ARMY MEDICAL DEPARTMENT CENTER AND SCHOOL
UNITED STATES ARMY - BAYLOR UNIVERSITY
GRADUATE PROGRAM IN HEALTHCARE ADMINISTRATION

A COST ANALYSIS MODEL FOR ARMY SPONSORED GRADUATE DENTAL TRAINING PROGRAMS

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Currently, 85 Army officers pursue graduate dental education (GDE) in 28 different training programs. Programs were surveyed to determine the direct and indirect costs to the Army for its sponsored GDE. Total training costs exceeded $48.40 million to complete one Army residency training cycle (from 1 to 6 years in duration) or about $576,000 per resident. When the dental procedures and services provided by the residents and mentors involved with GDE are considered as generated revenue, Army GDE operates at a net profit (revenues minus costs) of just under $865,000 or $10,300 per resident. If the net profit per resident is divided by the mean specialty trained career length of 17.91 years of service, the amortized net profit of training equates to +$587 per resident per retained year.

The hypothesis that outsourcing GDE to civilian institutions was refuted by the data collected. The Army Dental Care System (ADCS) does have more dental specialists in its inventory then needed to service its current population which perpetuates a higher than average dental specialist to generalist ratio. Readiness requirements mandate some programs, e.g., Advanced Education in General Dentistry (AEGD) 1 and 2 year programs as well as oral and maxillofacial (OMFS) residencies, must be continued regardless of the cost. To remain viable the other product line GDE programs must share their best business practices; to think of GDE as a business and not a luxury easily affordable to the military. Failing to focus on the bottom line, to show a profit, may lead to their extinction.

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TABLE OF CONTENTS

TABLE OF TABLES

TABLE OF FIGURES

EXECUTIVE SUMMARY

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INTRODUCTION

The medical system for the Department of Defense (DOD) costs about $15 billion annually and employs about 227,000 active duty and reserve personnel (GAO Report 1995). Section 733 of the National Defense Authorization Act for the Fiscal Years (FY) 1992 and 1993 required DOD to conduct a study to, among, other things, determine "(1) the size and composition of the military medical system needed to support United States Armed Forces during a war or other conflict and (2) any adjustments needed for cost-effective delivery of medical care to covered beneficiaries during peacetime" (Gebicke 1995). DOD's study, known as the "733 Study," was a part of the bottoms-up review of the nation's defense needs. As one of the outcomes, DOD judged that it is prudent to maintain the capability to fight and win nearly two simultaneous major regional conflicts (MRCs), and determined the forces, capability improvements, and the funding necessary to do so (GAO Report 1995). This analysis served as the basis for the DOD's 1995 budget and Future Years Defense Program (FYDP). The 733 Study's conclusion has challenged the Cold War assumption that all medical personnel employed during peacetime are needed for wartime requirements (GAO Report 1995, Gebicke 1995).

Besides the threatened cuts to its medical personnel, pressure on the United States Army Medical Command (USAMEDCOM) to further reduce health related expenditures has continued since the publication of the 733 study. FY 97 funding in Defense Health Program dollars is less than MEDCOM had to spend last FY (USA Medical Command, Resource Management Division 1996).

Rumors abound that the Armed Forces are not through downsizing and more personnel cuts are forthcoming. Should these rumors actually become true, MEDCOM could very well experience a double whammy: loss of military personnel and the customary way of performing the mission. Regardless of what happens, MEDCOM and its subordinate commands must evaluate all programs, under their direct control, which should be changed, merged, or eliminated to recapture dollars for direct patient care. It is paramount to assess the financial return on all on going programs and determine if a better, more cost effective manner way of doing them exists. The Dental Command's (DENCOM) Graduate Dental Education (GDE) training programs should not be immune from such scrutiny. If the cost analysis indicates a particular program is no longer affordable or cost-effective, senior leadership must make the appropriate, business case decision.

Conditions That Prompted The Study

As one of the subordinate commands within the MEDCOM, DENCOM is responsible for diagnosing, restoring, and maintaining the oral health of all United States Army active duty soldiers. Although the active duty soldiers population has declined steadily at the insistence of Congress beginning in 1991 after the Persian Gulf War, approximately four hundred and eighty thousand soldiers still depend upon the DENCOM for their oral health needs (Arnold 1995). While DENCOM has not experienced wholesale cuts to its work force, the Dental Corps has seen its active duty rolls shrink from more than 1600 dentists in 1981 to its current strength of 1087 (Personal Communication, COL Striano, PERSCOM). This downward trend is a

combination of an perpetual shortage of new accessions and the inability to retain officers within the junior ranks of Captain and Major. However, the Army Dental Care System (ADCS) is not hollow; it continues to have all eight recognized dental specialties plus a military federal specific one, comprehensive dentistry, represented in its ranks (see Table 1). With every specialty within the dental treatment continuum, DENCOM is capable of providing all dental care, to include elective procedures, totally within its own structure, obviating the need to refer any active duty patient to a civilian dental provider at an additional cost. However, this luxury does not come without a price.

Endodontics	Pediatric Dentistry
Periodontics	Oral Pathology
Oral and Maxillofacial Surgery	Orthodontics
Prosthodontics	Public Health Dentistry
Comprehensive Dentistry[1]	

Table 1: Army and Civilian Dental Specialties

Until FY 96, the ADCS operated GDE training programs within its facilities with the exception of oral pathology and public health dentistry. In addition to its multi-year specialty training programs, the US Army sponsors an Advanced Education in General Dentistry- 1 year (AEGD-1yr) at four geographically dispersed locations. These AEGD-1yr programs expose new dental school graduates to all the dental specialties on a rotational basis. They gain diagnostic confidence and clinical competence within these dental specialty areas by working under the direct supervision of experienced, board eligible/board certified specialists. Upon completion of this twelve month program, graduates usually find themselves assigned to remote locations, putting what they have

[1] Comprehensive dentistry is a federal services' specific dental specialty; no real equivalent in the civilian sector.

learned into practice. Presently the DENCOM's Board of Directors is investigating the possibility of establishing at least two more AEGD-1yr programs in Honolulu, Hawaii, and Landstuhl, Germany, to assist its recruitment efforts.

In 1987, the DOD made a decision to get out of the family member dental business when it unveiled its optional family member dental insurance plan. With the advent of the Delta Dental Plan, family members, for a small monthly premium and low co-payments, could select and utilize a civilian dental provider. When DOD made the program mandatory for all military service members within the Continental United States (CONUS) in 1989, the Army was prohibited from providing dental treatment for family members, except for certain case mix that directly supported training programs. Without the family member dental care mission, the need for trained pediatric dentists and orthodontists decreased significantly. Consequently, the ADCS made a corporate decision to decrease its output of pediatric dentists and orthodontists. Initially, one of its two training programs in each discipline was terminated. DENCOM finally closed the sole remaining pediatric dentistry and orthodontic training programs at Ft. Meade in 1995. In FY 98, however, in a partnership with the US Air Force at Lackland Air Force Base in San Antonio, TX, a joint orthodontic training programs will be established with two Army mentors assigned to support the prorgam.

In FY 97, DENCOM operated in-house training programs for all specialist candidates with the exception of officers desiring specialty training in pediatric dentistry, orthodontics, oral pathology, and public health dentistry. The ADCS now obtains this low density required specialty training by placing selected applicants in civilian dental schools' post-graduate training programs (where the tuition is paid for by the Army) or

through triservice agreements.[2] Post graduate fellowships (additional training after obtaining specialty board certification) exist for dental materials, hospital dentistry, and oral and maxillofacial surgery. Available this current FY, these training opportunities are subject to change based on the needs of the service. These fellowships, except for the hospital dentistry fellowship at Wilford Hall Air Force Medical Center, are conducted within the private sector. For a complete listing of training programs and their locations see Table 2.

Research Questions

The research questions in this study are: (1) What are the total costs for one complete cycle of Army sponsored GDE training? (2) Is this the most cost effective way to accomplish this task? (3) Should the DENCOM be training as many specialists as it does?

[2] *NB:* Oral Pathology is a triservice program within the Naval Dental School, Bethesda, Maryland. The three other programs are within civilian institutions.

Specialty Program	Training Locations	Annual Training Slots
AEGD-1 year	Ft. Benning, GA; Ft. Campbell, KY; Ft. Carson, CO; Ft. Lewis, WA	28-32
Clinical Dentistry	Ft. Bragg, NC	2 (1 in FY 96)
AEGD-2 year	Ft. Hood, TX; Ft. Bragg, NC	16
Periodontics	Ft. Gordon, GA	5
Periodontics (Civilian)	University of Washington, Seattle, WA	1 for FY 97
Endodontics	Ft. Gordon, GA	3
Endodontics (Civilian)	Medical College of Virginia, School of Dentistry, Richmond, VA	1 for FY 97
Prosthodontics	Ft. Gordon, GA; Walter Reed Army Medical Center, Wash, DC	3 for FY 97 (6 in FY 96)
Oral Pathology	US Navy Bethesda Medical Center, MD	1
Oral Surgery	Ft. Bliss, TX; Ft. Lewis, WA; Ft. Gordon, GA; Tripler Army Medical Center, HI; Walter Reed Army Medical Center, Wash, DC; Fort Sam Houston, TX*	2-6 yr dual degree (MD/DDS) 6-4 yr program
Orthodontics	University of Louisville, Louisville, KY	2
Pediatric Dentistry	Baylor College of Dentistry, Dallas,TX; University of Iowa, Iowa City, IA	1
Public Health Dentistry	University of North Carolina, Chapel Hill, NC; School of Public Health at Emory University, Atlanta, GA	1 each location
FELLOWSHIPS		
Dental Materials	University of Alabama, Birmingham, AL	1
Cosmetic OMFS	Cosmetic Surgery Center, Little Rock., AR	1
Hospital Dentistry	Wilford Hall Medical Center, USAF, San Antonio, TX	1

Table 2: Training Program, Locations, and Annual Training Starts

* 6 year dual degree (MD/DDS) program partnered with University of Texas

LITERATURE REVIEW

Medical Generalist versus Specialist

The practice of medicine has changed dramatically over the past fifty years. With the rapid growth of medical knowledge and technology, medicine and surgery have become increasingly specialized.

The terms "primary care" or "generalists" are used in defining primary care physicians. However. these terms also characterize a set of skills, a range of services, and a group of disciplines. The recognized primary care specialties are family practice/general practice medicine, general internal medicine, and general pediatrics.

Non-primary care specialists (or simply specialists) comprise the largest portion of the physician work force. Medicine has roughly sixty specialties and subspecialties. Their numbers have increased progressively for the past four decades (Rivo and Satcher 1993). Medical specialists can be segregated into six major functional groups (Cooper 1994)

Subspecialties of Internal Medicine	Psychiatry
Obstetrics and Gynecology	Surgery of all types
Hospital-based triad of Radiology, Anesthesiology and Pathology	The broad group of "medical" specialties

Table 3: Six Broad Categorization of Medical Specialties

The driving force behind such specialty medicine is science, and the specialty work force is largely technology-based. Elements of it will expand or contract depending on how technology advances and how the marketplace embraces these latest medico-technical advances. Although some technologies replace others, making no further

demands on the specialty work force, most do not. Replacement technologies frequently serve to enlarge the demand for specialty services (Cooper 1994).

Both the halls of academia and Congress echo with the call for more primary care providers. America perceives there is an excessive number of specialists who are too expensive when it comes to providing healthcare (Kronick et al. 1993, Weiner 1994). Primary care and specialty medicine are, to a large extent, independent actors on the same medical stage. There is overlap in the ability --a gray zone of definition-- yet there is distinction. The primary care need can be quantified on a per capita basis, whereas the specialty care need can be determined by what science and technology make possible.

Proper Mix or Staffing Ratios for Medicine

Sixty years ago, over 60% of the physician work force were primary care providers. Presently that number is slightly less than 36% (Kongstevdt 1995). For managed care delivery systems, primary care is population based. The principle determinant of need is demographic in nature. When measured in per capita terms, the primary care work force can be expressed as between 75 and 85 physicians per 100,000 population (Rivo and Satcher 1993).

Recent physician work force recommendations have touched off a debate on generalist-to-specialist physician ratios (COGME 1992). The evidence most commonly used in the debate is based on staffing patterns for staff and group model health maintenance organizations (HMOs). A staff model HMO is an organized prepaid health care system that delivers healthcare through a salaried physician group that is employed by the HMO unit. A group model HMO is an organized prepaid healthcare system that

contracts with one or more group practices to provide healthcare services and each group primarily treats the plan's members (Kongstevdt 1995)

Analysts have examined these two most closely because the HMOs can provide accurate data on both staffing and the populations they serve, are staffed to provide comprehensive care to all their members, and use an efficient mix of generalist and specialists (Dial et al 1995). Conversely, obtaining such data for full time equivalent (FTE) physicians working in individual practice associations (IPAs) and network style HMOs is more difficult since these physicians frequently contract with more than one health plan and do not report hours dedicated to each plan (Dial et al 1995).

So what is the "magic" number? The HMO Industry Survey, 1992, found an interquartile range of 71 to 168 full time physicians per 100,000 members in group and staff model HMOs (Palsbo et al. 1993). This number is double that reported by Rivo and Satcher (Rivo and Satcher 1993). The HMO survey examines three methods of estimating clinical staffing needs. Planned enrollment growth is the main measure HMOs use to determine clinical staffing needs. The second most commonly used measure is access standards; typically waiting times for specific types of appointments, e.g., physical exams. If no appointments are available within the given time frame, HMOs may consider adding more primary care providers. Other reported measures include "expected" number of visits based on the enrolled population's age and sex (Kongstedvt 1995, Dial et al. 1995). Most staff- and group-modeled HMOs reported they use specific target member to primary care physician ratios to estimate staffing needs. From their 1995 *Data Watch* article, Dial et. al. report that plans may have a ratio

range of 1 primary provider per 586 adult patients to 1 primary provider to 2,100, with the mean equaling 1 primary provider for every 1,512 adult patients in a given plan (Dial et al 1995).

Dental Generalist versus Specialist

Does the medical model just described pertain to dentistry? Few would argue that without a hospital, comprehensive medical care is certainly impossible. Many physicians cluster their offices around the very building that is crucial for their success. That situation is not the same in dentistry.

Dentists are far more independent and self-sufficient than their medical counterparts. As such, the dental care delivery system of the United States is unencumbered and straightforward. Realizing the importance of a sound patient base, dental practitioners rarely cluster together, eschewing the group practice model. In fact the dental profession remains very much the same "cottage industry" as when it started. Patients are free to choose their dental practitioners based on location convenience, office hours, provider gender or nationality, or best price. Except for some maxillofacial surgical procedures, dental appointments are primarily considered outpatient procedures, infrequently necessitating medical diagnostic laboratory support. Specialty referrals are simpler, with better one-on-one communication between generalist and specialist.

According to the 1991 American Dental Association Practitioner Survey, of the 150,762 dental providers, 125,234 are generalists. The remaining 25,528 dentists are divided into the eight specialists which are listed in Table 1. The generalist to specialist ratio is nearly the polar opposite of medicine: 83 % generalist to 17 % specialist (ADA

Practitioner Survey 1991). The breakdown of the dental specialty providers is graphically represented in Figure 1.

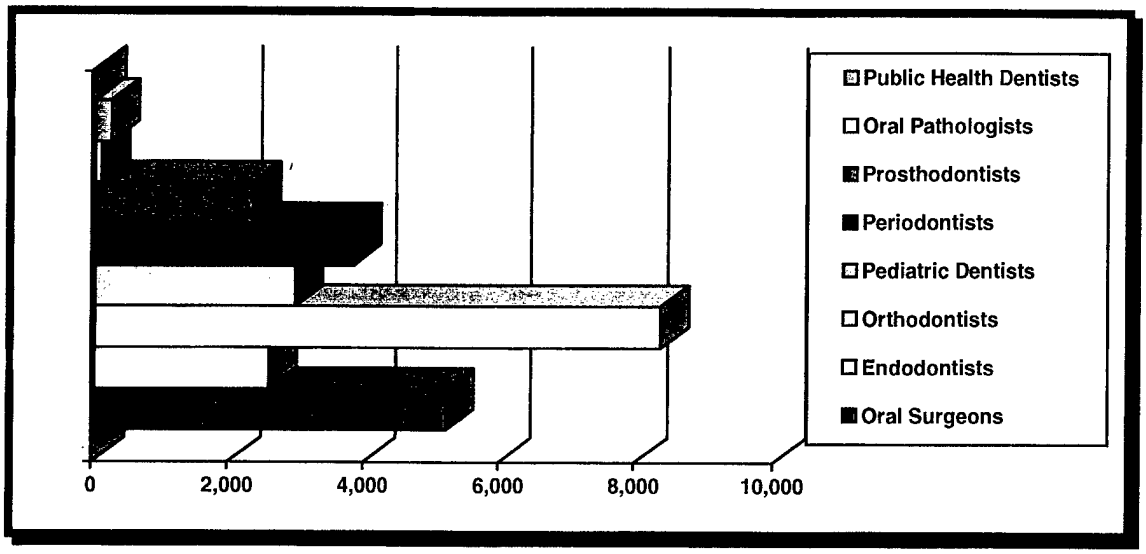

Figure 1: Providers by Dental Specialty

Most dentists are adequately trained to handle a broad range of dental treatment services. Unlike the medical profession many more general dentists serve as both the primary care manager and specialty provider. Why? It boils down to where the money is. Almost ninety percent of the dental benefit dollar is spent to treat the effects of two diseases: dental caries and periodontal disease (Harris 1993).

While managed care has not made as dramatic a push into dentistry as it has in medicine, it *is* beginning to gain acceptance. The Indianapolis-based trade association for most prepaid Dental Health Maintenance Organizations (DHMOs), the National Association of Dental Plans (NAPDP), claims the interest in dental managed care is increasing with member enrollment standing at 20.6 million in 1995, up from 7.8 million patients in 1990 (Robbins 1994, Gray 1997).

A DHMO is the type of prepaid plan that most closely resembles the ADCS. When part of a DHMO, providers receive capitated fees based on the number of members that select them as their dental provider. In the industry parlance, this fee, paid monthly, is referred to as the per member per month (PMPM) capitation rate. Essentially this is the very manner which the Assistant Secretary of Defense for Health Affairs (ASD,HA) allocates defense health program dollars to the three services.

Mayes claims "dental capitation may represent the ideal HMO, since in dentistry, preventive care really works. In a well managed capitated plan, the dentist has the incentives to provide adequate basic and preventive services, yet not over treat" (Mayes 1993). Greenblatt states it another way, "Managed dental care is a health-based system. The healthier the patient, the greater the profit for the provider" (Greenblatt 1992).

The current ADCS dental provider inventory is depicted in Figure 2. Counting only the general dental officers (Area of Concentration [AOC] 63A), "generalists" make up only 35% of the inventory. If one combines the comprehensive dentists (AOC 63B) with the 63As, then the ratio becomes 65% generalists and 35% specialists. Yet the questions remains: (1) Is this the best mix of dental providers and (2) How much does it cost the Army to conduct its own training? Historically, receipt of specialty training and attainment of board certification have been tied to promotion and additional specialty pay. However is that necessarily the way it should be?

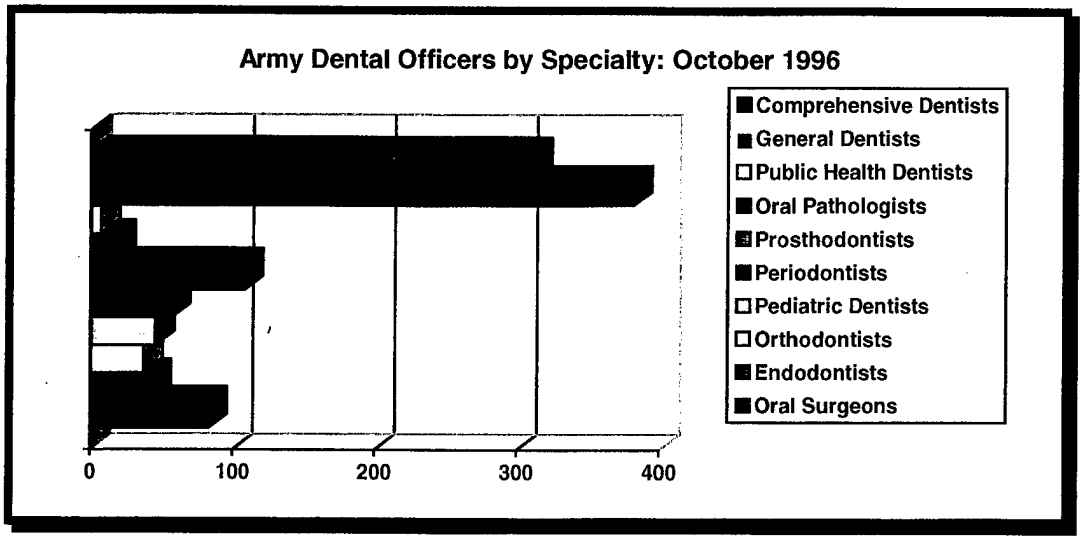

Figure 2: Distribution of Army Dental Specialties

(Source: Military Occupations Database System, October 1996)

To determine whether or not the ADCS possesses the correct mix of providers for its "enrolled" population, four prepaid dental managed care plans were contacted by the author.

Karen Darrah, Vice President, Managed Care 800-543-7784	Ameritas Life Insurance Corporation 5900 "O" Street Lincoln, NE 68501
Aaron Groffman, Vice President, Marketing 800-367-1037	CIGNA 300 NW 82nd Avenue, Suite 700 Plantation, FL 33324
James Shade Plans, Senior Professional Relations Representative 717-760-9766	United Concordia Companies, Inc. Family Member Dental Plans P. O. Box 898218 Camp Hill, PA 17089-8218
Laura Altland, Senior Professional Relations Representative 717-975-7481	United Concordia Companies, Inc. P. O. Box 898218 Camp Hill, PA 17089-8218

Table 3: Prepaid DHMOs Contacted for Comparisons

Based on these contacts, three similar standards were discovered: namely, driving distance to a provider, access standards, and specialty referral procedures. All plans have a requirement to have at least one provider within a five-to-ten mile distance of an enrolled member except Family Member Dental Plan (FMDP) offered by United Concordia Companies, Inc. (UCCI). Some of the plans allow their enrollees a choice and offer two providers with the designated driving distance. Allowable maximum driving distance to a plan's provider increases as the member's zipcode changes from urban, to suburban, to rural.

UCCI attempts to have a participating provider within 35 miles of every enrolled active duty family member. There is a subtle difference between the UCCI Family Member Dental Plan and the others being compared in that the FMDP is an open panel program where the family member enjoys provider choice. If the FMDP does not have a provider within its 35 mile driving distance then the company will reimburse the provider chosen by the patient for full fees and charges.

Access standards are also similar. Emergency dental care is normally available within twenty four hours. Some plans are written to allow after hours or weekend emergency care but at a cost of a co-payment for the member. Routine appointments should be readily available within thirty days or less.[3] Specialty referrals are kept within the plan's provider network whenever possible. In some cases the generalist must submit the referral to the company's dental consultant[4] for appropriateness and

[3] Appointment standards varies: Ameritas is within two weeks, UCCI FMDP is within 21 days, CIGNA is within four weeks.

[4] Ameritas uses only dental practitioners as consultants. CIGNA uses both dental ancillary staff members (assistants and hygienists) and dental practitioners. UCCI FMDP does not require specialty preapproval.

preauthorization. The authorization for the specialty treatment is valid for sixty days. Should the patient fail to visit their chosen specialist within this authorized period, then another referral is required or a hefty co-payment is borne by the enrollee.

Allocation of "covered" lives to individual offices varies between plans. Ameritas Life Insurance Corporation places no more than 100 members in any given office. Their rationale is this significantly decreases the financial risk to the dental practice. CIGNA's basis of allocation is 150 members per dental operatory within the practice. For example, if a group practice has ten treatment rooms, then 1,500 patients would be the maximum number of plan members served by that dental office.

UCCI uses the following formula to determine the number of providers needed:

- up to 500 beneficiaries: need 2 dentists
- from 501-10,000: 1 dentist per 500 beneficiaries
- more than 10,000: 1 dentist per 1,000 beneficiaries.

  Example: 25,223 patients = 37 dentists.

The ratio of general dentist to specialist also varies between plans. Ameritas tries to keep its participating provider population split one third specialist: two thirds generalist. CIGNA, more in line with accepted standards, has one specialist for every four generalist (a 20/80 split). UCCI/FMDP attempts to have one each periodontist, endodontist, oral surgeon, pediatric dentist, orthodontist and prosthodontist per 25,000 beneficiaries.

Dentistry within the US Army differs very little from that practiced in the civilian sector. Both sectors use state-of-the-art equipment and the latest dental materials and therapeutic agents in their war against dental disease. Some may argue that the military with its remote locations requires more specialists in support of their military unique

mission. Others remind us that specialty training and board certification are tied to promotion and therefore pay. In the past, distribution of Army dental specialists has been determined by senior dental commanders based on a heuristic of at least one each specialist per Dental Activity (DENTAC) or large soldier population concentration. In an attempt to determine whether the Army has too many specialists for its given population of relatively young soldiers, the author contacted each national specialty board or recognized association. If the national association or academy could not provide the information, the author obtained the addresses and telephone numbers of board certified members of the group to contact. The results and discussion of that effort appear later in this paper.

Graduate Medical Education Costs

The growth and cost of graduate medical education (GME) is a critical piece of the national healthcare reform movement. National attention has focused on reforming the medical education system to increase the percentage of physicians practicing primary care to at least fifty percent (Kindig et al. 1993). National and state health care reforms may include reimbursement changes to encourage training of primary care physicians. At present, GME is financed largely through payments to hospitals for inpatient services (Eisenberg 1990). In 1992, the Medicare GME appropriations equaled $5.2 billion (Jones, Culpepper and Shea 1995, Pereira-Ogan and Nash 1994).

Determining the cost of GME is complicated by the fact the education function is conducted jointly with patient care. Disentangling patient care from physician training has proved elusive and has remained a difficult problem for researchers (Cameron 1985).

Two methods have been used to study the revenues and expenses of GME. Each method has its appropriate use and its own limitations.

The cost allocation method is used to prepare hospital cost reports. It generates a number that purports to represent total educational costs. The costs of the hospital (or medical school) are assigned to mutually exclusive "products" of education, research, and patient care using a time analysis of physician activities. Cost allocation studies rarely have guidelines or criteria for the activity analysis, and the physician time reports are often completed by an accountant or administrator, not the individual provider concerned (Barrett, Midtling, and Burnett 1989). Even when objective standards are established, cost allocation is inherently arbitrary in an enterprise such as a teaching hospital where different products are simultaneously produced.

The joint-products cost allocation method recognizes the patient care and education are produced simultaneously. Most costs of a teaching hospital are attributable to these products (Koehler and Slighton 1973). Expenditures are divided into joint costs, the costs of activities in which products are simultaneously produced, and the pure costs of each product, i.e., costs that are strictly assignable to that product. The pure cost of education in a teaching hospital is the hospital current costs minus the estimated costs of delivering the same amount of patient care without a teaching program (Barrett, Midtling, and Burnett 1989).

Graduate Dental Education Costs

Graduate dental education (GDE) is an accumulation of diverse programs that cover the gamut of dental specialties. These post dental degree programs are either carried out in dental schools or in hospitals. An extensive literature review failed to uncover more than a small handful of articles that dealt with the costs associated with GDE (Wasserman, Brisotti and Petrie 1978, Brantley 1991).

As a cost contained item, dentistry has a decided advantage over medicine. The vast number of measurable procedures that are performed in the practice of dentistry enables the program/department to predict income reliably. Regardless of the type of practice (either dental or medical) there are two components which comprise the total cost of financing graduate health education: direct and indirect costs (Wasserman et al. 1978, Brantley 1991, Boex 1992, Cameron 1985, Barnett et al. 1991, Colwill 1989, Angelides 1986).

Direct costs are costs controlled directly by the graduate educational department. These costs normally consist of resident, instructor and ancillary support personnel salaries and benefits; supply costs; laboratory charges; equipment purchases; graphics art support; and travel expenses. Indirect costs are those allocated to the department from other cost drivers. Indirect costs are utilities; maintenance and housekeeping; laundry; and duplication or copier support. In the equations used to determine overall costs of the graduate program, all articles subtract revenue generated by the program from the total costs to arrive at the net cost (Wasserman et al. 1978, Brantley 1991, Boex 1992, Cameron 1985, Barnett et al. 1991, Colwill 1989, Angelides 1986). In these articles revenues are derived from either Medicare payments, other third party insurance

payments or payments made by patients. Since military dental graduate specialty training programs perform treatment at no charge to service members, how does one capture the "revenues" generated by the program? The answer is via the ADCS' Dental Workload Reporting System Plus (DWRS+). A UNIX-based computer software program, DWRS+ captures productivity by American Dental Association (ADA) codes. This system assigns each coded procedure a weighted work unit (a measure of time to perform the procedure) and a dollar amount (75% of the national mean dental fee for a given procedure). For this project the dollar amount will be substituted for the revenue received from either the patient or the third party payers.

The purpose of this project is threefold: (1) calculate the cost of US Army sponsored graduate dental education; (2) determine whether the ratio of generalist to specialist is appropriate for the ADCS; and (3) recommend future courses of action to senior management. The hypothesis is that dental specialty training can be obtained from civilian institutions at a cheaper cost to the government than performing that training mission in house. Additionally, the ADCS has more dental specialists than required for the present Army population, which creates a generalist to specialist ratio which is out of proportion with the civilian sector.

METHODOLOGY

Theoretical Framework

If healthcare professionals hope to eliminate waste, improve efficiency, and increase the purchasing power of budget dollars, then commitment at the highest echelon toward quality improvement is mandatory. Deming has suggested that organizational culture often thwarts attempts to measure, scrutinize, and solve problems (Deming 1986). Although the ADCS is not required to follow Joint Commission on Accreditation of Healthcare Organizations (JCAHO) recommendations, it does appear to follow its Agenda for Change (Joint Commission on Accreditation of Healthcare Organizations 1993). The two key assumptions of the program are: (1) measurement forms the basis for judgments and decisions, and (2) the act of measurement has as its goal future improvement (JCAHO 1993a, vi-vii).

What are the characteristics of a good measurement tool? Cooper and Emory in their textbook, Business Research Methods, state there are three major criteria for evaluating a measurement tool: validity, reliability, and practicality (Cooper and Emory 1995).

Validity can be compartmentalized into internal and external validity. External validity of research findings refers to their ability to be used to infer across persons, settings and or times. It is the intent of the investigator to make inferences based upon the data collected among similar Army programs and between similar Army and civilian programs.

Internal validity is the ability of the research instrument to truly measure what the researcher intended (Cooper and Emory 1995). Trying to capture the tangible costs of a graduate dental education program, as well as asking for the intangibles that make the program unique, could be a daunting task. Though a pilot study was not initiated, the data collection instruments (DCIs) for both rounds were carefully constructed to gather the information desired by the investigator. To ensure the questions were straightforward, comprehensible, and not laced with military lexicon, both were shown to a variety of individuals[5] to identify any questions that were confusing or any instruction that required clarification. Based upon their constructive criticism, the instruments was refined and modified for clarity.

Reliability means many things to many people, but in most contexts, the notion of consistency emerges. A reliable measure is one that supplies consistent results. One can improve reliability if external sources of variation are minimized and the conditions under which the measurement occurs are standardized. To that end, a written DCI was mailed to each residency director on the list the researcher obtained from the Office of Graduate Dental Education, Ft. Sam Houston, Texas (Barrett 1996).

While the scientific community requires a project to be reliable and valid, operationally it *must* be practical. Practicality may be either convenient or economical. In the interest of cost (time costs to the participant) the number of questions is kept to a minimum. Costs also may dictate the method of data collection: surveys versus personal observations or telephonic interviews in lieu of in-person questioning. A measuring

[5] LTC Holmes, MHA, Ph.D., previous assistant professor in Financial Accounting, US Army Baylor Masters Program in Healthcare Administration; MAJ Gail Long, Secretary to the General Staff, USA MEDCOM; COL Leo Rouse, Commander, USA DENCOM.

device may pass the convenience test if it is easy to administer. A research instrument, complete with detailed instructions mailed to a learned body of subjects, answers that question.

The author distributed the refined DCI (Appendix A) to all residency directors who, as a group, should be fully aware of their programs' costs. In addition to reporting costs and "revenues" of their particular programs, residency directors were specifically asked to state why their programs were unique or in the best interest of the Army. The researcher hoped that directors would highlight the programs' intangible benefits specifically those conducted within the ADCS. A point of contact with phone number was included in the cover letter attached to the disseminated DCI. Instructions to contact the researcher in the event of any problem were specified as well. The second DCI (Appendix B) was mailed seeking clarification of some specific variables for the cost equation.

Cost Analysis Technique

Using a commercial off the shelf (COTS) software program, the researcher created a spreadsheet model to determine the total cost of Army graduate dental education. Based upon the readings already mentioned (Wasserman et al. 1978, Brantley 1991, Boex 1992, Cameron 1985, Barnett et al. 1991, Colwill 1989, Angelides 1986), the DCI at Appendix 1 was created. This instrument was mailed to all graduate dental educational programs (both military and civilian [Appendix C]) used by the Army to obtain total costs (direct and indirect) and capture the revenue generated by the various training programs. See Table 4 for the variables in the equation.

Number of Residents In Each Class	Average Rank, Time in Service(TIS) of Resident
Number of Assigned Mentors	Mentors' Rank, TIS and Board Status
Number and Rank or Rating of Ancillaries Affiliated with the Program	Equipment Specifically Purchased for the Residency Program
Residency Specific Supply Costs	Dental Laboratory Costs
Budget for Guest Speakers	Tuition or Fees Paid to Civilian Institutions
Budget for Residents Travel or TDY	Clinic Square Footage for BASOPS Computation[6]
Printing/Duplication Costs	Copier Costs
Graphic Arts Charges	Program Length
Residents' Productivity or Generated Revenues	Mentors' Productivity or Generated Revenues

Table 4: Variables in the GDE Program Cost Equation

Cost Computation Equation

The researcher calculated the direct and indirect costs of GDE training by totaling:

(a) The number of residents in the class was multiplied by the average pay and allowances of a dental officer at that rank and TIS to determine the military pay for all residents of the program.

(b) Mentors military pay was calculated by adding the annual total salary (salary, housing allowance, subsistence allowance, professional pay, dental specialty pay, and board certification pay) for every mentor affiliated with the program.

(c) Ancillary pay (assistants, laboratory technicians, and secretaries) was calculated by adding the annual pay and allowances of the military ancillaries to the salary and benefits of the civilian employees associated with the residency program.

(d) Resident specific dental supply budget.

(e) Resident specific dental laboratory costs.

[6] Source: Department of the Army, Directorate of Public Works, Annual Summary of Operations, Volume III-Installation Operations, Fiscal year 1995, Editor: Edward T. Watling, PE, Director US Army Center for Public Works, Ft. Belvoir, VA 22060

(f) Equipment purchases designated for residency use; amortized over its life expectancies.

(g) Costs of travel in support of residency related Temporary Duty (TDY).

(h) Money spent to bring in guest lecturers to the program (honoraria. travel, and lodging costs.

(i) Any tuition or fees paid by the Army as a requirement for the residents to attend classes or use the facilities within a university's medical or dental school.

(j) Utilities and building repair and maintenance costs (Base Operations [BASOPS]) were calculated using $1 per sq. ft. for utilities and $1.50 per sq. ft. for repair and maintenance charges times the amount of square footage each residency occupied.

(k) Printing costs and any duplication charges allocated to the residency.

(l) Photocopier cost as determined by percent utilization of an annual lease or purchase agreement (If a copier cost $3000 to lease a year and the GDE program used it 40% of the time, then the cost to the program was $1200 ($3000 x .40). If the program had a dedicated copier, then the entire cost was charged to the program).

(m) Any additional costs associated with graphic arts support was also considered After obtaining the subtotal, this amount was then multiplied by the length of the program in years to arrive at the cost of training for one class.

The ADCS is not in the business of generating a profit but it does have a mechanism to track the productivity of its employees. The Dental Workload Reporting System (DWRS) and its successor, DWRS+, are UNIX-based computer software programs developed by dental officers within Health Care Service System Agency (HCSSA), a subordinate unit to MEDCOM. DWRS tracks the procedures performed by

its providers and assigns each procedure a dollar value. This dollar value is arbitrarily set at 75% of the national median fee charged by civilian dental practitioners for a given procedure. This "revenue" capture is routinely used to justify ADCS' effectiveness and efficiency to the DOD. While tending to be on the conservative side, it is the standard across the ADCS. Resident and mentor productivity or "income" was obtained from each directors with the assistance of the site specific DWRS system administrator. In the instances of Army residents training in civilian settings, this dollar value was categorized as a loss (a negative number) since the care was not being provided to Army beneficiaries. Similarly mentors' productivity from civilian programs was not entered into the equation at all for the above reason. After totaling the "revenues" generated by the residents and mentors, the total income generated was multiplied by the length of the program to obtain the total income.

Total costs were subtracted from total income to determine the net costs of the program. If the net cost was positive, then that program operated in the black or actually generated more in dental care and services than the costs associated with the training program. If the net cost was negative, then the cost of training exceeded the amount of dental care and services provided by those associated with the training program.

The training net costs were then divided by the number of graduates per class to get the costs per resident. Cost per resident was then divided by the mean career length of that specialist to amortize the cost of training over the career of the trained officer. Comparisons could be made across different locations offering the same training or across the various disciplines.

Assumptions

The DCIs requested exact information to accurately determine all costs associated with the Army's GDE programs. In the absence of complete data, the researcher made several assumptions:

- ✪ For military salary computations, all personnel were assumed to be married and living off post

- ✪ If Time in Service (TIS) was not specified, the researcher assigned the following TIS to each rank
  - (a) PFC - 4 years
  - (b) SPC - 6 years
  - (c) SGT - 10 years
  - (d) SSG - 12 years
  - (e) SFC - 14 years

- ✪ If General Schedule (GS) employees ratings failed to indicate the step, the researcher used specified GS rating at the step 6 level

- ✪ Pay scales effective 1 October 1996 were used to calculate both military and civilian personnel costs

- ✪ Average civilian employee benefits were assumed to equal 17% of annual salary[7]

- ✪ If resident productivity could not be easily determined, especially for those in a civilian program then the following values were used.
  - (a) Public Health: $55,500 per year
  - (b) Hospital Dentistry Fellow: $111,000 per year
  - (c) Dental Materials Fellow: $111,000 per year
  - (d) Cosmetic Oral Surgery Fellow: $200,000 per year

- ✪ Since APPD does not track retention either postgraduate fellows or the newly created clinical fellowship for 63As, it was arbitrarily set to equal the rate of the AEGD- 2 year trained officer.

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[7] Randy Gibson, Recruitment and Retention Specialist, Civilian Personnel Division, USA Medical Command, Ft. Sam Houston, TX, (210) 221-7293

RESULTS

Training Costs

The ADCS sends its 85 officers selected for post graduate dental education to 28 training programs (N = 28) across the country. Graduates emerge both academically and clinically prepared to challenge and usually pass organized dentistry's specialty boards in endodontics, periodontics, oral and maxillofacial surgery, prosthodontics, oral pathology, pediatric dentistry, and orthodontics. Those completing the AEPD-2 year programs achieve board certification by consecutively passing the two part Federal Services Board of General Dentistry (FSBGD) examination. Public health dental officers are considered to be board certified upon completion of the requirements of their graduate degree. While a higher percentage of Army GDE trained officers ultimately obtain board certification in their chosen specialty than their civilian counterparts (65% vs. 15%), all this training comes at a hefty price.

The total cost of the 27 training programs who participated in this effort (n=27) exceeds $48.40 million dollars or approximately $576,000 per trained graduate. The methodology was detailed in the previous section. While Army GDE programs do not generate money, it would be unwise to ignore the tremendous value associated with all dental services provided by the residents and mentors. From data obtained via DWRS+ system administrators at GDE training locations, residents produced more than $16.90 million in dental procedures and services. Income generated by residents in those programs (i.e., civilian or joint service) which do not provide care to Army-specific beneficiaries was reported as a negative value since it is "lost" to the Army reporting

system. In comparison, mentors assigned to Army GDE programs generated $32.36 million in dental procedures for their patients. The net ***profit*** from training (total revenues minus total costs) FY97's 84 residents is just under $865,000 or slightly less than $10,300 per resident. In essence, cumulative dental goods and services generated by all GDE product lines exceed the cumulative costs and ADCS "makes" about $1 million dollars for each training cycle.

Post dental school graduate training prepares the dental officer to function within a specialty for his/her remaining career. Amortizing the cost of this specialty education over the expected career of the officer seemed to be a better way of reporting the costs. Table 5 shows the range of expected career length by specialty.

Dental Specialty	Expected Service Time (years) [8]
AEGD-1 year	5.78
Oral and Maxillofacial Surgery	17.89
Orthodontics	17.96
Oral Pathology	19.29
Endodontics	19.52
Periodontics	19.71
AEGD-2 year	19.81
Pediatric Dentistry	20.02
Prosthodontics	20.68
Public Health Dentists	22.27

Table 5: Average Length of Service by Dental Specialty

According to the Army Medical Department Personnel Proponency Directorate (APPD), the typical Army trained or sponsored resident will remain on active duty for 17.91 ± 3.91 years. The years of dedicated service range from a low of 5.78 for AEGD-1

[8] MSG Krause, AMEDD Personnel Proponency Directorate, Ft. Sam Houston, TX 78234, (210) 221-9922

year programs' graduates to a high of 22.27 for ADCS' small number of public health dentists. When the net cost per resident is divided by the mean career years of service the amortized net cost of training equates to a return on investment of $587 per resident career year. Table 6 contains the complete listing of total costs, "revenues," net costs, cost per resident, and amortized cost of training for each of the 27 participating programs.

Tables 7 and 8 report training costs for the 63A9Ds and 63Bs which will be critical with ADCS' proposed movement toward impanelment and adoption of managed care principles (Fretwell et. al. 1997). Furthermore, these types of dental officers fill the vast majority of the Army's dental Table of Organization and Equipment (TOE) positions.[9] An additional significant finding in table 8 is the large number of dedicated ancillaries assigned to support the programs.

Table 9 details the analysis for the periodontic and endodontic GDE programs at Ft. Gordon. Located in the identical wings of the same facility these two programs, plus the Gordon prosthodontic program, share many of the indirect costs of training. Though Army training programs, these two have some tuition charges associated with their affiliation with the Medical College of Georgia. Although the endodontic mentors provide multiple continuing education lectures and seminars to others, they choose not to import any guest speakers.

[9] TOE units are those field capable units deployed by appropriate authority in support of humanitarian missions, disaster relief, or actual armed conflict.

The costs for the prosthodontic programs are presented in Table 10. The program at Ft. Meade, within the Walter Reed DENTAC, will graduate its last class this summer. The most noticeable difference between the two programs is the apparent lack of mentor productivity. Of course an explanation may be the amount of effort and paperwork required to close a program may significantly impact on the ability of the mentors to practice their craft.

Table 11 presents the costs of 5 of the 6 Army OMFS programs. Despite numerous attempts, Tripler elected not to participate in the data call. Oral surgeons (AOC 63N) are the other TOE required dental specialty. Assigned to Combat Support Hospitals (CSH) and Mobile Army Surgical Hospitals (MASH) (until they are phased out of the Army inventory) these officers are invaluable in treating severe, life threatening facial trauma. When mentors and residents share complex orthognathic cases it is often difficult to de-couple the generated income and assign it to only one provider. As a result several OMFS residency locations reported their income lumped together. Regardless of how it is reported, OMFS programs make money.

The summary of oral pathology costs is presented in Table 12. Resident productivity is "zero" since current policy prohibits the resident from "signing out " diagnoses. Conducted at the Navy Dental School at Bethesda and the Armed Forces' Institute of Pathology in Washington, DC, it was difficult to quantify several of the surveyed data fields. The mentor provided his "best guess" when he was unable to secure exact figures.

Tables 13 and 14 reflect the costs associated with training programs in civilian institutions. Outsourcing this training in addition to the fellowships presented in Table

15 costs the Army just under $3.35 million. Tuition fees account for only $295,000 of that figure. The vast majority of this high cost is directly related to the lost productivity as measured by the amount of dental care these residents generate for the civilian institution rather than for the ADCS.

The last table, Table 15, details the costs associated with the fellowship training programs. Fellowships, which tap into expertise not readily available within the ADCS, are also an expensive proposition. Similar to civilian based training, the majority of the expense it directly related to lost productivity. The Clinical Dentistry Fellowship at Ft. Bragg, NC is unique in that the officer selected for training must complete a masters' degree in public health or hospital administration at his own expense during the second and third years of the program Not meant to be punitive, this cost is offset by the fact that these officers continue to receive Dental Additional Specialty Pay (DASP) which can vary from $4,000 to $8,000 depending on the number of years of service. All other officers receiving specialty training (but not fellowships) forego this additional pay while engaged in specialty training.

GRADUATE DENTAL EDUCATION COST MODEL

+ = excess revenues
- = costs to US Army

TNG LOCATION	Total Training Costs	Resident "Revenues"	Mentor "Revenues"	Net Costs	Post Training Career Expectancy	Amortization Cost per Class Year	Amortized Cost Each Resident
BENNING	$ 1,109,566	$ 251,920	$ 233,478	$ (624,168)	5.78	$ (107,948)	$ (13,493)
CAMPBELL	$ 1,416,561	$ 853,600	$ 762,743	$ 199,782	5.78	$ 34,551	$ 4,319
CARSON	$ 1,346,690	$ 776,064	$ 2,660,595	$ 2,089,969	5.78	$ 361,452	$ 45,182
LEWIS	$ 1,109,566	$ 480,000	$ 875,000	$ 245,434	5.78	$ 42,447	$ 5,306
BRAGG	$ 5,675,150	$ 2,608,000	$ 1,911,608	$ (1,155,542)	19.81	$ (58,345)	$ (7,293)
HOOD	$ 5,220,446	$ 2,555,200	$ 1,538,000	$ (1,127,246)	19.81	$ (56,916)	$ (7,115)
GORDON	$ 2,213,077	$ 1,225,000	$ 270,546	$ (717,531)	19.71	$ (36,408)	$ (9,102)
Univ of WA	$ 198,792	$ (43,000)	$ -	$ (241,792)	19.71	$ (12,269)	$ (12,269)
GORDON	$ 1,263,243	$ 764,100	$ 280,000	$ (219,143)	19.52	$ (11,224)	$ (2,245)
Univ of VA	$ 134,784	$ (36,997)	$ -	$ (171,781)	19.52	$ (8,798)	$ (8,798)
GORDON	$ 2,832,517	$ 636,273	$ 288,750	$ (1,907,494)	20.69	$ (92,197)	$ (15,366)
WRAMC	$ 1,651,317	$ 200,862	$ 165,390	$ (1,285,065)	20.69	$ (62,112)	$ (20,704)
CHAPEL HILL	$ 238,854	$ (166,500)	$ -	$ (405,354)	22.27	$ (18,198)	$ (18,198)
EMORY	$ 200,940	$ (166,500)	$ -	$ (367,440)	22.27	$ (16,496)	$ (16,496)
BAYLOR	$ 256,067	$ (150,000)	$ -	$ (406,067)	20.03	$ (20,276)	$ (20,276)
IOWA	$ 123,034	$ (150,000)	$ -	$ (273,034)	20.03	$ (13,633)	$ (13,633)
LOUISVILLE	$ 275,079	$ (900,000)	$ -	$ (1,175,079)	17.97	$ (65,400)	$ (32,700)
BLISS	$ 5,241,667	$ 3,000,000	$ 4,000,000	$ 1,758,333	17.89	$ 98,310	$ 98,310
GORDON	$ 4,066,304	$ 4,432,000	$ 2,000,000	$ 2,365,696	17.89	$ 132,269	$ 132,269
LEWIS	$ 3,056,170	$ -	$ 4,980,000	$ 1,923,830	17.89	$ 107,563	$ 107,563
FSH	$ 5,978,513	$ -	$ 7,458,000	$ 1,479,487	17.89	$ 82,720	$ 82,720
TRIPLER	$ -	$ -	$ -	$ -	17.89	$ -	$ -
WRAMC	$ 3,162,354	$ 844,560	$ 4,410,000	$ 2,092,206	17.89	$ 116,978	$ 116,978
BETHESDA	$ 711,294	$ -	$ 258,000	$ (453,294)	19.29	$ (23,496)	$ (23,496)
BRAGG	$ 511,256	$ 533,448	$ 273,360	$ 295,552	19.81	$ 14,923	$ 14,923
Dental Materials	$ 173,236	$ (222,000)	$ -	$ (395,236)	19.81	$ (19,956)	$ (19,956)
Cosmetic OMFS	$ 81,904	$ (200,000)	$ -	$ (281,904)	19.81	$ (14,234)	$ (14,234)
Hospital Dentistry	$ 156,428	$ (222,000)	$ -	$ (378,428)	19.81	$ (19,107)	$ (19,107)
Totals:	**$ 48,404,810**	**$ 16,904,030**	**$ 32,365,470**	**$ 864,690**	**17.53**	**$ 49,312**	**$ 587**
27 programs	$ 1,792,771	Average Total Cost per Program					
84 residents	$ 576,248	Average Total Cost per Resident					
net cost/resident	$ 10,294	Average Net Cost per Resident					
net cost/program	$ 32,026	Average Net Cost per Program					

Table 6: Summary of All Costs for 28 Army-Sponsored GDE Training Programs

Advanced Program in General Dentistry - 1 year					
Location		Benning	Campbell	Carson	Lewis
Number of Residents	a	8	8	8	8
Military Salary per Resident	b	$ 38,726	$ 38,726	$ 38,726	$ 38,726
Total Military Pay for Residents	c= a x b	$ 309,808	$ 309,808	$ 309,808	$ 309,808
Mentors' Military Pay	d	$ 655,634	$ 750,546	$ 950,943	$ 867,085
Number of Dedicated Ancillaries	e	6	9	3	6
Total Ancillary Pay and Benefits	f	$ 134,708	$ 263,421	$ 79,038	$ 136,455
Laboratory Costs	g	$ -	$ 17,936	$ -	$ 4,300
Residency Specific Supply Costs	h	$ -	$ 40,000	$ -	$ 30,000
Residency Specific Equipment Costs	j	$ 400	$ 1,778	$ -	$ 400
Travel/TDY Budget for Residents	k	$ -	$ -	$ -	$ -
Residency Budget for Speakers	l	$ 6,516	$ 11,000	$ 2,400	$ 700
Tuition or Fees for the Program	m	$ -	$ -	$ -	$ -
BASOPS (Repair and Maint + Utilities)	n	$ 2,500	$ 9,875	$ 4,500	$ 3,875
Printing or Duplication Costs	o	$ -	$ -	$ -	$ -
Copier Costs/Annual Lease	p	$ -	$ -	$ 800	$ -
Graphic Arts or TASC Costs	q	$ -	$ -	$ -	$ -
Subtotal (annual costs)	r	$ 1,109,566	$ 1,416,561	$ 1,346,690	$ 1,109,566
Length of Program in years	s	1	1	1	1
Total Costs	t = r x s	$ 1,109,566	$ 1,416,561	$ 1,346,690	$ 1,109,566
Residents Productivity "Revenues"	u	$ 251,920	$ 853,600	$ 776,064	$ 480,000
Mentors' Productivity "Revenues"	v	$ 233,478	$ 762,743	$ 2,660,595	$ 875,000
Total Revenues	w = u + v	$ 485,398	$ 1,616,343	$ 3,436,659	$ 1,355,000
Cost of Residency (+=Profit, -= Loss)	x = w - t	$ (624,168)	$ 199,782	$ 2,089,969	$ 245,434
Average Length of Service Post Residency	y	5.78	5.78	5.78	5.78
Amortized Cost per Retained Year per Resident	z = (x / y) / a	$ (13,493)	$ 4,319	$ 45,182	$ 5,306
b= Average Rank, TIS			CPT, 0 yrs TIS		

Table 7: Summary of Costs for AEGD-1 Year Programs

Advanced Program in General Dentistry - 2 year					
Location			**Bragg**		**Hood**
Number of Residents	**a**		16		16
Military Salary per Resident	**b**	$	59,880	$	57,184
Total Military Pay for Residents	**c= a x b**	$	958,081	$	914,938
Mentors' Military Pay	**d**	$	872,004	$	758,785
Number of Dedicated Ancillaries	**e**		30		24
Total Ancillary Pay and Benefits	**f**	$	845,156	$	620,073
Laboratory Costs	**g**	$	35,200	$	35,200
Residency Specific Supply Costs	**h**	$	44,000	$	186,500
Residency Specific Equipment Costs	**j**	$	10,911	$	4,417
Travel/TDY Budget for Residents	**k**	$	16,000	$	21,280
Residency Budget for Speakers	**l**	$	12,000	$	14,000
Tuition or Fees for the Program	**m**	$	-	$	-
BASOPS (Repair and Maint + Utilities)	**n**	$	43,245	$	43,245
Printing or Duplication Costs	**o**	$	-	$	-
Copier Costs/Annual Lease	**p**	$	978	$	11,785
Graphic Arts or TASC Costs	**q**	$	-	$	-
Subtotal (annual costs)	**r**	$	2,837,575	$	2,610,223
Length of Program in years	**s**		2		2
Total Costs	**t = r x s**	$	5,675,150	$	5,220,446
Residents Productivity "Revenues"	**u**	$	2,608,000	$	2,555,200
Mentors' Productivity "Revenues"	**v**	$	1,911,608	$	1,538,000
Total Revenues	**w = u + v**	$	4,519,608	$	4,093,200
Cost of Residency (+=Profit, -= Loss)	**x = w - t**	$	(1,155,542)	$	(1,127,246)
Average Length of Service Post Residency	**y**		19.81		19.81
Amortized Cost per Retained Year per Resident	**z = (x / y) / a**	$	(7,293)	$	(7,115)
b= Average Rank and TIS			MAJ 10 yrs		MAJ 8 yrs

Table 8: Summary of Costs for AEGD-2 Year Programs

Endodontic and Periodontic GDE Trraining Programs			
Location		Gordon Periodontics	Gordon Endodontics
Number of Residents	a	4	5
Military Salary per Resident	b	$ 55,517	$ 56,350
Total Military Pay for Residents	c= a x b	$ 194,309	$ 253,576
Mentors' Military Pay	d	$ 272,667	$ 191,744
Number of Dedicated Ancillaries	e	8	7
Total Ancillary Pay and Benefits	f	$ 209,214	$ 140,656
Laboratory Costs	g	$ 500	$ 500
Residency Specific Supply Costs	h	$ 24,000	$ 15,000
Residency Specific Equipment Costs	j	$ 4,127	$ 1,500
Travel/TDY Budget for Residents	k	$ -	$ 4,500
Residency Budget for Speakers	l	$ 7,767	$ -
Tuition or Fees for the Program	m	$ 7,263	$ 6,300
BASOPS (Repair and Maint + Utilities)	n	$ 15,125	$ 15,125
Printing or Duplication Costs	o	$ 2,000	$ 2,000
Copier Costs/Annual Lease	p	$ 2,000	$ 2,000
Graphic Arts or TASC Costs	q	$ 720	$ 720
Subtotal (annual costs)	r	$ 737,692	$ 631,622
Length of Program in years	s	3	2
Total Costs	t = r x s	$ 2,213,077	$ 1,263,243
Residents Productivity "Revenues"	u	$ 1,225,000	$ 764,100
Mentors' Productivity "Revenues"	v	$ 270,546	$ 280,000
Total Revenues	w = u + v	$ 1,495,546	$ 1,044,100
Cost of Residency (+=Profit, -= Loss)	x = w - t	$ (717,531)	$ (219,143)
Average Length of Service Post Residency	y	19.71	19.52
Amortized Cost per Retained Year per Resident	z = (x / y) / a	$ (10,402)	$ (2,494)
b= Average Rank and Time In Service		MAJ -6yrs TIS	MAJ- 7 yrs TIS

Table 9: Summary of Costs for Endodontic and Periodontic Programs

Prosthodontics Training Programs			
Location		Gordon	WRAMC
Number of Residents	a	6	3
Military Salary per Resident	b	$ 57,184	$ 57,184
Total Military Pay for Residents	c= a x b	$ 343,102	$ 171,551
Mentors' Military Pay	d	$ 288,267	$ 263,660
Number of Dedicated Ancillaries	e	12	10
Total Ancillary Pay and Benefits	f	$ 333,242	$ 299,882
Laboratory Costs	g	$ 30,000	$ 71,000
Residency Specific Supply Costs	h	$ -	$ -
Residency Specific Equipment Costs	j	$ 3,200	$ -
Travel/TDY Budget for Residents	k	$ 6,000	$ 4,500
Residency Budget for Speakers	l	$ 6,000	$ 3,000
Tuition or Fees for the Program	m	$ 1,872	$ -
BASOPS (Repair and Maint + Utilities)	n	$ 15,125	$ 12,065
Printing or Duplication Costs	o	$ 2,000	$ -
Copier Costs/Annual Lease	p	$ 1,199	$ -
Graphic Arts or TASC Costs	q	$ -	$ -
Subtotal (annual costs)	r	$ 1,030,006	$ 825,658
Length of Program in years	s	2.75	2
Total Costs	t = r x s	$ 2,832,517	$ 1,651,317
Residents Productivity "Revenues"	u	$ 636,273	$ 200,862
Mentors' Productivity "Revenues"	v	$ 288,750	$ 165,390
Total Revenues	w = u + v	$ 925,023	$ 366,252
Cost of Residency (+=Profit, -= Loss)	x = w - t	$ (1,907,494)	$ (1,285,065)
Average Length of Service Post Residency	y	20.69	20.69
Amortized Cost per Retained Year per Resident	z = (x / y) / a	$ (15,366)	$ (20,704)
b= Average Rank and Time In Service		MAJ- 8 yrs TIS	

Table 10: Summary of Total Costs of Prosthodontic Training Programs

Oral and Maxillo-Facila Surgery Training Programs							
Location		Bliss	Gordon	Lewis	Sam Houston	Tripler	WRAMC
Number of Residents	a	4	4	4	6	4	4
Military Salary per Resident	b	$ 59,880	$ 57,184	$ 57,184	$ 57,184	$ -	$ 57,184
Total Military Pay for Residents	c= a x b	$ 239,520	$ 228,735	$ 228,735	$ 343,102	$ -	$ 228,735
Mentors' Military Pay	d	$ 794,674	$ 289,960	$ 185,446	$ 289,960	$ -	$ 286,533
Number of Dedicated Ancillaries	e	5	12	10	8	0	9
Total Ancillary Pay and Benefits	f	$ 155,722	$ 354,331	$ 304,412	$ 233,657	$ -	$ 254,821
Laboratory Costs	g	$ 3,000	$ -	$ -	$ -	$ -	$ 2,000
Residency Specific Supply Costs	h	$ 100,000	$ 120,000	$ 14,000	$ 80,000	$ -	$ -
Residency Specific Equipment Costs	j	$ 2,500	$ -	$ 7,000	$ 4,750	$ -	$ 2,500
Travel/TDY Budget for Residents	k	$ -	$ 3,200	$ -	$ 10,700	$ -	$ 8,000
Residency Budget for Speakers	l	$ 10,000	$ 7,000	$ 7,000	$ 3,000	$ -	$ 3,000
Tuition or Fees for the Program	m	$ -	$ 1,600	$ -	$ 22,500	$ -	$ -
BASOPS (Repair and Maint + Utilities)	n	$ 5,000	$ 10,750	$ 8,750	$ 8,750	$ -	$ 5,000
Printing or Duplication Costs	o	$ -	$ -	$ 3,200	$ -	$ -	$ -
Copier Costs/Annual Lease	p	$ -	$ 1,000	$ 2,700	$ -	$ -	$ -
Graphic Arts or TASC Costs	q	$ -	$ -	$ 2,800	$ -	$ -	$ -
Subtotal (annual costs)	r	$ 1,310,417	$ 1,016,576	$ 764,042	$ 996,419	$ -	$ 790,588
Length of Program in years	s	4	4	4	6	4	4
Total Costs	t = r x s	$ 5,241,667	$ 4,066,304	$ 3,056,170	$ 5,978,513	0	$ 3,162,354
Residents Productivity "Revenues"	u	$ 3,000,000	$ 4,432,000	$ -	$ -	$ -	$ 844,560
Mentors' Productivity "Revenues"	v	$ 4,000,000	$ 2,000,000	$ 4,980,000	$ 7,458,000	$ -	$ 4,410,000
Total Revenues	w = u + v	$ 7,000,000	$ 6,432,000	$ 4,980,000	$ 7,458,000	$ -	$ 5,254,560
Cost of Residency (+=Profit, -= Loss)	x = w - t	$ 1,758,333	$ 2,365,696	$ 1,923,830	$ 1,479,487	$ -	$ 2,092,206
Average Length of Service Post Residency	y	17.89	17.89	17.89	17.89	17.89	17.89
Amortized Cost per Retained Year	z = (x / y) / a	$ 24,578	$ 33,067	$ 26,891	$ 13,787	$ -	$ 29,244
b= Average Rank and TIS		MAJ 10 yr TIS	MAJ 8 yr TIS	MAJ 8 yr TIS	MAJ 8 yr TIS	no response	MAJ 8 yr TIS

Table 11: Summary of Costs for Oral and Maxillofacial Surgery Training

Oral Pathology			
Location			Naval School Bethesda
Number of Residents	a		1
Military Salary per Resident	b	$	55,517
Total Military Pay for Residents	c= a x b	$	55,517
Mentors' Military Pay	d	$	104,514
Number of Dedicated Ancillaries	e		3
Total Ancillary Pay and Benefits	f	$	77,067
Laboratory Costs	g	$	-
Residency Specific Supply Costs	h	$	-
Residency Specific Equipment Costs	j	$	-
Travel/TDY Budget for Residents	k	$	-
Residency Budget for Speakers	l	$	-
Tuition or Fees for the Program	m	$	-
BASOPS (Repair and Maint.+ Utilities)	n	$	-
Printing or Duplication Costs	o	$	-
Copier Costs/Annual Lease	p	$	-
Graphic Arts or TASC Costs	q	$	-
Subtotal (annual costs)	r	$	237,098
Length of Program in years	s		3
Total Costs	t = r x s	$	711,294
Residents Productivity "Revenues"	u	$	-
Mentors' Productivity "Revenues"	v	$	258,000
Total Revenues	w = u + v	$	258,000
Cost of Residency (+=Profit, -= Loss)	x = w - t	$	(453,294)
Average Length of Service Post Residency	y		19.29
Amortized Cost per Retained Year	z = (x / y) / a	$	(23,496)
b= Average Rank and TIS			MAJ 6 yrs TIS

Table 12: Summary of Costs for Oral Pathology Training

Army Sponsored GDE Training in Civilian Institutions					
Location		Univ of WA	Univ of VA	Chapel Hill	Emory
		Periodontics	Endodontics	Public Health	Public Health
Number of Residents	a	1	1	1	1
Military Salary per Resident	b	$ 55,517	$ 56,350	$ 64,118	$ 58,880
Total Military Pay for Residents	c= a x b	$ 55,517	$ 56,350	$ 64,118	$ 58,880
Tuition or Fees for the Program	m	$ 24,000	$ 7,000	$ 15,500	$ 8,100
Subtotal (annual costs)	r	$ 79,517	$ 67,392	$ 79,618	$ 66,980
Length of Program in years	s	2.5	2	3	3
Total Costs	t = r x s	$ 198,792	$ 134,784	$ 238,854	$ 200,940
Residents Productivity "Revenues"	u	$ (43,000)	$ (36,997)	$ (166,500)	$ (166,500)
Mentors' Productivity "Revenues"	v				
Total Revenues	w = u + v				
Cost of Residency (+=Profit, -= Loss)	x = w - t	$ (241,792)	$ (171,781)	$ (405,354)	$ (367,440)
Average Length of Service Post Residency	y	19.71	19.52	22.27	22.27
Amortized Cost per Retained Year per Resident	z = (x / y) / a	$ (12,269)	$ (8,798)	$ (18,198)	$ (16,496)
Resident Average Rank, TIS	b	MAJ- 6 yrs TIS	MAJ- 7 yrs TIS	LTC-12 yrs TIS	MAJ-10 yrs TIS

Table 13: Summary of Costs for Civilian Based GDE Training Programs

Army Sponsored GDE Training in Civilian Institutions (cont.)				
Location		Baylor	Iowa	Univ of Louisville
		Pediatric Dentistry	Pediatric Dentistry	Orthodontics
Number of Residents	a	2	1	2
Military Salary per Resident	b	$ 55,517	$ 55,517	$ 55,517
Total Military Pay for Residents	c=a x b	$ 111,034	$ 55,517	$ 111,034
Tuition or Fees for the Program	m	$ 17,000	$ 6,000	$ 18,500
Subtotal (annual costs)	r	$ 128,034	$ 61,517	$ 137,540
Length of Program in years	s	2	2	2
Total Costs	t=r x s	$ 256,067	$ 123,034	$ 275,079
Residents Productivity "Revenues"	u	$ (150,000)	$ (150,000)	$ (900,000)
Mentors' Productivity "Revenues"	v			
Total Revenues	w=u+v			
Cost of Residency (+=Profit, -= Loss)	x=w-t	$ (406,067)	$ (273,034)	$ (1,175,079)
Average Length of Service Post Residency	y	20.03	20.03	17.97
Amortized Cost per Retained Year per Resident	z=(x/y)/a	$ (10,138)	$ (13,633)	$ (32,700)
Resident Average Rank, TIS	b	MAJ-6 yrs TIS	MAJ 6 yrs TIS	MAJ 6 yrs TIS

Table 14: Summary of Remaining Civilian Based GDE Training Programs

Army Sponsored Fellowships					
Location		Ft.Bragg, NC	Little Rock,AK	Wilford Hall, TX	Univ of Alabama
		Clinical Fellowship	Cosmetic OMFS	Hospital Dentistry	Dental Materials
Number of Residents	a	1	1	1	1
Military Salary per Resident	b	$ 70,118	$ 81,904	$ 78,214	$ 74,118
Total Military Pay for Residents	c= a x b	$ 70,118	$ 81,904	$ 78,214	$ 74,118
Mentors' Military Pay	d	$ 86,642	$ -	$ -	$ -
Tuition or Fees for the Program	m	$ 13,659	$ -	$ -	$ 12,500
Subtotal (annual costs)	r	$ 170,419	$ 81,904	$ 78,214	$ 86,618
Length of Program in years	s	3	1	2	2
Total Costs	t = r x s	$ 511,256	$ 81,904	$ 156,428	$ 173,236
Residents Productivity "Revenues"	u	$ 533,448	$ (200,000)	$ (222,000)	$ (222,000)
Mentors' Productivity "Revenues"	v	$ 273,360	$ -	$ -	$ -
Total Revenues	w = u + v	$ 806,808	$ (200,000)	$ (222,000)	$ (222,000)
Cost of Residency (+=Profit, -= Loss)	x = w - t	$ 295,552	$ (281,904)	$ (378,428)	$ (395,236)
Average Length of Service Post Residency	y	19.81	19.81	19.81	19.81
Amortized Cost per Retained Year	z = (x / y) / a	$ 16,449	$ (14,234)	$ (19,107)	$ (19,956)
Resident Average Rank, TIS	b	LTC 13 years	LTC 16 yrs TIS	LTC 14 yrs TIS	LTC 13 yrsTIS

Table 15: Summary of Costs for Fellowship Programs

Mentor Characteristics/Findings

GDE faculty includes the directors, assistant directors and additional staff members who all serve as mentors to the residents. The number of mentors affiliated with any program. either military or civilian, varies. It can range from 2 or 3 mentors at some of the low density specialty programs to more than 10 mentors at some of the AEGD sites. An advantage that the military programs seem to have over their civilian counterparts is in the commitment of full-time mentors. Yet, one civilian program reported 7 full-time faculty members and 3 part-time affiliates (Seals 1997). Another distinction is the greater number of board certified mentors within military programs. This is not meant to imply that military programs hold greater status, it merely reflects the economic impact that board certification has on a military career, i.e., additional pays and better opportunities for promotion.

DCI Round 1 asked GDE program directors how much time they spent in support of their programs versus the time spent in treating patients. This question tried to capture data on productivity and time commitment to a program for a mentor versus a non-teaching peer. All directors emphatically stated their total support as in 100% as did most of their associated faculty. Based on mean responses, mentors spent 73% of their time in support of the program (preparing lectures, researching, or in assisting residents), 35% of their time treating patients, and believed they were 55% as productive as a non-teaching peer.[10] This finding parallels the results on mentor productivity as reported by Barrett et. al (Barrett, Midtling, and Burnett 1989).

[10] Total time dedicated to the program and treating patients exceeded 100%, since many of the dirctors and their staffs claimed to support their program 100%.

DISCUSSION

GDE Cost Analysis

To produce one residency class cycle, lasting anywhere from one to six years in duration, costs the Army $48.40 million dollars. As expected, the largest domain of the total training costs, approximately 92%, is tied to specialized labor costs: residents', mentors', and ancillaries' pay, allowances and/or benefits. See Figure 3 and 4 for a quick breakdown of GDE training costs.

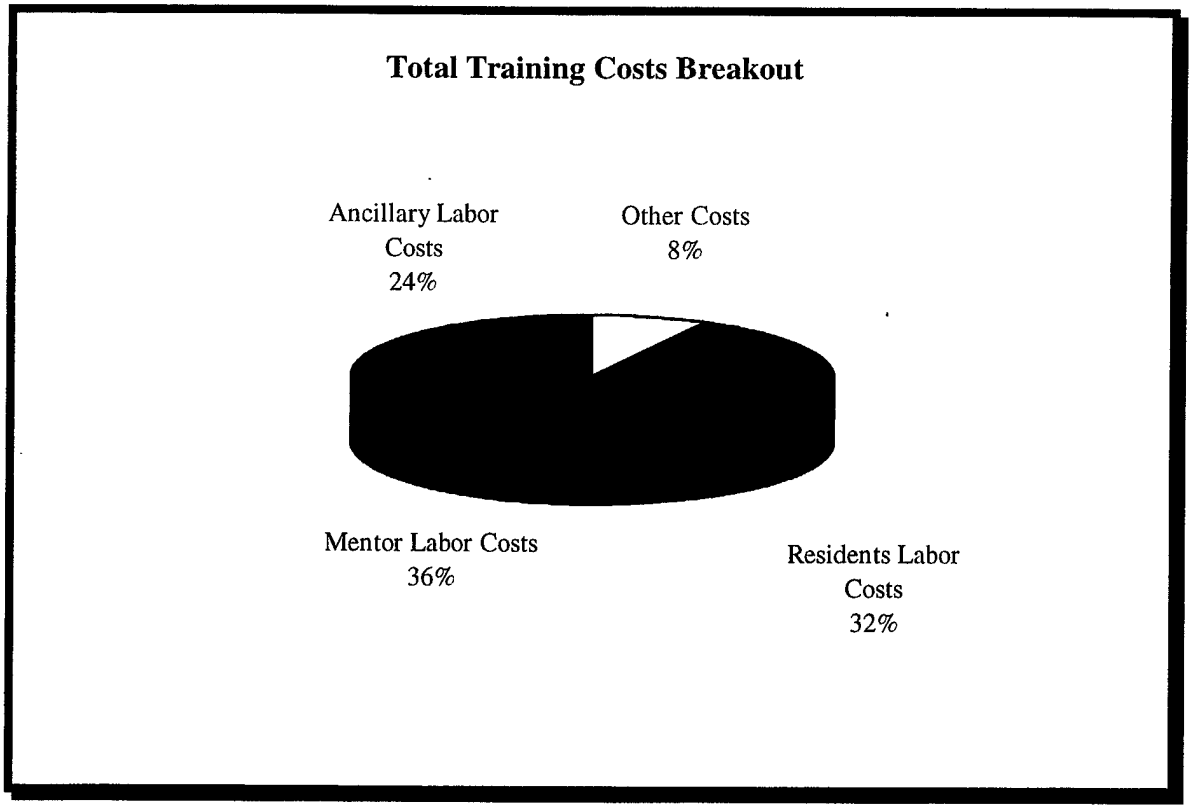

Figure 3: Total Training Cost Analysis

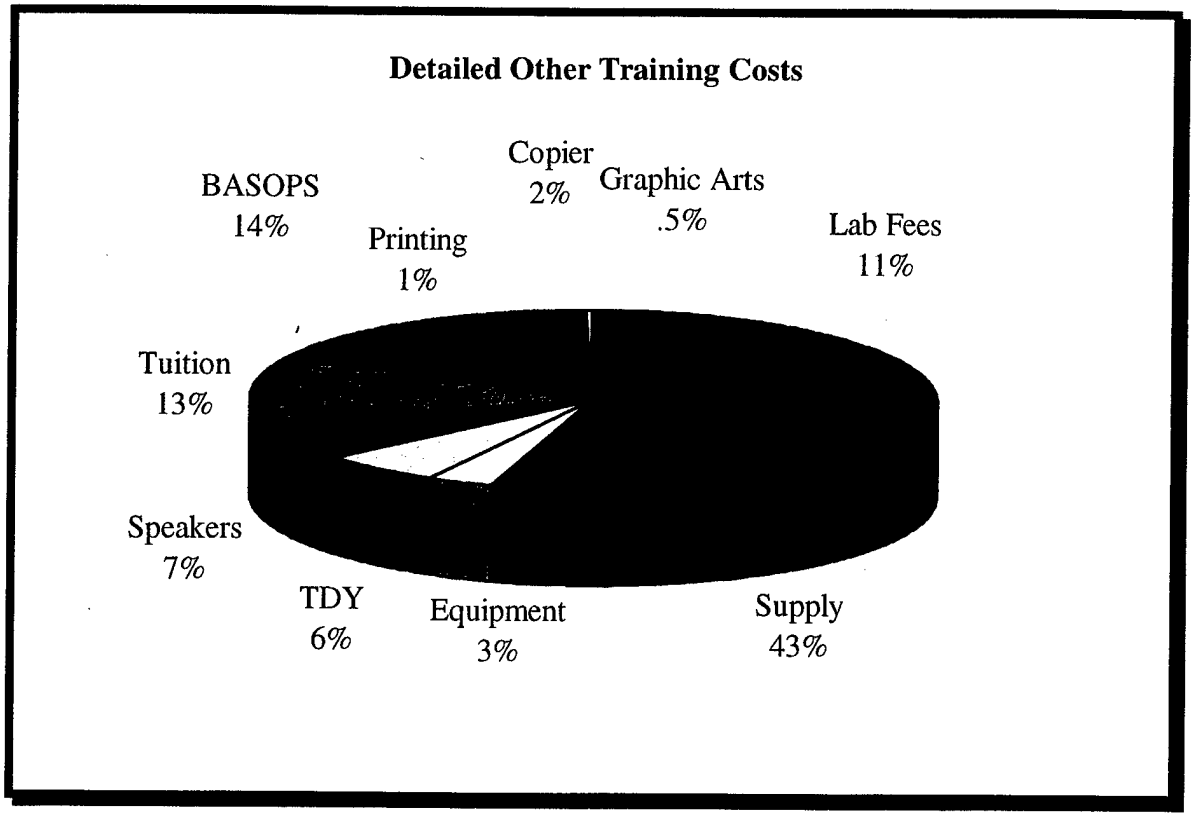

Figure 4: Training Cost Analysis Excluding Labor

Dental treatment requires an individualized diagnosis and treatment plan which essentially eliminates the concept of mass production and realization of any economies of scale or scope. Dental care cannot be manufactured on an assembly line and placed into inventory for use or "sale" at a later date.

Within the past 5 years, two studies have attempted to quantify the cost of GDE. In 1992, a study at the request of senior dental leadership arrived at the following conclusions. The total cost of all GDE was $36.6 million dollars, with the average residency costing $1.46 million. The resident class of 1992 equaled 171 officers which equates to a training cost per resident of $214,247. The team of officers involved in the analysis considered military and civilian pay, allowances, and benefits, supply,

equipment, contracts, travel and base operations costs based on FY 93 agreements. However, the panel failed to consider any dental laboratory costs; copier, printing or duplication charges; tuition or fees paid to civilian institutions; any graphic arts charges; and specific budgets for any invitational guest speakers. Additionally, the panel did not consider the dental care provided by residents and mentors to authorized beneficiaries as income realized by GDE programs.

In 1995, DENCOM performed a "down and dirty" costing of GDE. This attempt was more flawed that the 1992 version. Grossly underestimating the cost, it failed to consider supplies, equipment purchases, and more. The summary underreported the costs associated with mentors' military pay since it uniformly assigned the rank of Lieutenant Colonel to the residency director and any additional faculty. It assumed only three ancillary personnel are associated with any program—an artificially low number. All dental officers in training were assumed to be junior majors. Their results suggested that the cost of training dental officers ranged from $19,025 for one year 63A9Ds to more than $495,804 to train public health dentists at a civilian institution. It is unknown to this investigator whether the DENCOM study considered income generated by GDE participants.

In the November 1996, COL Kulild, Chief of the AMEDD's Directorate of Health Education and Training, presented a briefing to the expanded Dental Board of Directors (Kulild, 1996). COL Kulild claimed "by combining the best data from these two studies, actual costs from civilian programs can be determined fairly accurately." He concluded that to train the 14 residents enrolled in civilian programs (4-OMFS, 1-Endodontics, 1-Periodontics, 2-Orthodontics, 3-Public Dental Health, and 3-

Pedodontics) cost the Army approximately $100,000 in tuition, equipment and lost resident productivity (he termed this "opportunity costs"). He further calculated the training costs for in-house programs to be $11,016,700; the income generated by residents and mentors (his so-called opportunity costs) to be $11,880,500; and the "net" program costs to be +$863,800. His conclusion was that in-house training programs were more cost efficient (Kulild 1996).

In contrast to the previous studies, the current research effort considered all costs previously mentioned and others. Any dental care provided to patients treated by residents and mentors was considered as income. However dental care provided by Army residents in a civilian program was characterized as lost income. Total training costs were then subtracted from this generated income to arrive at a net cost of GDE for the specific training program. Using this methodology the total training costs for one class of fully trained residents equaled $48,404,810. The average cost per program was $1,792,771. The cost per resident trained was slightly less than $577,000. After considering the income generated by the program participants, the net total ***profit*** of training was approximately $865,000 in the aggregate or $32,026 per program or $10,294 per resident.

This project considered another method of reporting the data. Realizing that once trained, officers functioned in that specialty for the duration of their career. Amortizing the cost of training over the career expectancy appeared to be a worthwhile ratio. Figure 5, 6, and 7 present the amortized loss or profit for all current GDE product lines. Figure 5 shows that all participating OMFS programs "turn" a profit. Figure 6 indicates that outsourcing training to either a civilian or joint program tends to yield a negative

amortized net cost per career year (it loses money). This finding is a direct result of lost resident productivity or generated "income." Figure 7 suggests that programs which generate a "profit" for the Army are those where residents' and mentors' productivity exceeds the cost of conducting the training.

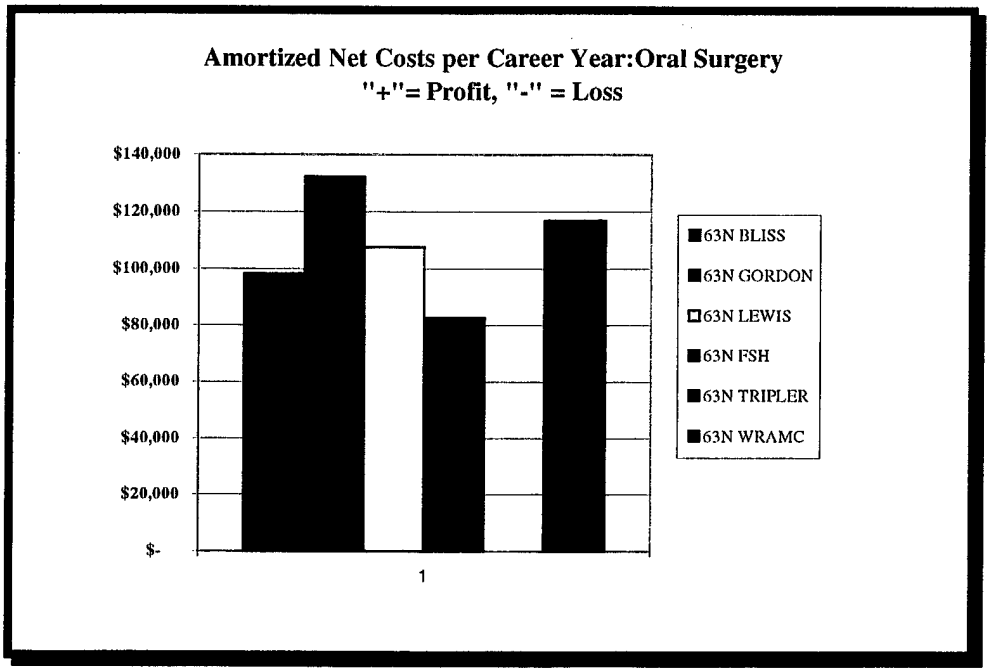

Figure 5: Amortized Net Costs per Career Year for OMFS Programs

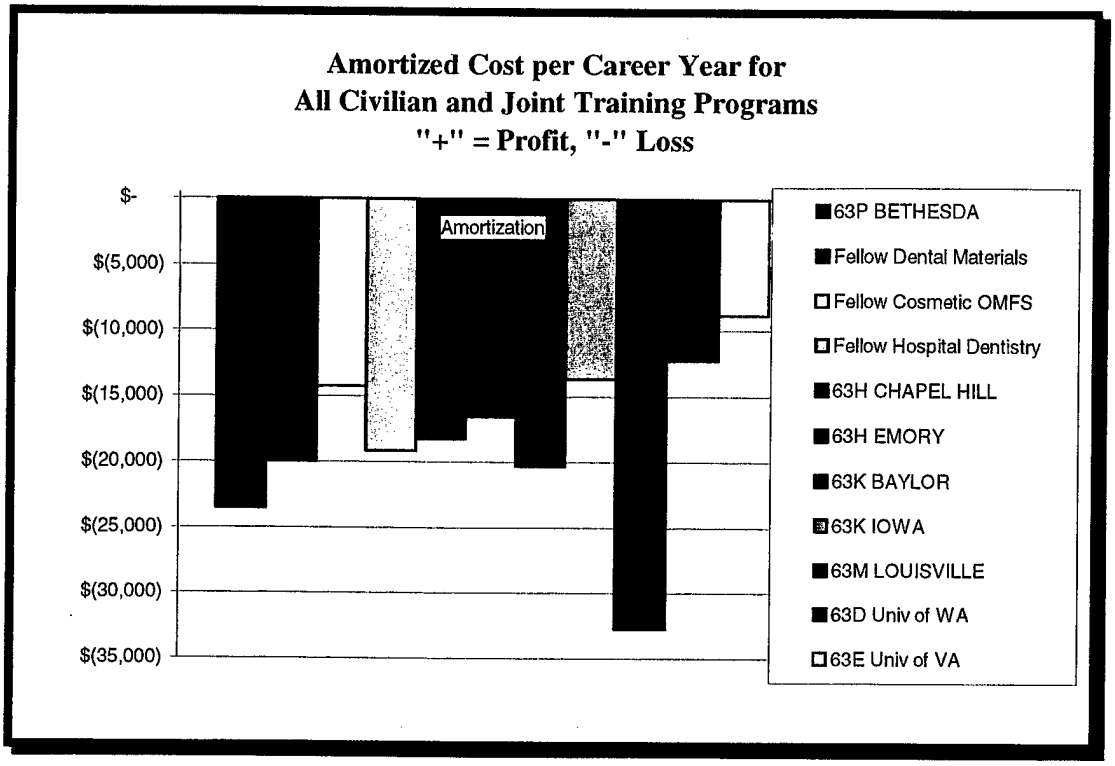

Figure 6: Amortized Net Costs per Career Year for Civilian and Joint Training

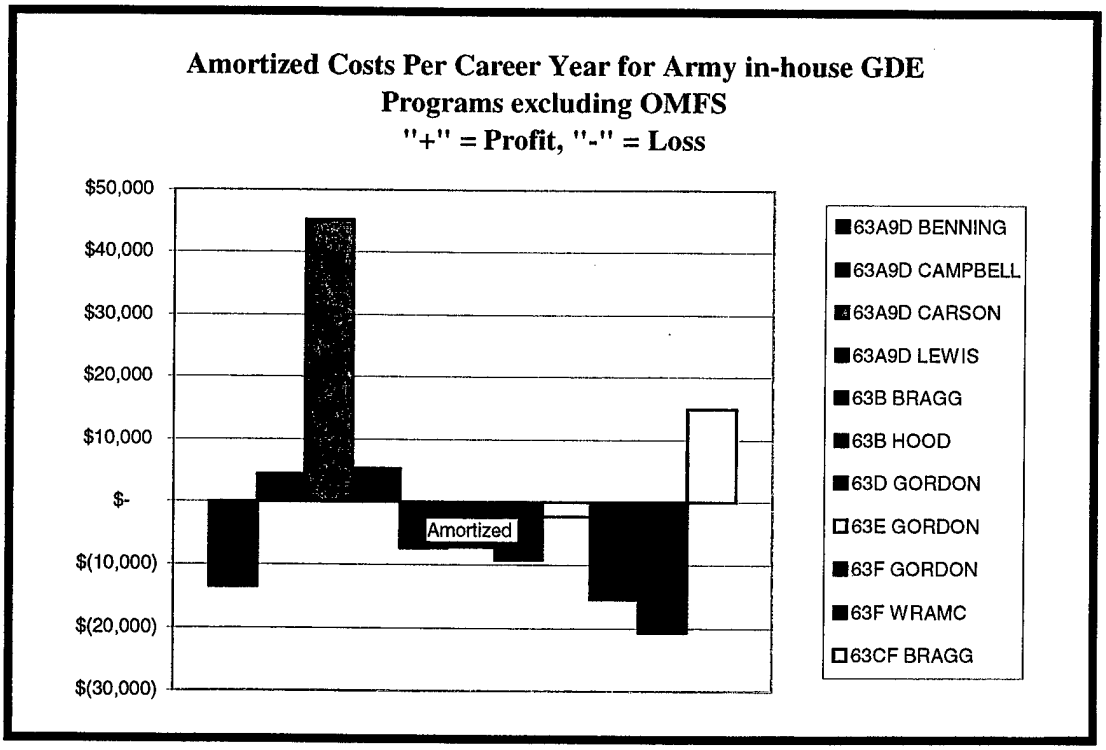

Figure 7: Amortized Net Costs per Career Year for All Remaining In-House Army Programs

Readiness Implications

If the so few GDE programs turn a profit, why should the ADCS be involved in it in the first place. Wartime requirements drive the personnel system. At APPD. the force modeling cells still work under the two major regional conflict (MRC) scenario. Under this scenario the wartime dental officer requirement is 828. These officers will serve in the TOE positions as well as perform the sustainment and training base mission. The part that is missing is the dental readiness piece for the continental United States based active duty soldier. The wartime requirements by AOC plus the annual GDE training starts needed to maintain the force for the next ten years is presented in Table 16.

Area of Concentration	Required 2 MRC	Annual GDE Starts
General Dentist 63A	305	32
Comprehensive Dentist 63B	180	13.35
Periodontist 63D	35	1.35
Endodontist 63E	32	1.95
Prosthodontist 63F	58	4
Public Health Dentist 63H	17	2
Pediatric Dentist 63K	27	2.15
Orthodontist 63M	29	2.3
Oral and Maxillofacial Surgeon 63N	89	7.4[11]
Oral Pathologist 63P	11	0.8
Executive Dentist 63R	45	0[12]
Total	**828**	**67.3**

Table 16: Projected Wartime Requirements and GDE Starts: 2 MRC Scenario

The dental readiness for CONUS based active duty soldiers is included in the 5 Year Capability Plan. This plan suggests a dental corps strength of 1169. With 341

[11] Does not include the two Financial Assistance Program (FAP) participants per year enrolled in civilian OMFS specialty training programs. These students receive a stipend and bonuses for agreeing to serve on active duty following the completion of their training.

[12] 63Rs are any AOC serving in a command position. These officers are "grown" not school trained.

more officers than wartime mandated positions, one can see how the current annual GDE residency class size came to be. Both models take into account resignations and retirements from the ranks of trained specialists.

Some programs, regardless of the costs, must remain in the Army training system based on their applicability to deployments in support of hostilities. AEGD-1 and -2 year programs whose graduates might find themselves in TOE positions in the event of a conflict will need the military specific training available to them only within the confines of military medicine—Advanced Trauma Life Support, Combat Casualty Care, anesthesia training, and emergency room rotations all further the officer's capabilities if deployed. Once deployed they may find themselves acting as physician extenders in addition to being dentists. Civilian OMFS GDE programs situated in larger metropolitan areas might very well see enough trauma to make their graduates feel comfortable in a combatant situation, but may lack the soldiering skill necessary to survive the hostilities themselves. Other GDE programs that cannot relate their training to battlefield dentistry may be unable to justify why their training programs should continue and face termination.

Unique Attributes of GDE Programs

If only OMFS and some AEGD-1 year programs generate a profit, why should the ADCS operate programs that lose money? What makes the Army sponsored programs worth the tremendous expense?

The AEGD-1 year program is used extensively as a recruiting tool to encourage senior dental students to join the Army Dental Corps. The curriculum ensures each

graduate can operate independently across the continuum of dental care in either a remote clinical setting or an extended TOE deployment. As a part of that curriculum, additional training is garnered in Advanced Cardiac Life Support and Forensic Dentistry. Professional development not only addresses clinical dentistry but also military specific training such as field training exercises, participation in mass casualty practice drills, or other activities that expose the residents to the proud traditions of being a military officer. Valuable "lessons learned" from senior clinicians and experienced NCOs help prepare these young officers to function in leadership positions: operative team leaders, department chief or as officers in charge of clinics. As with most programs, the majority of the dental care is provided to active duty troops, with emphasis on those soldiers in a dental class 3 or 4.[13] Residents receive intensive and extensive one-on-one instructions from board-eligible or board-certified senior dental officers that often have a profound impact on a junior officer's career intentions. Civilian programs exist but are not comparable in experience obtained, volume of clinical practice and certainly do not provide any of the military unique skills required to function in isolated duty locations in peace time or during deployments.

AEGD civilian equivalent programs are not readily available. Currently there are only 7 two year civilian programs which produce only 35 residents annually. There are an additional 35 one year programs scattered around the country. Unlike the civilian counterparts, Army AEGD-2 year programs have more than one dedicated board certified mentor, with mentors who are constantly available for treatment planning

[13] Dental Class 3 = patient with a condition that will likely result in a dental emergency within 6 months, i.e., deep caries, pulpal pathology, symptomatic wisdom teeth, etc. Dental Class 4 = No record on file, no examination within one year, unconfirmed panorex on file.

consultation and assistance/guidance with clinical procedures. Residents identify the needs and demands of the military patients and develop treatment plans that allow for flexibility in scheduling, deployments, and other considerations. Officer professional development and Alternate Wartime Training given by the collocated DENTAC reinforces leadership principles. Residents stay connected to the Army and its changing needs. They are trained in administrative and command responsibilities as well as a wide range of clinical competencies to include dental implant system. AR 351-3 requires military programs be structured so graduates meet the requirements for certification. 70% of residents eventually become board certified in comparison to less than 10% of their civilian counterparts[14].

For the periodontic, endodontic, and prosthodontic programs many of the comments share the same theme: care provided is not referred to outside civilian sources. Our selection system, controlled by the military, rewards those hardworking and motivated officers with a chance to obtain specialty training at the cost of foregoing their Dental Additional Specialty Pay (DASP). Program mentors serve as adjunct faculty members to other programs and provide dental continuing education lectures at reduced costs to the Army Dental Care System.. All program directors are convinced that when full time mentors are constantly available for consultation the standard of care and the completeness of that care far surpasses the care delivered in civilian programs. Specialty training can be influential in retaining officers and is indeed a potential discriminator for promotion. Many residents, after obtaining board certification, move on to mentor

[14] Source: COL Randall Pohjola, Director, AEGD-2 year, Ft. Hood, TX (817) 228-7655/7611

positions and upon retirement often assume teaching positions in civilian institutions.

OMFS programs are the most demanding residencies within the military. One of the six OMFS programs follows a dual degree curriculum where the first three years of the residency is spent completing the requirements for a medical degree which includes passing each academic year certifying examination. After obtaining their medical degree the residents return to the confines of the military medical center to complete their OMFS surgery training. In the straight four year program, the residents spend their entire time rotating within the medical center and develop a collegial relationship with the medical staff. Again it must be emphasized that without these programs the amount of care available for active duty soldiers and other than active duty beneficiaries would be severely limited. Several of the OMFS directors suggested closing in-house training OMFS surgical programs would severely deplete the number and denigrate the quality of OMF surgeons on active duty, especially if the pay problem remains unresolved. All directors unequivocally stated the quality and quantity of clinical experience obtained in military programs is much higher than civilian institutions probably since ability to pay is never a barrier to treatment.

Small density specialty training programs, such as pediatric dentistry, public health dentistry and orthodontics, obtained in the civilian sector are not without their champions. The director of the Baylor pediatric dentistry program believes her program is the best available in the country. A comprehensive curriculum married to a full-time staff available at three teaching hospitals exposes the residents to a wide variety of patient types. Residents participate in the treatment of many challenging patients to include those undergoing cancer and/or transplant therapy, physically and mentally

handicapped, and other immuno-compromised individuals who receive treatment at no cost to the patient or family (Seals 1997). One civilian director, who had guided a military program prior to retirement, readily admitted that most graduate training programs were money making operations for their dental schools (Regennitter 1997). Civilian residencies must generate revenue to pay staff salaries, purchase expendable supplies and equipment. and pay for speakers. His statement is supported by the productivity of his residents. With usually only one full-time mentor, civilian programs often lack the personal attention and close supervision that most military programs enjoy. A final consideration is that all dental services provided by military residents in civilian programs are consumed by non-military beneficiaries, thereby requiring military patients who would benefit from an in-house training experience to forego that care or seek it through other avenues, perhaps paying for it out-of-pocket.

Comparison with Industry Standards

The ADCS matches up very well with reported industry standards, with one exception: the specialist to generalist ratio. Every clinic within the ADCS employs a mechanism allowing walk-in emergency care every duty day. Clinics routinely have a dental officer on call after duty hours and on weekends for consultation or treatment. The Army meets the routine appointment standard, too. Most facilities can offer a patient the next available appointment within the two to four week industry standard. Specialty care appointments are a different matter. Referral patterns within the civilian community are much different from those in the military. Many general dentists routinely perform a majority of the required specialty care since they would lose income should they refer their patients elsewhere. The ADCS, perhaps. has become so accustomed to having in-house specialty providers that referrals also serve as second opinions. Another possible reason for current Army referral patterns is frequently young dental officers hate the one to say "no" to a patient. If a fixed partial denture is "wanted" but would take time away from the readiness mission, the less experienced officer may defer to a senior ranking specialist to save a patient-provider confrontation .

Provider-Population Ratios

The author queried multiple sources to identify the correct number of patients to specialty provider. Most specialty associations capture only basic demographic data on their members. Telephone calls and written requests to numerous specialty associations or academies yielded nothing more than some addresses and telephone numbers of each kind of local specialists. Table 17 presents the "best guesses" by these experts of the number of patients required to support specialty dental practices.

	ADA 1991 Data	US Army ratios 10/96	Specialty Association	Civilian Inquiry	Statistical Average
General Dentists	2,014	1,260	2,014	2,000 to 5,000[15]	2,568
Orthodontists	30,230	12,973		25,000 to 50,000[16]	29,550
Oral Surgeons	48,608	5,854		35,000 to 55,000[17]	36,115
Periodontists	66,188	8,571		20,140 to 30,000 [18]	31,225
Pediatric Dentists	85,542	10,667		15,000 to 20,000[19]	32,802
Endodontists	98,276	11,163		20,000 to 40,000[20]	42,360
Prosthodontists	108,557	4,486		50,000 to 75,000[21]	59,511
Public Health Dentists	1,033,512	68,571		n/a	551,042
Oral Pathologists	2,356,794	26,667		n/a	1,191,731

Table 17: Comparison of Provider to Population Ratio

[15] Dr. Richard J. DeFillipo, Associate Professor, University of Pittsburgh, School of Dental Medicine, Private Practice, 159 Allegheny River Boulevard, Oakmont, PA, 15139, personal interview, 10 March 1997

[16] Dr. William Terhune, DDS, MA, Private Practice, San Antonio, TX, telephonic interview, 28 October 1996. He stated a good population base for his type of practice would be within the range given.

[17] Dr. David G. Leibold, MD, DDS, Oral and Maxillofacial Affiliates of South Texas, telephonic interview 28 October 1996. Most patients are for third molar extractions with sedation.

[18] Dr. James T. Melloning, President, American Academy of Periodontology, telephone interview 28 October 1996. Dr. Melloning stated a periodontist would be happy if between 10-15 generalists referred to him; a good practice would have 1,000 active patients under periodontal therapy.

[19] Dr. Paul E. Kittle, Trustee, American Academy of Pediatric Dentists, Private Practice, Leavenworth, KS, electronic interview, pedidont@aol.com, 11 March 97.

[20] Dr. Gary Hartwell, Director, Endodontic Residency Program, Medical College of Virginia, telephone interview 28 October 1996. He echoed Dr. Melloning's response-about referral dentists and said he supposed that 20-40,000 patients would allow an attractive practice.

[21] Dr. Don Morgan, DDS, MA, Diplomate American Board of Prosthodontics, private practice San Antonio, TX. Telephonic interview 28 October 1996. In today's competitive climate with general dentists performing most of the routine prosthetics, he believes a thriving prosthodontic practice requires a solid population base in the 50-75,000 range.

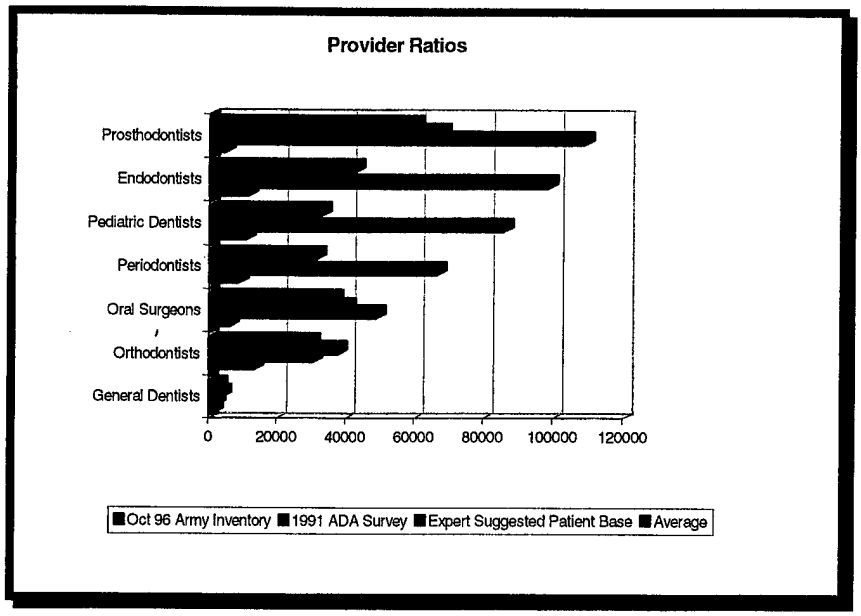

Figure 8: Common Dental Specialty Provider Ratio Comparison

Based on the data depicted in Figure 8, the Army is out of balance in every dental specialty except general dentistry. This quick analysis verifies the ADCS has moved away from generalization and veered toward specialization. The ADCS should relook its allocation of dental specialists to bring its provider demographic profile into closer harmony with the comparable civilian environment. This needed introspective analysis[22] and potential shift in National Military Strategy to a more capability-based Army will ultimately shape the future GDE training needs of the Corps.

[22] Analysis is ongoing within the Office of the Surgeon General, Falls Church, VA. COL Michael Carino is the action officer.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

The purpose of this paper was threefold: (1) calculate the cost of US Army sponsored graduate dental education; (2) determine whether the ratio of generalist to specialist is appropriate for the ADCS; and (3) recommend future courses of action to senior management. The hypothesis that outscourcing GDE to civilian institutions would be the cheaper alternative has been refuted by the collected data. According to the ADA and local provider information, ADCS does have more dental specialists than needed to adequately service its current patient base, thereby perpetuating the higher than normal specialist to generalist ratio. Finally, as the ADCS moves to impaneled practices within the dental treatment facilities (DTFs), the need for generalists, i.e., 63As and 63Bs, serving as primary care managers (PCMs) will increase (Fretwell et.al. 1997). If one considers the readiness requirements some programs, regardless of the cost, must be maintained since they are not available from a civilian source. Additional findings include:

- GDE is expensive since it is labor intensive.
- Apparently mentors generate more revenue than residents. While that should be true based on didactic training and clinical experience, that is not always the case. Some OMFS did not differentiate what was generated by whom. In many complex cases where mentors assist residents or vice versa, it is difficult to de-couple procedures. When programs were able to report by provider, it was apparent some mentors and a few residents failed to generate dental services that equaled their annual compensation.

Additionally, any productivity (revenues) generated by residents training in civilian or joint sponsored programs, where the recipients of the provided dental care were not Army beneficiaries, was considered lost and subtracted from the remaining resident total.

- Current policy places the resident selection process within total control of the ADCS. Although undergraduate and dental school grades remain part of the process, the officer's complete record is considered in developing the order of merit list. This practice allows the selection board to recognize the actual achievements and accomplishments of hard working officers who flourish within the military system.
- Even with its calculation mechanism to establish its "charge" for each dental procedure performed (75 percentile of the national median), the dental care generated by training program participants almost offsets the cost of training. If ADCS used even the national average fee schedule then the total GDE program would be a guaranteed money maker.
- Variation exists in the manner in which directors choose to spend their training dollars and in the support each receives from its collocated MEDDAC or MEDCEN.
- Low density dental specialty residents are apparently allowed to self select their training program, forsaking ADCS' significant negotiating power to drive down the cost of tuition.
- Similar product lines experience tremendous variation in the amount of dental goods and services generated by its participants. The question begs asking: How much clinical training and experience are these residents actually receiving?
- Interservice cooperation is not leveraged.

- Tuition for and fees to civilian institutions cost the Army $295,000 per residency cycle. Total cost of non-Army related GDE exceeds $3.35 million

Recommendations

- If GDE was looked at as a business product line and more emphasis was placed on productivity, GDE could actual make money across all product lines (even at the artificially low fixed charge rate).
- Similar product line programs should share methods and mechanisms to ensure interchangeable residents (as equal as possible given the individuality of the officers involved) at the completion of their training period.
- Resident selection should remain under ADCS control to ensure the best qualified officers are selected for training under the total person concept. Past academic performance may not carry the same predictive power as does desire and motivation.
- If the penultimate goal of the ADCS is to place its specialty providers at the chair, eliminate public health dentistry and purchase this expertise, when required, with personal service contracts. Perhaps this functionality can be assumed by dental officers who have completed the US Army-Baylor Program in Healthcare Administration.
- Low density specialty training positions should be secured at the leading civilian institutions, as recognized by the ADA, under an agreement negotiated either by ADCS alone or by all three services. Since officers receive military compensation perhaps the tuition can be waived in lieu of the stipend.

- Consider cooperation, e.g., sharing the personnel costs of mentors, among the three services to train those low density specialists each service requires but in locations where each individual service can benefit from its resident officer.
- DENCOM should demand and insist upon a consistent level of MEDCOM Regulation 10-1 type support for all ADCS GDE programs.
- For the one and two year AEGD programs, fill mentor positions from the low density specialties with retired board certified officers on a personal service contract.

Summary

The purpose behind this graduate management project was to perform a comprehensive cost analysis of Army sponsored GDE training. DCIs, mailed to current residency directors, attempted to capture the tangible costs associated with providing GDE to members of the Army Dental Corps. Additionally the directors had the opportunity to expound upon their programs' uniqueness and significant contributions toward the Corps. Though not the primary intention of this study, it is hoped that as a result of their participation in this effort, residency directors now reflect on their program's total costs in training skilled practitioners for Army Dental Corps.

To remain viable, Army GDE programs must share their best practices, to think of education as a business and not a luxury easily affordable to itself. Given that Army GDE programs produce a superior clinician, well schooled in the chosen specialty, failing to focus on the bottom line, to show a profit, may lead to its extinction.

Individual service training programs may become a thing of the past. Interservice cooperation may replace service specific competition. The merging of the two San

Antonio-based OMFS programs (US Air Force program at Wilford Hall Medical Center and US Army program at Brooke Army Medical Center) may become the test case toward this practice. Problems will undoubtedly occur but there may be no other alternative if both services wish to continue their training programs.

All military residency directors steadfastly believe GDE is a powerful recruitment and retention tool. Totally abandoning the GDE process and contracting out the entire system would be foolhardy. This study has identified those programs which return a profit on their investment of resources. It has also indicated those programs which cost the Army money that could become profitable with the proper command emphasis. As the ADCS embarks upon implementation of the Fretwell Report's staff DHMO model, the need for some of our dental specialists may vanish (Fretwell et. al. 1997). As the needs of our beneficiary population change, the ADCS must evolve as well. Other individuals within the Army Dental Corps family are addressing that very question--how to keep pace--but wholesale change cannot happen overnight. Dentistry is a skill that takes 4 post collegiate years to acquire and another 2-6 years to gain a clinical specialty.

Current leadership must begin planning for the Dental Corps organizational transformation as it moves into the next century. Failure to comprehend the magnitude of such actions may place the Corps' very existence in jeopardy. This study has only looked at Army GDE training programs. A thorough inspection and cost analysis of the complete Corps would undoubtedly produce other findings identifying opportunities for improvement in both our efficiency and effectiveness. In time that may be necessary, but for now, the ADCS provides GDE at a reasonable price to the America's Army.

APPENDIX A

Data Collection Instrument I

Please take a moment and complete this short questionnaire
Use the reverse side if you need more space to answer a question.

Residency Name: _____ Clinic: _____ Bldg. Number: _____

1. How many residents do you train each year? Army and Non Army? _____
   Do the residents receive a stipend? If so, how much? _____
   If a military program, what are the rank and TIS of your typical resident? _____

2. How long is your program in months? _____

3. What is the approximate square footage of the space dedicated to the program, i.e.. office space for director/assistant director, residents, support staff; dedicated resident treatment and lab areas; residency conference room, etc.? If you occupy an entire building or floor. list the total square footage of the area.

_____

Is this space a scarce resource? If your program was not at this location, could the space be mothballed? Or would it be used by the DENTAC or University for something else

_____

Is your program billed for the housekeeping/janitorial service for your area? How is it billed or charged?

_____

4. How many ancillary Full Time Equivalents support the residency program? _____
   (secretaries, assistants, lab techs)

If you have dedicated personnel assigned specifically to the training program, what are their salary and benefit costs? For military programs, list the civilian employees by GS rating and step; Military ancillaries by rank.

_____ _____ _____ _____

_____ _____ _____ _____

Do you use a civilian dental laboratory under contract? _____
What is its annual cost? _____
Is this passed on to the patients or is it paid for by the program or university?

_____

5. What is Residency program's "fenced" supply budget? Fy 96 _____FY 97 _____

Does this include film for intraoral photography? _____

6. Have you purchased any specialized equipment for the sake of the training program? What was it, what did it cost, and what is the life expectancy of that equipment? Did you include this purchase in the total supply budget?

_____

_____

_____

7. Does the program have a dedicated copier? If not, what percentage of the work of the existing copier is caused by the residency? _____

Do you lease or own it? _____ What is the annual cost to operate it? _____

8. How do you handle printing and/or duplication charges for material given to residents? What is the annual cost? What is your annual cost for graphic support either from TAS-C or an in-house graphics art department?

_____

_____

_____

9. What are the laundry and/or linen charges allocated to your program? Do you buy your own scrubs? Do you wash them in house or use the hospital laundry service? Did your clinic buy a washer and dryer?

_____

_____

10. Does the program have a travel budget for resident related travel to conferences or seminars? _____

How much is apportioned per resident? _____

11. How much is spent annually for guest speakers (include travel, per diem and honoraria) who might address your residents? _____

12. Are residents required to purchase anything specifically for the residency? Are they reimbursed for any expenditures associated with your training program?

_____

_____

13. If your program has an agreement with a civilian institution for tuition or related fees (e.g., any University or Dental School), how much does the Army or DENTAC pay that institution per resident?

_____

14. How much dental care (in dollars) does your average resident generate per year?

First Year _____ Second Year _____ Third Year _____

Fourth Year _____ Fifth Year _____ Sixth Year _____

15. The literature says that mentors in Graduate Medical Programs are only 50% productive when compared to their non-teaching peers. What percentage of a mentor's time is spent supporting the program? How much time do they have to treat their own patients? What is the annual productivity for each mentor? How does that compare to a non teaching peer at your location?

_____

_____

_____

_____

_____

_____

16. Does your program require or offer a Masters' Degree in addition to a certificate?_____
Are all residents expected to obtain a Masters' if offered ? _____

17. Do you believe your Army Program is unique or are we duplicating what we can purchase from the civilian sector ? If unique, what features make it unique?

_____

_____

_____

_____

18. Are there any specific training requirements that your residents must complete in addition to their dental training (e.g., ACLS, ATLS,) that costs you money?

_____

_____

_____

You may fax this questionnaire or return it in the self addressed envelope provided. Please ensure all answers are legible and accurate to the best of your ability.
Thank you for help with this project.

APPENDIX B

Data Collection Instrument II

Residency Data Call: Round 2

Use the reverse side if you need more space to answer a question.

Residency Name: _____ Contact Number _____

Location: _____ Best time to call: _____

1. Every residency program consumes supplies. Some military training programs are embedded in clinics that provide other dental services. How much of the clinic's supply budget is consumed by the residency program per year (or best estimate)? Please include money dedicated to intraoral film, if applicable.

_____

2. Some special equipment purchases are justified by having a training program within the DENTAC. Have you purchased any such equipment for your program? What were these **items, total costs** and the **life expectancy** of these purchases? (Example: Slide Duplicator, $2700, 10 yrs)

_____
_____
_____
_____

3. Please list the rank. AOC and board certification status, Time in Service (TIS) and annual productivity (in dollars) for **all** mentors affiliated with your training program.
(Ex: LTC, 63B9B, 16 yrs, $ 87,654)

_____
_____
_____
_____
_____
_____

4. Certain programs take advantage of in-house dental laboratories. How much is spent on expendable lab supplies (i.e., plasters, stones, waxes, precious metals, resins, porcelain, prosthetic teeth, etc.) which are a direct result of the training program? Stated another way: If the program was closed or moved to another location, how much would be saved in lab related supply costs?

_____
_____

5. Many residencies report terrific support from their collocated MEDDAC/MEDCEN. Please list all services that are provided under 10-1 support agreements (e.g., housekeeping, laundry, copier support).

_____
_____
_____
_____
_____
_____
_____

6. Ask your DWRS Clerk to provide the average annual productivity in **dollar amounts** for your residents. This value when combined with the mentors' productivity (question # 3) will be the "revenue" that your program generates. If your residency is a multi-year one. please report the "revenues" by resident year.

_____
_____
_____
_____
_____
_____

Fax this questionnaire (DSN 471-8753, Commercial 210-221-8753) or return it in the self-addressed envelope provided. Please ensure all answers are legible and accurate to the best of your ability. Thank you for help with this project.

APPENDIX C

Army Sponsored GDE Training Programs, Directors, and Locations

AEGD- 1 Year

COL Thomas Richardson
USA DENTAC
Ft. Benning, GA 31905-6100

LTC(P) Robert Reichl
USA DENTAC
Ft. Campbell, KY 42223-1498

COL William Mitchell
USA DENTAC
Ft. Carson, CO 80913-5000

COL Craig Chilton
USA DENTAC
Ft. Lewis, WA 98431-5020

AEGD- 2 Year

COL Steven Hackman
USA DENTAC
Ft. Bragg, NC 28307-5000

COL Randall Pohjola
USA DENTAC
Ft. Hood, TX 76544-5063

Periodontics

COL Michael Billman
Tingay Dental Clinic
USA DENTAC
Ft. Gordon, GA 30905-5650

Dr. Robert O'Neal
Department of Periodontics
D-552 Health Sciences Building
Box 35744
Seattle, WA 98195-7444

Endodontics

COL Robert Lousine
Tingay Dental Clinic
USA DENTAC
Ft. Gordon, GA 30905-5650

Dr. Gary Hartwell
Department of Endodontics
Box 980566
MCV/VCU School Of Dentistry
Richmond, VA 23298-0566

Prosthodontics

COL Carl Driscoll
USA DENTAL CLINIC
Ft. Meade, MD 20755-5700

COL Merle Parker
Tingay Dental Clinic
USA DENTAC
Ft. Gordon, GA 30905-5650

Oral and Maxillo-Facial Surgery

COL Charles Ringgold
Department of Oral Surgery
USA DENTAC
Ft. Bliss, TX 79920-5001

COL Robert Jordan
Department of Oral Surgery
USA DENTAC
Ft. Gordon, GA 30905-5650

COL Roger Throndson
Department of Oral Surgery
USA DENTAC
Honolulu, HI 96859-5000

COL Andrew Vorono
Department of Oral Surgery
USA DENTAC
Ft. Lewis, WA 98431-5020

COL James Startzell
Department of Oral Surgery
USA DENTAC
Ft. Sam Houston, TX 78234-6200

COL Adrian Patterson
Department of Oral Surgery
USA DENTAC
Washington, DC 20307-5000

Oral Pathology

COL Harvey Kessler
Chairman, Department of Oral Pathology
Armed Forces Institute of Pathology
Washington, DC 20306

Orthodontics

Dr. Fred Regennitter
Department of Orthodontics
University of Louisville, School of Dentistry
Louisville, KY 40292

Public Health Dentistry

Dr. Erika Lendeman
UNC at Chapel Hill
CB 4010 Bynum Hall
Chapel Hill, NC 27599-4010

Elaine Koenig
Rollins School of Public Health
at Emory University
1518 Clifton Road, NE
Atlanta, GA 30322

Pediatric Dentistry

Dr. Susie Seals
Baylor College of Dentistry
3302 Gaston Avenue
Dallas, TX 75246-2098

Dr. Jimmy Pinkham
University of Iowa
201 Dental Science, S
Iowa City, IA 52242-1001

Fellowships

Clinical Dentistry
LTC(P) James Gergely
USA DENTAC
Ft. Bragg, NC 28307-5000

Hospital Dentistry
COL Steven Nevins
Department of Dentistry
Wilford Hall Medical Center
Lackland AFB, TX 78236-5300

Dental Materials
Dr. Steven Filler
University of Alabama at Birmingham
1919 Seventh Avenue South
Birmingham, AL 35294-0007

Oral and Maxillo-Facial Fellowship (Cosmetics)
Dr. James Billie
10809 Executive Center Drive
Suite 100
Little Rock, AK 72211

APPENDIX D

Glossary

63A	General Dentist
63A9D	General Dentist Graduate of AEGD-1 Year Program
63B	Comprehensive Dentist, Graduate, AEGD-2 Year Program
63D	Periodontist
63E	Endodontist
63F	Prosthodontist
63H	Public Health Dentist
63K	Pediatric Dentist
63M	Orthodontist
63N	Oral And Maxillofacial Surgeon
63P	Oral Pathologist
63R	Executive Dentist
ADA	American Dental Association
ADC	Army Dental Corps
ADCS	Army Dental Care System
AEGD-1yr	Advanced Education in General Dentistry - 1 year
AEGD-2yr	Advanced Education in General Dentistry - 2 year
AMEDD	Army Medical Department
AOC	Area of Concentration
APPD	AMEDD Personnel Proponency Directorate
ASD,HA	Assistant Secretary of Defense for Health Affairs
CONUS	Continental United States
COTS	Commercial off the shelf
CSH	Combat Support Hosiptal
DCI	Data Collection Instrument
DENCOM	Dental Command
DMHO	Dental Health Maintenance Organization
DOD	Department of Defense
DWRS	Dental Workload Reporting System
FAP	Financial Assistance Progam
FMDP	Family Member Dental Plan
FMDP	Family Member Dental Plan
FSBGD	Federal Services Board in General Dentistry
FY	Fiscal year
FYDP	Future Years Defense Program
GAO	Government Accounting Office
GDE	Graduate Dental Education
GME	Graduate Medical Education

GS	General Schedule
HCSSA	Health Care System Support Agency
HMO	Health Maintenance Organization
MASH	Mobile Army Surgical Hospital
MEDCOM	Medical Command
MRC	Major regional conflicts
OMFS	Oral and maxilliofacial surgery
PERSCOM	Personnel Support Command
PFC	Private First Class (E-3)
PMPM	per member per month
SFC	Sergeant First Class (E-7)
SGT	Sergeant (E-5)
SPC	Specialist (E-4)
SSG	Staff Sergeant (E-6)
TIS	Time in Service

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