 0.53 | 0.73 | 12.90 | 1.06 | 36.58 |
| **EDUCATION** | | | | | | | | |
| No College | 78,648 | 5.84 | 14.64 | 0.48 | 5.69 | 14.57 | 0.22 | 41.96 |
| Some College | 228,576 | 5.66 | 14.80 | 0.44 | 3.18 | 13.15 | 0.27 | 37.95 |
| College Graduate | 65,106 | 3.46 | 12.39 | 0.23 | 2.10 | 9.83 | 0.32 | 28.68 |
| Beyond College | 67,793 | 2.77 | 11.11 | 0.24 | 0.79 | 6.67 | 0.20 | 22.05 |
| **PAYGRADE** | | | | | | | | |
| E1-E4 | 163,837 | 5.36 | 11.92 | 0.37 | 6.06 | 9.71 | 0.10 | 33.98 |
| E5-E6 | 133,447 | 5.57 | 17.17 | 0.52 | 1.60 | 15.55 | 0.33 | 41.08 |
| E7-E9 | 49,699 | 6.14 | 19.04 | 0.52 | 0.70 | 20.67 | 0.76 | 48.66 |
| O1-O3 | 65,645 | 2.18 | 8.72 | 0.13 | 1.65 | 3.45 | 0.10 | 16.45 |
| O4-O7 | 27,495 | 3.51 | 12.07 | 0.19 | 0.58 | 11.74 | 0.31 | 28.72 |
| MEAN TOTAL | 440,123 | 4.90 | 13.90 | 0.40 | 3.10 | 12.00 | 0.50 | 34.80 |
| 95% Confidence Interval | | [4.7-5.2] | 13.4-14.3 | [.38-.42] | [2.8-3.4] | [11.9-12.1] | [.48-51] | [34.7-35.0] |
| % of Mean Total CTV | | 14.10 | 39.90 | 1.10 | 8.90 | 34.60 | 1.40 | 100.00 |
| MEDIAN TOTAL | | 0.00 | 7.20 | 0.00 | 0.00 | 0.00 | 0.00 | 20.40 |

Table 3

PERCENT DISTRIBUTION OF COMPOSITE TIME VALUES (CTV) FOR **ACTIVE DUTY AIR FORCE**

PERCENT DISTRIBUTION OF RESTORATIVE COMPOSITE TIME VALUES (CTV)

| | Estimated Population | Percent in Each CTV Category | | | | | | | | Mean Rest CTV | Median Rest CTV |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | None | 1-5 | 6-10 | 11-15 | 16-25 | 26-50 | 51-75 | >75 | | |
| ALL ACTIVE DUTY | 440,123 | 58.1 | 16.3 | 9.5 | 6.1 | 5.4 | 3.9 | 0.5 | 0.1 | 4.9 | 0 |
| 95% Confidence Interval | | | | | | | | | | [4.7-5.2] | |

PERCENT DISTRIBUTION OF ORAL SURGERY COMPOSITE TIME VALUES (CTV)

| | Estimated Population | % in Each CTV Category | | | | Mean OS CTV | Median OS CTV |
|---|---|---|---|---|---|---|---|
| | | None | 1-15 | 15-25 | 26-70 | | |
| ALL ACTIVE DUTY | 440,123 | 87.4 | 3.6 | 3.4 | 5.6 | 3.1 | 0 |
| 95% Confidence Interval | | | | | | [2.8-3.4] | |

PERCENT DISTRIBUTION OF PERIODONTAL COMPOSITE TIME VALUES (CTV)

| | Estimated Population | Percent in Each CTV Category | | | | | | | Mean Perio CTV | Median Perio CTV |
|---|---|---|---|---|---|---|---|---|---|---|
| | | None | 1-5 | 6-10 | 11-15 | 16-25 | 26-50 | >50 | | |
| ALL ACTIVE DUTY | 440,123 | 8.0 | 27.3 | 21.6 | 8.5 | 13.9 | 17.2 | 3.5 | 13.9 | 7.2 |
| 95% Confidence Interval | | | | | | | | | [13.4-14.3] | |

PERCENT DISTRIBUTION OF PROSTHODONTIC COMPOSITE TIME VALUES (CTV)

| | Estimated Population | Percent in Each CTV Category | | | | | Mean Pros CTV | Median Pros CTV |
|---|---|---|---|---|---|---|---|---|
| | | None | 1-40 | 41-70 | 71-100 | >100 | | |
| ALL ACTIVE DUTY | 440,123 | 80.9 | 8.7 | 5.2 | 1.5 | 3.7 | 12.4 | 0 |
| 95% Confidence Interval | | | | | | | [11.3-13.5] | |

Table 4

PERCENT DISTRIBUTION OF COMPOSITE TIME VALUES (CTV) FOR **AIR FORCE RECRUITS**

PERCENT DISTRIBUTION OF RESTORATIVE COMPOSITE TIME VALUES (CTV)

| | Estimated Population | Percent in Each CTV Category | | | | | | | | Mean Rest CTV | Median Rest CTV |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | None | 1-5 | 6-10 | 11-15 | 16-25 | 26-50 | 51-75 | >75 | | |
| ALL ACTIVE DUTY | 14,722 | 12.2 | 13.0 | 9.4 | 19.5 | 20.3 | 22.0 | 2.3 | 1.4 | 17.8 | 14.0 |
| 95% Confidence Interval | | | | | | | | | | [16.5-18.8] | |

PERCENT DISTRIBUTION OF ORAL SURGERY COMPOSITE TIME VALUES (CTV)

| | Estimated Population | % in Each CTV Category | | | | Mean OS CTV | Median OS CTV |
|---|---|---|---|---|---|---|---|
| | | None | 1-15 | 15-25 | 26-70 | | |
| ALL ACTIVE DUTY | 14,722 | 42.2 | 10.3 | 27.9 | 19.7 | 13.3 | 10.4 |
| 95% Confidence Interval | | | | | | [12.2-14.1] | |

PERCENT DISTRIBUTION OF PERIODONTAL COMPOSITE TIME VALUES (CTV)

| | Estimated Population | Percent in Each CTV Category | | | | | | | Mean Perio CTV | Median Perio CTV |
|---|---|---|---|---|---|---|---|---|---|---|
| | | None | 1-5 | 6-10 | 11-15 | 16-25 | 26-50 | >50 | | |
| ALL ACTIVE DUTY | 14,722 | 6.7 | 27.9 | 35.6 | 8.5 | 11.0 | 9.4 | 1.0 | 9.8 | 7.2 |
| 95% Confidence Interval | | | | | | | | | [8.99-10.4] | |

PERCENT DISTRIBUTION OF PROSTHODONTIC COMPOSITE TIME VALUES (CTV)

| | Estimated Population | Percent in Each CTV Category | | | | | Mean Pros CTV | Median Pros CTV |
|---|---|---|---|---|---|---|---|---|
| | | None | 1-40 | 41-70 | 71-100 | >100 | | |
| ALL ACTIVE DUTY | 14,722 | 82.8 | 10.0 | 4.8 | 1.2 | 1.2 | 8.0 | 0 |
| 95% Confidence Interval | | | | | | | [6.5-9.6] | |

Table 5

DISTRIBUTION OF ENDODONTIC TREATMENT NEEDS
(AMONG THOSE NEEDING ENDODONTIC CARE)
ACTIVE DUTY AIR FORCE

| | Estimated | % Needing at Least One | | | Mean Number of Endo. Needed | | | |
|---|---|---|---|---|---|---|---|---|
| | Population | Anterior | Premolar | Molar | Anterior | Premolar | Molar | Total |
| ALL ACTIVE DUTY | 8,581 | 22.2 | 15.7 | 64.3 | .30 | .17 | .80 | 1.27 |
| 95% Confidence Interval | | | | | [.29-.31] | [.08-.25] | [.64-.95] | [1.14-1.39] |

DISTRIBUTION OF ENDODONTIC TREATMENT NEEDS
(AMONG THOSE NEEDING ENDODONTIC CARE)
AIR FORCE RECRUITS

| | Estimated | % Needing at Least One | | | Mean Number of Endo. Needed | | | |
|---|---|---|---|---|---|---|---|---|
| | Population | Anterior | Premolar | Molar | Anterior | Premolar | Molar | Total |
| ALL ACTIVE DUTY | 1,062 | 18.0 | 6.8 | 76.5 | .29 | .08 | .92 | 1.29 |
| 95% Confidence Interval | | | | | [.10-.48] | [.01-.17] | [.73-1.11] | [1.10-1.48] |

Table 6

**MEAN COMPOSITE TIME VALUES (CTV) FOR EACH CLINICAL DISCIPLINE (FOR ALL DOD RECRUITS)**

| | ESTIMATED POPULATION | REST | PERIO | ENDO | ORAL SURG | FIXED PROS | REM PROS | MEAN TOTAL |
|---|---|---|---|---|---|---|---|---|
| **GENDER** | | | | | | | | |
| Male | 73972 | 14.2 | 10.3 | 2.1 | 16.5 | 8.8 | 0.2 | 52.2 |
| Female | 27100 | 14.5 | 9.8 | 1.8 | 15.8 | 10.6 | 0.3 | 52.8 |
| **RACE** | | | | | | | | |
| White | 69607 | 13.9 | 8.1 | 1.7 | 14.8 | 7.3 | 0.2 | 46.0 |
| Black | 20229 | 15.9 | 16.6 | 3.7 | 20.7 | 15.7 | 0.5 | 73.3 |
| Other | 11236 | 13.2 | 11.2 | 1.4 | 17.9 | 9.9 | 0.3 | 54.0 |
| **AGE CATEGORY** | | | | | | | | |
| 18 -19 years | 48404 | 13.6 | 8.5 | 1.6 | 17.1 | 6.8 | 0.1 | 47.6 |
| 20 - 24 years | 44874 | 14.5 | 10.3 | 2.2 | 16.5 | 9.2 | 0.2 | 53 |
| 25 - 29 years | 5822 | 16.3 | 19.1 | 3.8 | 10.7 | 22.5 | 1.3 | 73.7 |
| 30 - 34 years | 1972 | 16.7 | 22.2 | 4.3 | 10.2 | 34.6 | 3.1 | 91.1 |
| **EDUCATION** | | | | | | | | |
| Not HS Graduate | 1540 | 19.9 | 13.5 | 1.9 | 18.8 | 13.7 | 0.0 | 67.7 |
| High School Graduate | 51985 | 15.3 | 9.7 | 2.2 | 17.8 | 8.5 | 0.3 | 53.7 |
| Some College | 41708 | 13.3 | 10.7 | 2.0 | 15.0 | 10.2 | 0.3 | 51.5 |
| College Graduate | 5839 | 10.1 | 9.6 | 1.3 | 11.8 | 20.7 | 0.3 | 42.0 |
| **MEAN TOTAL** | **101072** | **14.1** | **10.2** | **2.0** | **16.3** | **9.3** | **0.3** | **52.3** |
| **95% Confidence Interval** | | **[13.5-14.6]** | **[9.7-10.6]** | **[1.8-2.3]** | **[15.7-16.9]** | **[8.4-10.2]** | **[.2-.4]** | **[50.5-54.2]** |
| **% of Mean Total CTV** | | **27.0** | **19.5** | **3.9** | **31.2** | **17.8** | **0.6** | **100.0** |
| **95% Confidence Interval (± %)** | | **1.8** | **1.6** | **0.8** | **1.8** | **1.4** | **0.2** | |
| **MEDIAN TOTAL** | | **10.5** | **5.2** | **0.0** | **14.6** | **0.0** | **0.0** | **40.4** |

Source - Copied from 1994 TSCOHS

Table 7

**MEAN COMPOSITE TIME VALUES (CTV) FOR EACH CLINICAL DISCIPLINE FOR ALL ACTIVE DUTY MILITARY**

| | ESTIMATED POPULATION | REST | PERIO | ENDO | ORAL SURG | FIXED PROS | REM PROS | MEAN TOTAL |
|---|---|---|---|---|---|---|---|---|
| **Gender** | | | | | | | | |
| Male | 1,520,248 | 5.1 | 17.1 | 0.6 | 4.0 | 10.9 | 0.8 | 38.5 |
| Female | 179,414 | 4.9 | 12.0 | 0.5 | 2.9 | 12.8 | 0.8 | 33.9 |
| **Race** | | | | | | | | |
| White | 1,273,796 | 5.0 | 15.2 | 0.6 | 3.7 | 9.6 | 0.5 | 34.6 |
| Black | 326,328 | 5.6 | 21.0 | 0.8 | 4.5 | 16.0 | 1.9 | 49.8 |
| Hispanic | 64,518 | 4.7 | 17.5 | 0.5 | 4.9 | 12.4 | 0.7 | 40.7 |
| Asian | 20,570 | 3.6 | 18.1 | 0.4 | 2.6 | 19.2 | 4.3 | 48.2 |
| Other | 14,450 | 6.5 | 19.8 | 1.4 | 4.2 | 13.4 | 1.8 | 47.1 |
| **Age Category** | | | | | | | | |
| 18 -19 years | 42,048 | 5.7 | 10.4 | 0.5 | 10.6 | 4.2 | 0.1 | 31.5 |
| 20 - 24 years | 587,359 | 6.1 | 13.1 | 0.6 | 7.1 | 6.9 | 0.1 | 33.9 |
| 25 - 29 years | 420,366 | 4.7 | 15.5 | 0.6 | 2.9 | 9.8 | 0.4 | 33.9 |
| 30 - 34 years | 312,028 | 4.5 | 18.1 | 0.6 | 1.4 | 13.3 | 0.9 | 38.8 |
| 35 - 39 years | 210,497 | 4.5 | 22.2 | 0.6 | 1.1 | 18.3 | 1.9 | 48.6 |
| 40 - 44 years | 95,699 | 3.9 | 24.4 | 0.8 | 0.5 | 18.8 | 3.0 | 51.4 |
| > 44 years | 31,655 | 3.3 | 24.7 | 0.3 | 1.9 | 21.3 | 6.4 | 57.9 |
| **Education** | | | | | | | | |
| No College | 658,519 | 5.9 | 17.6 | 0.7 | 5.2 | 10.3 | 0.7 | 40.4 |
| Some College | 708,713 | 5.3 | 17.1 | 0.6 | 3.5 | 13.0 | 1.0 | 40.5 |
| College Graduate | 217,546 | 3.6 | 14.0 | 0.5 | 2.5 | 9.5 | 1.0 | 31.1 |
| Beyond College | 114,884 | 2.4 | 10.9 | 0.3 | 0.9 | 6.8 | 0.6 | 21.9 |
| **Paygrade** | | | | | | | | |
| E1 - E4 | 773,974 | 6.3 | 14.3 | 0.6 | 6.4 | 8.7 | 0.3 | 36.6 |
| E5 - E6 | 533,446 | 4.7 | 20.0 | 0.6 | 2.0 | 13.9 | 1.2 | 42.4 |
| E7 - E9 | 178,304 | 4.5 | 24.1 | 0.8 | 1.2 | 19.5 | 2.7 | 52.8 |
| O1 - 03 | 161,065 | 2.4 | 9.2 | 0.3 | 2.1 | 4.1 | 0.3 | 18.4 |
| O4 - O7 | 52,873 | 2.6 | 11.0 | 0.1 | 0.4 | 10.2 | 0.3 | 24.6 |
| **MEAN TOTAL** | **1,699,662** | **5.1** | **16.5** | **0.6** | **3.9** | **11.1** | **0.8** | **38.0** |
| **95% Confidence Interval** | | **[4.9-5.3]** | **[16.2-16.8]** | **[0.5-0.7]** | **[3.7-4.1]** | **[10.5-11.7]** | **[0.7-0.9]** | **[37.2-38.8]** |
| **% of Mean Total CTV** | | **13.4** | **43.4** | **1.6** | **10.3** | **29.2** | **2.1** | **100.0** |
| **95% Confidence Interval (± %)** | | **0.6** | **0.8** | **0.2** | **0.6** | **0.8** | **0.2** | |
| **MEDIAN TOTAL** | | **0.0** | **9.6** | **0.0** | **0.0** | **0.0** | **0.0** | **25.6** |

Source - Copied from 1994 TSCOHS

Appendix 1

ADDITONAL DENTAL PROVIDERS REQUIRED FOR RESTORATIVE NEEDS

| | AF RECRUITS | ACTIVE DUTY AF |
|---|---|---|
| Target Population | 14,722 | 365,000 |
| Mean Restorative CTV per patient | 17.8 | 4.9 |
| Total Restorative CTV Need Workload (Total Unmet Tx Need CTV) | 262,051 | 1,788,500 |
| Provider Productivity (CTV's/year) | 8,864 | 8,864 |
| Time (years) Needed to Complete Tx | 5 | 5 |
| % Treatment to be completed | 100% | 100% |

Number of Additional Providers =

$$\frac{\text{(Total Unmet Tx Need CTV/Annual Productivity per Provider)(\%Tx Completed)}}{\text{Time to deplete Unmet Tx Need Pool}}$$

Number of Additional Providers = $\frac{(262{,}051/8{,}864) \times 100\%}{5 \text{ years}}$ = **5.9 for recruits**

Number of Additional Providers = $\frac{(1{,}788{,}500/8{,}864) \times 100\%}{5 \text{ years}}$ = **40.4 for active duty**

Appendix 1

ADDITONAL DENTAL PROVIDERS REQUIRED FOR PERIODONTIC NEEDS

| | AF RECRUITS | ACTIVE DUTY AF |
|---|---|---|
| Target Population | 14,722 | 365,000 |
| Mean Periodontic CTV per patient | 9.8 | 13.9 |
| Total Periodontic CTV Need Workload (Total Unmet Tx Need CTV) | 144,276 | 5,073,500 |
| Provider Productivity (CTV's/year) | 8,864 | 8,864 |
| Time (years) Needed to Complete Tx | 5 | 5 |
| % Treatment to be completed | 100% | 100% |

**Periodontic Tx requiring a dentist for recruits** = 30% 144,257 x .30 = 43,277 (workload)

**Periodontic Tx requiring a dentist for active duty** = 43% 5,073,500 x .43 = 2,181,605 (workload)

Number of Additional Providers =

$$\frac{\text{(Total Unmet Tx Need CTV/Annual Productivity per Provider)(\%Tx Completed)}}{\text{Time to deplete Unmet Tx Need Pool}}$$

Number of Additional Providers = $\frac{(43{,}277/8{,}864) \times 100\%}{5 \text{ years}}$ = **1.0 for recruits**

Number of Additional Providers = $\frac{(2{,}181{,}605/8{,}864) \times 100\%}{5 \text{ years}}$ = **49.2 for active duty**

Periodontal treatment includes providing preventive services.

Appendix 1

ADDITONAL DENTAL PROVIDERS REQUIRED FOR ENDONTIC NEEDS

| | AF RECRUITS | ACTIVE DUTY AF |
|---|---|---|
| Target Population | 14,722 | 365,000 |
| Mean Endodontic CTV per patient | 1.6 | 0.4 |
| Total Endodontic CTV Need Workload (Total Unmet Tx Need CTV) | 23,555 | 146,000 |
| Provider Productivity (CTV's/year) | 8,864 | 8,864 |
| Time (years) Needed to Complete Tx | 5 | 5 |
| % Treatment to be completed | 100% | 100% |

Number of Additional Providers =

$$\frac{\text{(Total Unmet Tx Need CTV/Annual Productivity per Provider)(\%Tx Completed)}}{\text{Time to deplete Unmet Tx Need Pool}}$$

Number of Additional Providers = $\frac{(23{,}555/8{,}864) \times 100\%}{5 \text{ years}}$ = **.50 for recruits**

Number of Additional Providers = $\frac{(146{,}000/8{,}864) \times 100\%}{5 \text{ years}}$ = **3.3 for active duty**

Appendix 1

ADDITONAL DENTAL PROVIDERS REQUIRED FOR ORAL SURGERY NEEDS

| | AF RECRUITS | ACTIVE DUTY AF |
|---|---|---|
| Target Population | 14,722 | 365,000 |
| Mean Oral Surgery CTV per patient | 13.3 | 3.1 |
| Total Oral Surgery CTV Need Workload (Total Unmet Tx Need CTV) | 195,803 | 1,131,500 |
| Provider Productivity (CTV's/year) | 8,864 | 8,864 |
| Time (years) Needed to Complete Tx | 5 | 5 |
| % Treatment to be completed | 100% | 100% |

Number of Additional Providers =

$$\frac{\text{(Total Unmet Tx Need CTV/Annual Productivity per Provider)(\%Tx Completed)}}{\text{Time to deplete Unmet Tx Need Pool}}$$

Number of Additional Providers = $\frac{(195{,}802/8{,}864) \times 100\%}{5 \text{ years}}$ = **4.4 for recruits**

Number of Additional Providers = $\frac{(1{,}131{,}500/8{,}864) \times 100\%}{5 \text{ years}}$ = **25.5 for active duty**

Appendix 1

ADDITONAL DENTAL PROVIDERS REQUIRED FOR PROSTHODONTIC NEEDS

| | AF RECRUITS | ACTIVE DUTY AF |
|---|---|---|
| Target Population | 14,722 | 365,000 |
| Mean Prosthodontic CTV per patient | 8.0 | 12.4 |
| Total Prosthodontic CTV Need Workload (Total Unmet Tx Need CTV) | 117,776 | 4,526,000 |
| Provider Productivity (CTV's/year) | 8,864 | 8,864 |
| Time (years) Needed to Complete Tx | 5 | 5 |
| % Treatment to be completed | 100% | 100% |

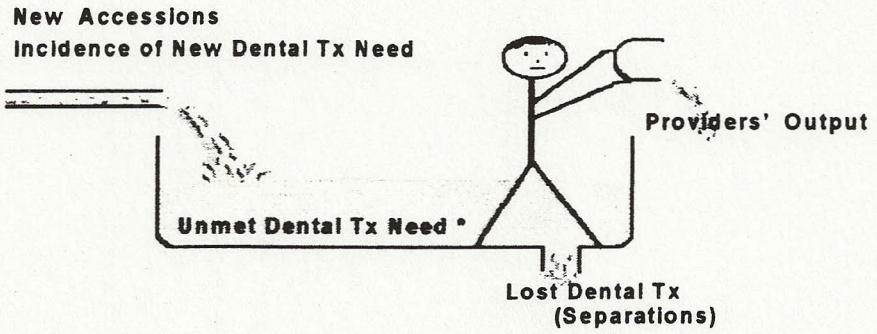
Number of Additional Providers =

$$\frac{\text{(Total Unmet Tx Need CTV/Annual Productivity per Provider)(\%Tx Completed)}}{\text{Time to deplete Unmet Tx Need Pool}}$$

Number of Additional Providers = $\frac{(117{,}776/8{,}864) \times 100\%}{5 \text{ years}}$ = **2.7 for recruits**

Number of Additional Providers = $\frac{(4{,}526{,}000/8{,}864) \times 100\%}{5 \text{ years}}$ = **102.0 for active duty**

# *Provider Model*




* Separate models for: Restorative, Perio., Endo., Pros., & Oral Surgery

**Assumptions 1-4**: The above drawing is presented to graphically demonstrate the concept of this manpower model. The unmet dental treatment need is represented by the water inside the tank. This level is affected by several elements. Contributing to the rise in dental need is the inflow of treatment need generated by new accessions and the incidence of new dental treatment found among active duty members. At the other side of the tank, the level of treatment need is lowered through the efforts of the oral health care providers' output (represented by the stick figure) and separations of personnel from active service (drain). Although this is a dynamic process, it is assumed, for the purpose of modeling, that the amount of incoming need is approximately equal to treatment need output/loss. The remaining unmet need, as identified in the 1994 TSCOHS, has probably varied little over the past few years but is the result of the incoming stream slowly exceeding the outgoing flow at the right side of the tank. All other factors being equal, increasing the number of providers (bailers in the tank) will lower the existing treatment need burden.

**Assumptions 5-6**: Because of rigorous sampling design, response rate, and standardization of examiners, the 1994 TSCOHS represents the most sophisticated and accurate collection and analysis of military dental data ever compiled.

**Assumption 7**: Unmet treatment need probably has changed very little since the 1994 survey. End strength is lower but so are the number of providers. Therefore it is assumed there is little net difference. When the next Tri-Service survey is completed, comparisons between the two surveys will detect any significant changes in the treatment needs among Navy, Army, and Air Force personnel.

**Assumption 8-9**: Productivity rates for different specialists were collected from NDC NORVA because this site represents a clinic that has an adequate number of different dental specialists who are clinically active. Productivity information on general dentists providing specialty care was not available, therefore productivity rates for the specialty providers were used. These rates can be adjusted as

Discussion of assumptions provided by LCDR Tom Leindecker, DC, USN

information gathering for general dentists becomes more sophisticated. Although there may be differences in productivity rates, the concept of the model does not change. The productivity rates used in this model can be adjusted at Summary Level 3 to suit any clinic/command. Full time equivalents (FTE) were used in this model and were arbitrarily set at 0.75. This may also be adjusted at Summary Level 3. If the FTE factor is not to be considered in the productivity calculation, set FTE=1.00 and use the actual mean annual CTVs produced per provider type.

**Assumption 10**: With the advent of phased dentistry, the general dentist is moving away from the "amalgam line" and providing a broader range of dental services. As general dentists deliver a variety of less complicated specialty care, specialists can concentrate on more complex cases. Not only is this better resource utilization, it promotes professional development and well-being among all provider types. The following is a suggested protocol for utilization of oral health care providers by treatment category and is not meant to restrict or limit the delivery of care. These recommendations, in part, come after consultation with a variety of specialty advisors.

Restorative Dentistry.....General Dentist

Periodontics
- PSR 1 pts.....Prophy Technician
- PSR 2-3 pts..... Dental Hygienist
- PSR 3-4 pts.....Advanced Trained Dentist

Oral Surgery (Exodontia only)
- Simple Extractions only.....General Dentist
- Complicated and/or impacted Extractions.....Advanced Trained Dentist

Endodontics
- Anterior Endo.....General Dentist
- Posterior Endo.....Advanced Trained Dentist
  (Premolars & Molars)

Prosthodontics
- 1 - 6 fixed units.....General Dentist
- > 6 fixed units & Rem.....Advanced Trained Dentist

## DOD DENTAL CLASSIFICATION CRITERIA

Source: DoD Instruction 6410.1, *Standardization of Dental Classifications*

**CLASS 1** : not requiring dental treatment or reevaluation within 12 months.

A. No dental caries or defective restorations
B. Arrested caries for which treatment is not indicated
C. Healthy periodontium, no bleeding on probing, oral prophylaxis not indicated
D. Replacement of missing teeth not indicated
E. Unerupted, partially erupted, or malposed teeth that are without historical, clinical, or radiographic signs or symptoms of pathosis and are not recommended for prophylactic removal
F. Absence of temporomandibular disorder; stable occlusion

**CLASS 2**: conditions present which, if not treated or followed up, are **not expected** to, but have the potential to result in dental emergencies within 12 months.

A. Treatment or followup indicated for dental caries with minimal extension into dentin or minor defective restorations easily maintained by the patient where the condition does not cause definitive symptoms
B. Interim restorations or prostheses that can be maintained by the patient where the underlying condition does not cause definitive symptoms. (This includes teeth that have been restored with permanent restorative materials, but for which protective coverage is indicated).
C. Edentulous areas requiring prostheses but not on an immediate basis
D. Periodontal disease or peridontium exhibiting:
   (1) Requirement for oral prophylaxis
   (2) Requirement for maintenance therapy; this includes stable or non-progressive mucogingival conditions requiring periodic evaluation
   (3) Non-specific gingivitis
   (4) Early or mild adult periodontitis
   (5) Supragingival or slight subgingival calculus

**CLASS 2:** (Cont.)

E. Unerupted, partially erupted, or malposed teeth that are without historical, clinical, or radiographic signs or symptoms of pathosis, but which are recommended for prophylactic removal
F. Active orthodontic treatment
G. Temporomandibular disorder patients in maintenance therapy

**CLASS 3**: oral conditions which, if not treated, **are expected** to result in dental emergencies within 12 months. When there are questions in determining classification between Class 2 and Class 3, patient should be placed in Class 3.

A. Dental caries, tooth fractures, or defective restorations where the condition extends beyond the dentinoenamel junction and causes definitive symptoms; dental caries with moderate or advanced extension into dentin; and defective restorations not maintained by the patient.
B. Interim restorations or prostheses that cannot be maintained for a 12-month period. (This includes teeth that have been restored with permanent restorative materials but for which protective coverage is indicated).
C. Periodontal diseases or periodontium exhibiting:
    (1) Acute gingivitis or pericoronitis
    (2) Active moderate to advanced periodontitis
    (3) Periodontal abscess
    (4) Progressive mucogingival condition
    (5) Periodontal manifestations of systemic disease or hormonal disturbances
    (6) Moderate to heavy subgingival calculus
D. Edentulous areas or teeth requiring immediate prothodontic treatment for adequate mastication, communication, or acceptable esthetics
E. Unerupted, partially erupted, or malposed teeth with historical, clinical, or radiographic signs or symptoms of pathosis, that are recommended for removal

**CLASS 3:** (Cont)

F. Chronic oral infections or other pathologic lesions including:
   (1) Pulpal or periapical pathology requiring treatment
   (2) Lesions requiring biopsy or awaiting biopsy report
G. Emergency situations requiring therapy to relieve pain, treat trauma, treat acute oral infections, or provide timely follow-up care (e.g., drain or suture removal) until resolved
H. Temporomandibular disorder requiring active treatment

Copied from the 1994 TSCOHS June 1995 Report, NDRI Report No. PR 9502

# COMPOSITE TIME VALUES (CTV) ASSIGNMENT FOR DENTAL CLINICAL PROCEDURES

Military dentistry uses a Standardized Code on Dental Procedures which is a modification of the American Dental Association's Code on Dental Procedures and Nomenclature. The military code for dental procedures assigns Composite Time Values (CTV) for each procedure to be used for workload accountability. For every episode of dental care delivered, the care provider records a list of the treatment codes involved. This list of codes is then converted into numeric CTV.

The TSCOHS collected dental treatment requirements expressed as counts of specific dental procedures (i.e. number of two surface restorations, crowns, molars requiring endodontic treatment, patients in each PSR code, etc.). In order to address the total workload of treatment needs and to make comparisons across clinical disciplines possible, raw counts of dental treatment procedures were converted into CTV.

***Consulting specialists in each clinical discipline were asked to provide a list of the dental procedure codes they normally record when delivering each specific dental treatment***. For example, when treating a patient with an amalgam restoration it is customary to record procedure codes for patient examination, rubber dam, local anesthesia, and patient handling time. ***The specialists were asked to exclude procedure codes which are occasionally taken and list only those which are routinely a part of each specific dental treatment. This approach guards against artificial inflation of CTV counts***. The following pages of this section provide a detailed description of the calculations and assumptions used in the process of converting required dental treatments into composite time values.

## CTV ASSIGNMENT FOR RESTORATIVE CARE AND SEALANTS

### ADD ON PROCEDURES FOR RESTORATIVE CARE

| | |
|---|---|
| 0130 - other examination | 0.4 |
| 9973 - patient handling (tx) | 1.4 |
| 2960 - rubber dam | 0.4 |
| 9211 - local anesthesia | 1.0 |
| subtotal for restorative care | 3.2 |
| TOTAL (for each rest. procedure) | 3.2/ 1.3 restorations per appointment = **2.5** |

(assumption: 1.3 restorative procedures per restorative appointment) Based on information collected on 555 restorative appointments at Bolling AFB from May-July 1994.

### TOTAL PROCEDURES FOR RESTORATIVE CARE

<u>One surface restoration</u>

2140 - one surface amalgam 1.0 plus 2.5 = **3.5**

<u>Two surface restoration</u>

2150 - two surface amalgam 1.9 plus 2.5 = **4.4**

<u>Three surface restoration</u>

2160 - three surface amalgam 2.2 plus 2.5 = **4.7**

Four or more surface restoration

2161 - four or more surface amalgam 2.6 plus 2.5 = **5.1**

Note: CTV for amalgam restorations were used. The CTV for a single surface resin plus etch (1.4) is greater than for a single surface amalgam (1.0). However, the CTV for a two surface resin (1.4) is less than for a two surface amalgam (1.9). Also, three surface resin plus etch (2.1) and three surface amalgam restorations (2.2) have essentially the same CTV. The TSCOHS data base does not indicate the type of restorative material required. Assuming all restorations to be amalgam should not cause significant error in the operative CTV count.

**PROCEDURES FOR SEALANTS**

| | |
|---|---|
| 0130 - other examination | 0.4 |
| 9973 - patient handling (tx) | 1.4 |
| subtotal for sealants | 1.8 |

(assume four sealants placed per appointment) 1.8 / 4 = 0.45

1350 - pit/fissure sealant 0.3 + 0.45 = **0.75**

## CTV ASSIGNMENT FOR ORAL SURGERY (EXTRACTIONS)

### SIMPLE EXTRACTION

| | | |
|---|---|---|
| 7110 - simple tooth removal | 0.7 | |
| 0130 - other examination | 0.4 | |
| 0160 - blood pressure x 2 | 0.4 | |
| 9211 - local anesthesia | 1.0 | |
| 9973 - pt. handling (tx) | 1.4 | |
| 9631 - prescription | 0.3 | |
| 7520 - biopsy | (1.4) | not included in total |
| TOTAL | **4.2** | |

### COMPLICATED EXTRACTION

| | | |
|---|---|---|
| 7120 - complicated tooth removal | 1.2 | |
| 0130 - other examination x 2 | 0.8 | |
| 0160 - blood pressure x 2 | 0.4 | |
| 9211 - local anesthesia | 1.0 | |
| 9973 - pt. handling (tx) x 2 | 2.8 | |
| 9631 - prescription | 0.3 | |
| 9918 - post-op. tx | 0.5 | |
| 7520 - biopsy | (1.4) | not included in total |
| TOTAL | **7.0** | |

**IMPACTION REMOVAL**

| | |
|---|---|
| 7130 - impacted tooth removal | 1.4 |
| 0130 - Other examination x 2 | 0.8 |
| 0160 - blood pressure x 2 | 0.4 |
| 9211 - local anesthesia | 1.0 |
| 9973 - pt. handling (tx) x 2 | 2.8 |
| 9630 - other therapeutic med. | 0.6 |
| 9631 - prescription | 0.3 |
| 4250 - mucogingival flap | 2.6 |
| 9918 - post-op. tx | 0.5 |
| 7520 - biopsy | (1.4) not included in total |
| 9231 - IV sedation | (1.2) not included in total |
| TOTAL | **10.4** |

Assumption: By not including biopsy, IV sedation and other commonly used codes not listed, giving full credit for other listed codes for each extraction should provide a reasonable estimate of actual CTV for each procedure.

# CTV ASSIGNMENT FOR ENDODONTIC PROCEDURES

| | |
|---|---|
| 0130 - other examination x 2 | 0.8 |
| 0220 - radiographs x 4 | 0.8 |
| 2940 - temporary restoration x 2 | 1.0 |
| 2960 - rubber dam x 2 | 0.8 |
| 3360 - endodontic interim treatment | 1.8 |
| 4330 - occlusal adjustment | 0.7 |
| 3311-3334 endodontic therapy | 2.3 (anterior), 2.8 (premolar), 3.9 (molar) |
| 9211 - local anesthesia x 2 | 2.0 |
| 9630 - other therapeutic med (NaOCl, etc.) x 2 | 1.2 |
| 9631 - prescription | 0.3 |
| 9973 - patient handling time (tx) x 2 | 2.8 |

| | |
|---|---|
| TOTAL (anterior) | **14.5** |
| TOTAL (premolar) | **15.0** |
| TOTAL (molar) | **16.1** |

## CTV ASSIGNMENT FOR PROSTHODONTIC PROCEDURES

### SINGLE TOOTH CAST RESTORATION

| | | |
|---|---|---|
| 0130 - other examination x 2 | 0.8 | |
| 9973 - patient handling (tx) x 2 | 2.8 | |
| 9630 - other therapeutic med. | 1.2 | |
| 9211 - local anesthesia | 2.0 | |
| 9923 - Impression | 0.8 | |
| 6711 - interim crown | 2.1 | |
| 2940 - temp. cementation | 0.5 | |
| 6611 - stain and glaze (71%) | 1.5 | (2.1)(.71) = 1.5 |
| 61x0 - metal(29%), pfm(71%) | 10.1 | .29(7.7) + .71(11.1) = 10.1 |

(assumes 71% of crowns will be porcelain fused to metal. 1990 ADA Survey of Dental Services Rendered)

| | | |
|---|---|---|
| TOTAL | **21.8** | |

### FIXED PARTIAL DENTURE ABUTMENTS

(assumes 2 abutments per FPD, does not include the pontics)

| | | |
|---|---|---|
| 0130 - other examination x 2 | 0.8 | |
| 9973 - patient handling (tx) x 2 | 2.8 | |
| 9923 - Impression | 0.8 | |
| 6711 - interim FPD | 3.2 | |
| 6611 - stain and glaze (71%) | 3.0 | (2.1)(.71)(2) = 3.0 |
| 2940 - cementation x 2 abutments | 1.0 | |
| 61x0 - metal (29%), pfm (71%) | 20.2 | (10.1)(2) = 20.2 |
| total for both abutments | 31.8 | |
| | | |
| TOTAL (single abutment) | **15.9** | (31.8/2 = 15.9) |

## FIXED PARTIAL DENTURE PONTIC

(note: all patient handling time, impressions, etc. are counted with the abutments)

| | |
|---|---|
| 62xx - pontic (assume .5 metal and .5 pfm) | 1.4 |
| 6611 - stain and glaze (assume pfm are chairside stained and glazed) | 1.5 |
| TOTAL (single pontic) | **2.9** |

## REMOVABLE PARTIAL DENTURE

| | | |
|---|---|---|
| 0130 - other examination x 4 | 1.6 | |
| 9973 - patient handling (tx) x 4 | 5.6 | |
| 9923 - impression | 0.8 | |
| 5330 - rpd corrected cast x 25% | 0.7 | 2.6/4 = .65 (assumes corrected cast technique 25% of cases) |
| 5203 - cast metal RPD | 12.3 | |
| 2970 - odontoplasty | 0.4 | (0.2)(2) = 0.4 |
| 9918 - post-op tx | 0.5 | |
| TOTAL | **21.9** | |

## COMPLETE DENTURE (ONE ARCH)

| | |
|---|---|
| 0130 - other examination x 6 | 2.4 |
| 9973 - patient handling (tx) x 6 | 8.4 |
| 9923 - impression x 2 | 1.6 |
| 9924 - jaw relation record | 4.1 |
| 5820 - chairside remount | 3.5 |
| 5110 - complete denture | 10.3 |
| 9918 - post-op. tx | 0.5 |
| TOTAL | **30.8** |

## POST AND CORE

| | |
|---|---|
| 0130 - other examination x 2 | 0.8 |
| 9973 - patient handling (tx) x 2 | 2.8 |
| 9630 - other ther. med. (irrigation) | 0.6 |
| 9211 - local anesthesia | 1.0 |
| 3335 - root canal filling removal | 2.0 |
| 2940 - temporary restoration | 0.5 |
| 6711 - interim crown | 2.1 |
| 6720 - post-core, metal | 4.4 |
| 9923 - impression | 0.8 |
| 2960 - rubber dam x 2 | 0.8 |
| TOTAL | **15.8** |

## CTV ASSIGNMENT FOR PERIODONTAL SCREENING AND RECORDING CODES

Periodontal status and treatment requirements were assessed using Periodontal Screening and Recording (PSR) a rapid and effective way to screen patients for periodontal diseases. PSR is an adaptation of the Community Periodontal Index of Treatment Needs (CPITN), which is endorsed by the World Health Organization. PSR is recommended by The American Dental Association and The American Academy of Periodontology for all patients as an integral part of oral examinations. PSR includes suggested guidelines for appropriate patient management based on individual PSR score. Following the guidance of a group of consulted military periodontists, PSR treatment guidelines were converted to dental procedure codes and composite time values (CTV). The following provides the breakout of dental procedure codes taken when treating each PSR coded sextant and an explanation of the conversion to CTV.

*Code 1:*
Oral hygiene instruction
Coronal polish
Topical fluoride application

*Code 2:*
Oral hygiene instruction
Scaling by oral prophylaxis technician or registered dental hygienist
Coronal polish
Topical fluoride application

*Code 3:*
Comprehensive periodontal examination by a dental officer
Vertical bitewing and selected periapical radiographic survey
Oral hygiene instruction
Scaling, and root planing as indicated, with anesthetic by RDH or a dental officer
Coronal polish
Topical fluoride application
Post-hygiene reevaluation by a dental officer.

*Code 4:* Comprehensive periodontal examination by a dental officer
Vertical bitewing and selected periapical radiographic survey
Oral hygiene instruction
Scaling, and root planing as indicated, with anesthetic by RDH or a dental officer
Coronal polish
Topical fluoride application
Post-hygiene reevaluation by a dental officer
Periodontal Surgery to include:
a) blood pressure recording
b) anesthetic
c) mucogingival flaps
d) root planing
e) prescription medications
f ) adjunctive surgical procedures
Postoperative Treatment at 1, 2, and 4 weeks.

Included in this scheme are the conservative assumptions that:

-Two sextants can receive either root planing or surgery during the same appointment.
-No surgical therapy will be required for code 3 sextants.
-Osseous surgery, osseous grafting, guided tissue regeneration, or distal/mesial wedge will be required in only one-half of code 4 sextants.
- Complete (7.2) or limited (0.7) occlusal adjustment, and antimicrobial therapy have not been factored into these estimates.
- The requirement for supportive periodontal therapy is not included in the algorithm.

## Estimated Comprehensive Periodontal Treatment Based on Whole Mouth PSR

1) Given a dentition with all six sextants PSR code 1, the following dental treatment is required:
Oral hygiene instruction, coronal polish, topical fluoride application.

| Dental Procedure Codes | |
|---|---|
| 0130- other examination | 0.4 |
| 1330- oral hygiene inst. | 0.3 |
| 1110- adult prophylaxis | 1.8 |
| 1240- topical fluoride tx | 0.7 |
| 9973- patient handling (tx) | 1.4 |
| Total CTV | 4.6 |

**CTV per Code 1 sextant = 4.6/6 = 0.8**

2) Given a dentition with all six sextants PSR code 2, the following dental treatment is required:

Oral hygiene instruction, coronal polish, topical fluoride application, scaling by hygienist.

| Dental Procedure Codes | |
|---|---|
| 0130- other examination | 0.4 |
| 1330- oral hygiene inst. | 0.3 |
| 4342- periodontal scaling x 6 | 2.4 |
| 1110- adult prophylaxis | 1.8 |
| 1240- topical fluoride tx | 0.7 |
| 9973- patient handling (tx) | 1.4 |
| Total CTV | 7.0 |

**CTV per Code 2 sextant = 7.0/6 = 1.2**

3) Given a dentition with all six sextants PSR code 3, the following dental treatment is required:

Oral hygiene instruction, coronal polish, topical fluoride application, type 2 exam by specialist, selected periapical radiographs, vertical bitewing radiographs, scaling and root planing (4 settings, root plane x 6), local anesthetic.

Dental Procedure Codes

| | |
|---|---|
| 0130- other examination x 4 | 1.6 |
| 0140- comprehensive exam x 2 | 7.2 |
| 0210- intraoral series of radiographs | 2.8 |
| 1330- oral hygiene inst. x 6 | 1.8 |
| 4343- scaling and root planing x 6 | 8.4 |
| 1110- adult prophylaxis | 1.8 |
| 1240- topical fluoride tx | 0.7 |
| 9211- local anesthesia x 4 | 4.0 |
| 9972- patient handling (dx) x 2 | 2.0 |
| 9973- patient handling (tx) x 4 | 5.6 |
| Total CTV | 35.9 |

**CTV per Code 3 sextant = 35.9/6 = 6.0**

4) Given a dentition with all six sextants PSR code 4, the following dental treatment is required:

Oral hygiene instruction, coronal polish, topical fluoride application, type 2 exam by specialist, selected periapical radiographs, vertical bitewing radiographs, scaling and root planing (4 settings, root plane x 6), local anesthetic, post-hygiene reevaluation by specialist, six sextants of periodontal surgery at four settings, final scaling and root planing (4 sittings, root plane x 6).

Dental Procedure Codes

| | |
|---|---|
| 0130- other examination x 14 | 5.6 |
| 0140- comprehensive exam x 2 | 7.2 |
| 0160- blood pressure x 8 | 1.6 |
| 0210- intraoral series of radiographs | 2.8 |
| 1330- oral hygiene inst. x 16 | 4.8 |
| 4250- mucogingival flap x 12 | 31.2 |
| 4343- scaling and root planing x 12 | 19.2 |
| 1110- adult prophylaxis | 1.8 |
| 1240- topical fluoride tx | 0.7 |
| 9211- local anesthesia x 8 | 8.0 |
| 9631- prescription x 4 | 1.2 |
| 9918- postoperative treatment x 9 | 4.5 |
| 9972- patient handling (dx) x 2 | 2.0 |
| 9973- patient handling (tx) x 14 | 19.6 |
| Total CTV | 110.2 + 15 (surgery supplement 2.5 x 6) = 125.2 |

**CTV per Code 4 sextant = 125.2/6 = 20.9**

Osseous surgery, osseous grafting, guided tissue regeneration, or distal/mesial wedge techniques will be required in only one half of code 4 sextants. Therefore count 5.1/2 = 2.5 CTV (surgery supplement) for each code 4 sextant.

| Surgery supplement | |
|---|---|
| 4260- osseous resective surgery | 1.4 |
| 4261- osseous graft | 1.5 |
| 4268- guided tissue regeneration | 1.5 |
| 4230- mesial/distal wedge | 0.7 |
| Total ..... | 5.2 |

## 3. Patient Questionnaire

Questions on dental utilization and perceived need were drawn from Oral Health of U.S. Employed Adults and Seniors: 1985-86; U.S. Department of Health and Human Services, National Institute of Dental Research, NIH Pub. No. 87-2868, 1987, Bethesda, MD. This survey is the most recent study of adult oral health by the National Institute of Dental Research. Using these questions allows direct comparison between the civilian and military populations on these measures.

## 4. Sampling Strategy

The population of interest for this study is all active duty airmen, sailors, and soldiers in the continental United States. The sampling strategy was developed by Molajo and Associates, Consultants in the Mathematical Sciences ( a civilian firm specializing in survey sampling design). Personnel information was provided by the Defense Manpower Data Center (DMDC). Recruits were sampled using single stage, stratified, random sampling. Recruit sampling details are provided in the TSCOHS Recruit Report (June 1995).

Non-recruit personnel were sampled using two stage, stratified, random sampling. The sampling frame consisted of all Army, Air Force, Navy, and Marine bases located in the continental United States (CONUS) with populations of at least 4,000. This resulted in approximately 80% of the CONUS active duty military population being in the sampling frame. After stratifying by service, nine bases per service strata were randomly selected with a probability of selection proportional to each base population. Next, each selected base population was stratified by gender, race (white, black, other), and military paygrade category (E1-E4, E5-E6, E7-E9, O1-O3, O4-O10). Finally, individuals to be examined were randomly selected from each strata. Because military members are predominantly white or black males, in order to sample sufficient numbers of females and other males to allow valid statistical comparisons of their outcome measures with other subgroups of the active duty population, we oversampled these groups. During analysis, data were weighted back to the proportional representation of each group in the actual population. The target sample size, for active duty (non-recruits), was 15,924, representing 1,699,662 military personnel. For all services combined, 13,050 examinations were completed for an overall, non-recruit, response rate of 82.0%. Questionnaire response rate was slightly lower (81.3%). Table 1.1 provides a breakout of the sample and estimated population by race, gender, and age interval.

## 5. Human Subject Use

The TSCOHS protocol was reviewed by the Army Human Use Review and Regulatory Affairs Division; the Human Use Review Board, Naval Health Sciences Education and Training Command; and the Air Force Surgeon General's Clinical Investigation Committee. The protocol was found to be in full compliance with human use guidelines defined in Title 45, Code of Federal Regulations, Part 46 (Protection of Human Subjects).

# Appendix 5 Active Duty

## COMPOSITION OF SAMPLE AND ESTIMATED POPULATION BY AGE INTERVAL, RACE, AND GENDER

| AGE INTERVAL | RACE | MALE | | FEMALE | | TOTAL | |
|---|---|---|---|---|---|---|---|
| | | NUMBER IN SAMPLE | ESTIMATED POPULATION | NUMBER IN SAMPLE | ESTIMATED POPULATION | NUMBER IN SAMPLE | ESTIMATED POPULATION |
| 18-19 | WHITE | 157 | 29,382 | 24 | 3,649 | 181 | 33,031 |
| | BLACK | 35 | 5,969 | 8 | 980 | 43 | 6,949 |
| | HISPANIC | 11 | 1,405 | 0 | 0 | 11 | 1,405 |
| | ASIAN | 4 | 293 | 1 | 65 | 5 | 358 |
| | OTHER | 3 | 237 | 1 | 69 | 4 | 306 |
| | ALL GROUPS | 210 | 37,286 | 34 | 4,763 | 244 | 42,049 |
| 20-24 | WHITE | 2,390 | 396,656 | 340 | 43,420 | 2,730 | 440,076 |
| | BLACK | 553 | 92,292 | 148 | 20,918 | 701 | 113,210 |
| | HISPANIC | 219 | 22,923 | 31 | 2,454 | 250 | 25,377 |
| | ASIAN | 39 | 3,362 | 7 | 639 | 46 | 4,001 |
| | OTHER | 49 | 3,861 | 9 | 835 | 58 | 4,696 |
| | ALL GROUPS | 3,250 | 519,094 | 535 | 68,266 | 3,785 | 587,360 |
| 25-29 | WHITE | 2,022 | 280,645 | 269 | 30,166 | 2,291 | 310,811 |
| | BLACK | 539 | 74,447 | 124 | 13,160 | 663 | 87,607 |
| | HISPANIC | 150 | 12,349 | 18 | 1,406 | 168 | 13,755 |
| | ASIAN | 60 | 4,484 | 7 | 633 | 67 | 5,117 |
| | OTHER | 29 | 2,582 | 7 | 493 | 36 | 3,075 |
| | ALL GROUPS | 2,800 | 374,507 | 425 | 45,858 | 3,225 | 420,365 |
| 30-34 | WHITE | 1,737 | 217,507 | 169 | 17,974 | 1,906 | 235,481 |
| | BLACK | 414 | 49,676 | 76 | 8,239 | 490 | 57,915 |
| | HISPANIC | 137 | 11,706 | 5 | 296 | 142 | 12,002 |
| | ASIAN | 44 | 3,004 | 6 | 843 | 50 | 3,847 |
| | OTHER | 27 | 2,393 | 3 | 389 | 30 | 2,782 |
| | ALL GROUPS | 2,359 | 284,286 | 259 | 27,741 | 2,618 | 312,027 |
| 35-39 | WHITE | 1,263 | 143,353 | 145 | 14,319 | 1,408 | 157,672 |
| | BLACK | 309 | 34,080 | 47 | 5,922 | 356 | 40,002 |
| | HISPANIC | 89 | 7,330 | 8 | 736 | 97 | 8,066 |
| | ASIAN | 38 | 2,965 | 1 | 17 | 39 | 2,982 |
| | OTHER | 19 | 1,540 | 3 | 236 | 22 | 1,776 |
| | ALL GROUPS | 1,718 | 189,268 | 204 | 21,230 | 1,922 | 210,498 |
| 40-44 | WHITE | 608 | 65,422 | 60 | 5,631 | 668 | 71,053 |
| | BLACK | 135 | 13,994 | 24 | 2,846 | 159 | 16,840 |
| | HISPANIC | 38 | 2,632 | 2 | 367 | 40 | 2,999 |
| | ASIAN | 43 | 3,309 | 2 | 85 | 45 | 3,394 |
| | OTHER | 15 | 1,136 | 5 | 277 | 20 | 1,413 |
| | ALL GROUPS | 839 | 86,493 | 93 | 9,206 | 932 | 95,699 |
| > 44 | WHITE | 241 | 24,085 | 22 | 1,588 | 263 | 25,673 |
| | BLACK | 29 | 3,210 | 5 | 595 | 34 | 3,805 |
| | HISPANIC | 9 | 760 | 2 | 155 | 11 | 915 |
| | ASIAN | 10 | 859 | 1 | 12 | 11 | 871 |
| | OTHER | 5 | 400 | 0 | 0 | 5 | 400 |
| | ALL GROUPS | 294 | 29,314 | 30 | 2,350 | 324 | 31,664 |
| TOTAL POPULATION | | 11,470 | 1,520,248 | 1,580 | 179,414 | 13,050 | 1,699,662 |

## 3. Patient Questionnaire

The patient questionnaire is a composite. Questions on dental utilization and perceived need were drawn from Oral Health of U.S. Employed Adults and Seniors: 1985-86; U.S. Department of Health and Human Services, National Institute of Dental Research, NIH Pub. No. 87-2868, 1987, Bethesda, MD. This survey is the most recent study of adult oral health by the National Institute of Dental Research. Using these questions allows direct comparison between the civilian and military populations on these measures. Questions on satisfaction with military dental care were drawn chiefly from two sources: a medical satisfaction questionnaire prepared by the RAND Corporation to evaluate the CHAMPUS Reform Initiative (CRI) and the Dental Satisfaction Questionnaire (DSQ) prepared for the RAND Health Insurance Experiment. We chose these questions because they were the result of extensive development by RAND staff to evaluate the multiple components of the quality of health care. In addition, the CRI questions have been field tested with a military population.

## 4. Sampling Strategy

The population of interest for this study is all active duty airmen, sailors, and soldiers in the continental United States. The sampling strategy was developed by Molajo and Associates, Consultants in the Mathematical Sciences ( a civilian firm specializing in survey sampling design). Active duty personnel information was provided by the Defense Manpower Data Center. The complex sampling scheme utilized to draw the non-recruit sample is described in the non-recruit report. Recruits were sampled using single stage, stratified, systematic random sampling. Historic data of the size and composition of the most recent year's recruit population were used to determine sample size and what specific subgroups of interest were feasible to sample in sufficient numbers to allow comparisons across study outcome measures. Military recruits are predominantly white or black males. In order to sample sufficient numbers of females and non-white, non-black males to allow valid statistical comparisions of their outcome measures with other subgroups of the recruit population, we oversampled these groups. During analysis, data were weighted back to the proportional representation of each group in the actual recruit population. The recruit sample size was 2,711 which represented the 101,072 recruits that passed through the recruit training facilities of the Air Force, Army, Navy, and Marine Corps during the six month data collection period. Table (1.1) provides a breakout of the recruit sample and estimated population by race, gender, and age interval.

## 5. Human Subject Use

The TSCOHS protocol was reviewed by the Army Human Use Review and Regulatory Affairs Division; the Human Use Review Board, Naval Health Sciences Education and Training Command; and the Air Force Surgeon General's Clinical Investigation Committee. The protocol was found to be in full compliance with human use guidelines defined in Title 45, Code of Federal Regulations, Part 46 (Protection of Human Subjects).

Appendix 5

Recruits

**COMPOSITION OF SAMPLE AND ESTIMATED POPULATION BY AGE INTERVAL, RACE, AND GENDER**

| AGE INTERVAL | RACE | MALE | | FEMALE | | TOTAL | |
|---|---|---|---|---|---|---|---|
| | | NUMBER IN SAMPLE | ESTIMATED POPULATION | NUMBER IN SAMPLE | ESTIMATED POPULATION | NUMBER IN SAMPLE | ESTIMATED POPULATION |
| 18-19 | WHITE | 701 | 26,221 | 221 | 7,949 | 922 | 34,170 |
| | BLACK | 198 | 6,620 | 60 | 2,017 | 258 | 8,637 |
| | OTHER | 118 | 3,508 | 48 | 2,089 | 166 | 5,597 |
| | ALL GROUPS | 1017 | 36349 | 329 | 12055 | 1346 | 48404 |
| 20-24 | WHITE | 566 | 22,489 | 216 | 8,192 | 782 | 30,681 |
| | BLACK | 190 | 7,108 | 67 | 2,452 | 257 | 9,560 |
| | OTHER | 116 | 3,336 | 34 | 1,297 | 150 | 4,633 |
| | ALL GROUPS | 872 | 32933 | 317 | 11941 | 1189 | 44874 |
| 25-29 | WHITE | 56 | 2,442 | 36 | 1,395 | 92 | 3,837 |
| | BLACK | 17 | 803 | 13 | 580 | 30 | 1,383 |
| | OTHER | 15 | 476 | 2 | 126 | 17 | 602 |
| | ALL GROUPS | 88 | 3721 | 51 | 2101 | 139 | 5822 |
| 30-35 | WHITE | 10 | 459 | 8 | 459 | 18 | 918 |
| | BLACK | 4 | 286 | 6 | 363 | 10 | 649 |
| | OTHER | 6 | 224 | 3 | 181 | 9 | 405 |
| | ALL GROUPS | 20 | 969 | 17 | 1003 | 37 | 1972 |
| **TOTAL POPULATION** | | **1,997** | **73,972** | **714** | **27,100** | **2,711** | **101,072** |

## ACKNOWLEDGMENTS

The author wishes to express appreciation to the USAF for their support of this project, especially Colonel Forrest Poindexter and Colonel Al Hancock. Also of great assistance were Lt. Commander Tom Leiendecker DC, USN, Dr. John Brown, Residency Director, Residency Committee members Dr. Dan Jones, Dr. Ben Bradshaw and Dr. Elaine Neenan.