

Issues Affecting the Future Demand for Orthotists and Prosthetists: Update 2002

A Study Prepared for the National Commission
on Orthotic and Prosthetic Education, May 2002



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DEMAND FOR ORTHOTISTS AND PROSTHETISTS:UPDATE 2002

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INTRODUCTION

The professions of orthotics and prosthetics have developed rapidly. Early orthotists and prosthetists were artisans such as blacksmiths, armor makers and the patients themselves. In the 1950's the American Orthotic and Prosthetic Association was formed and today these professionals are an integral part of the allied health community. With rapid advances in technology and in the provision of health care, the role of the prosthetist and orthotist has grown from a focus on the technological aspects to a more inclusive role as a member of the comprehensive rehabilitation team. Contemporary practitioners must address the increasing complexity of technological developments in the field of rehabilitation as well as concern themselves with patient evaluation, education, and treatment. As orthotics and prosthetics has progressed from the traditional cottage industry to the contemporary role as an allied health profession, educational programs have tried to meet that demand.

Today, there is a concern with the increasing number of patients requiring orthotic or prosthetic care and the ability of the present number of certified orthotists and prosthetists to meet that demand. This study was originally completed in 1996 to determine the current and future need for certified orthotists and prosthetists, and the ability of the existing educational programs to meet this need. The study was updated in 2002 to provide the necessary data to estimate the future demand for certified orthotists and prosthetists. These data and their critical analyses are essential for appropriate planning of future educational programs.

Several methods of data collection have been used to provide both quantitative and qualitative data on issues related to the national demand for orthotists and prosthetists. The number of certified practitioners required in the future will be affected by a variety of factors including: a) the current prevalence and future trends in the incidence of those diseases and disabilities which are the core of practice; b) health care payment sources and extent of coverage for orthotic and prosthetic care; and c) the rate of population growth, especially in particular age segments. Trends and data in each of these areas are discussed and related to the potential future demand for certified orthotists/prosthetists.

The population of certified orthotists/prosthetists and their age distribution, the present number of educational programs, and the anticipated annual number of new certified members are analyzed to determine the number of professionals potentially available to meet future demands. These numbers are then correlated with projected population changes and disease/disability prevalence.

The current update suggests that the need for orthotists and prosthetists has not diminished, but continues to increase. Without substantial changes in the number of educational programs, and the number of graduates becoming certified, the profession will be unable to serve the needs of a substantial percent of the population.

PREVALENCE AND TRENDS OF SELECTED DISEASES/DISABILITIES

HIGHLIGHTS:

I. Trends in Amputation:

*Proportion of population at risk for peripheral vascular disease and amputation will increase significantly by the year 2015.

*The incidence of diabetes and diabetes-related amputation continues to increase. The number of Americans with diagnosed diabetes is projected to increase 165% by 2050.

*Any reductions in the incidence of peripheral vascular disease and diabetes-related amputations as a result of intervention programs are likely to be offset by increases in the proportion of population in the older, higher risk age groups.

*The number of trauma related amputations are likely to continue to decrease at a slow rate with improved safety in farm and industrial machinery, and improved work conditions.

*Amputation rates due to osteogenic sarcoma are decreasing through technological advances.

*The rate of amputation for congenital limb deficiencies is likely to remain relatively constant accounting for about three percent of all amputations.

II. Trends in Orthopedic Impairments:

*Data indicate increasing growth in use of orthoses, particularly among the age group 18-44.

*The proportion of the population 18-44 years of age will decline slightly by 2010. The slight reduction in this segment of the population may be offset by the increasing growth in the use of improved design orthoses.

*In 2010, as the Baby Boomers reach the ages of 46-64, the proportion of the population at greatest risk of back injuries and paralysis will increase requiring a greater number of certified orthotists.

*It appears that, until 2010, continued growth will depend primarily on cost-effective innovative technology.

I. INCIDENCE OF AMPUTATION

Amputations occurring today are generally the result of: a) peripheral vascular disease (PVD); b) trauma, or c) cancer (osteosarcoma). Congenital limb deficiencies comprise another category which may require surgical conversion to a more functional level. Incidence trends in each of these areas will affect the future demand for prosthetists.

A. Peripheral Vascular disease

Disease accounts for approximately 70% of all amputations. The highest percentage of amputations due to disease occur in the 61-70 year age group, and most amputations are at the lower limb level. The disease most frequently related to amputation is PVD, and it is the most common cause of lower extremity amputations. PVD and peripheral neuropathy are frequently a result of long-term diabetes, and of all amputations, 50-70% are diabetes related. Other risk factors for PVD include hypertension, high cholesterol levels, and smoking.

The number of hospital discharges, reported in the National Hospital Discharge Survey, listing an amputation and diabetes increased 29% from 36,000 in 1980 to 54,000 in 1990. About half of the amputations in the United States occur in people with diabetes and the number of people with diagnosed diabetes increased five-fold between 1958 and 1993. About 54,000 lower extremity amputations were performed on individuals with diabetes in the United States in 1990. The age adjusted rate for lower extremity amputation among people with diabetes in the United States is about 15 times that of the non-diabetic population. Although there have been major improvements in non-invasive diagnosis, revascularization, and wound healing techniques still 2-5% of individuals with PVD and without diabetes, and 6-25% of those with diabetes eventually undergo an amputation. The likelihood and the extent of amputation increases with age. Patients with diabetes age 65 and over account for 61% of all diabetes related lower extremity amputations. Between 1980 and 1990, the total population increased by about 13%, but the number of persons using artificial limbs increased by 23.2%. The population with diagnosed diabetes is projected to increase 165% from 11 million in 2000 (prevalence of 4.0%) to 29 million in 2050 (prevalence of 7.2%).

Early interventions to prevent peripheral vascular disease and neuropathy target smoking reduction programs, controlling hypertension, hyperlipidemia, and hyperglycemia. It is estimated that amputations in the diabetic population could be reduced by at least 50% through reduction of the risk factors for amputation, and through improved foot care by a multidisciplinary health care team. Reduction of these predisposing factors may eventually reduce the incidence of amputation in the diabetic population. However, the potential effects of these programs have not yet become apparent, and reductions in the incidence of diabetes related amputation may be offset by population growth in the higher risk age groups.

Increase in the proportion of the population at greatest risk will likely have an effect on the number of amputations occurring, particularly those related to peripheral vascular disease. In 2001, the median age of the population of the United States was 36 years, compared to 29 years in 1975. By 2010, the 46 million people over 65 will represent about 15% of the population compared to 8% in 1950.

B. Trauma

Trauma is the second leading cause of amputation, generally the result of vehicle or work-related accidents, or gun shots. Amputation due to trauma occurs more frequently among young adults, and primarily among males. Trauma accounted for about 33.2% of all amputations in 1963 and has currently decreased to about 23%. The incidence of trauma related amputation will probably continue to decrease slightly with the implementation of new regulations, the development of safer farm and industrial machinery, improved safety in work conditions, and advanced techniques for saving traumatized limbs.

C. Cancer

Amputation due to cancer is generally a result of osteogenic sarcoma occurring primarily in young adults. Amputation as a result of osteogenic sarcoma has been reduced through early detection, improved imaging techniques, more effective chemotherapy regimens, and better limb resection and salvage procedures. Tumor resection followed by limb reconstruction frequently provides a functional extremity eliminating the need for a prosthesis. Amputation for osteogenic sarcoma now accounts for less than four percent of all amputations.

D. Congenital Limb Deficiencies

Amputations to correct congenital limb deficiencies are relatively rare accounting for less than three percent of all amputations. The use of prosthetics is a common intervention for children with congenital limb deficiencies. The rate of limb reduction defects has remained relatively constant at about 3.6 per 10,000 infants for the last ten years.

II. PREVALENCE AND TRENDS IN ORTHOPEDIC IMPAIRMENTS

Results from the National Health Interview Survey indicate that 35 million Americans (one in every eight) have disabling conditions that interfere with their life activities. The main cause of activity limitations reported was orthopedic impairments accounting for 16% of those who reported these limitations. Deformities of the back or lower extremities accounted for approximately 86% of those persons reporting deformities or orthopedic impairments. These impairments accounted for a major percentage of restricted activity and bed disability days per year. Slightly more than 50% of all back injuries occur in the 20-44 age group. Population projections indicate that this age group will increase by 3.9% from 2002 to 2020. For some specific technologies a significant proportion of users are under twenty-five years of age: foot orthoses (38%), and leg orthoses (24%). However, users of back orthoses remain the largest category with 34% in the age group 25-64 years of age.

Approximately 20.3% of individuals with complete or partial paralysis of extremities use orthoses. Of those with paralysis, 27% are 45-64 years of age and 40% are 65 years or older. This proportion of the population will increase significantly after 2010 as the Baby Boomers reach ages 46-64.

In 1990, 3,514,000 persons in the United States were using some kind of orthosis. The number of users of orthoses more than doubled between 1980 and 1990. According to the 2000 AOPA Business Report, in 1999, spinal orthoses accounted for 27% of sales of all orthotic devices, and lower limb orthoses accounted for 68%. The increase in use may be due to improved cost coverage by public programs, reduced costs of technology, and improved design, which has made devices lighter, safer, stronger, easier to use and more attractive.

The incidence of some congenital malformations is decreasing in the United States. The number of infants born with Spina Bifida decreased significantly between 1995-1998, but has remained stable in 1999-2000 at 20.85 cases per 100,000 live births. Although a greater number of children with disabilities requiring orthotic care are surviving, it is not anticipated that this group will change significantly in the next 15 years.

Since many orthotic devices are used by a younger population, it is important to determine the rate of growth in these age groups of the population. Population projections from 2002 to

2020 indicate that the nation's youth, ages 0-19, will decrease slightly from 28% of the population to 26% in 2020. Therefore, increased use of orthotic products will depend more on better technology than population growth. Continued growth in use is likely, though perhaps not at the rapid rate of the early 1990's.

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HEALTH CARE COVERAGE AND REIMBURSEMENT POLICIES

HIGHLIGHTS:

- Reimbursement for technologically advanced products will be increasingly dependent on demonstrating improved quality of life and long term cost-effectiveness.
- Without continuing changes in reimbursement policies, an increasing number of persons are likely to be paying for orthotic/prosthetic products from their own resources.
- An increase in the number of insurers requiring patient care to be provided by an ABC certified orthotist/prosthetist would increase the share of the market and the number of certified practitioners required to meet patient needs.
- In this fluctuating reimbursement environment, research, public relations, and educational efforts are essential to demonstrate the high quality and cost effectiveness of patient care by certified orthotists/prosthetists.

The future of health care coverage in the United States is in a great state of flux. It is difficult to determine the effect both federal and private health insurance programs will have on the future market for orthotists and prosthetists. The impact of managed care on orthotic/prosthetic practice has been significant. Practitioners have expressed concern with the amount of time necessary to demonstrate the need for particular devices potentially compromising their ability to provide effective, individualized care. Although it is helpful to look at the current number of persons covered by these programs, it is difficult to project into the future the effect that coverage will have on orthotic/prosthetic practice.

The extent of coverage is an important issue in planning for the future. Prosthetists and orthotists are well aware that Medicare and some private insurers only cover the basics of orthotic, and particularly prosthetic care. What does this mean for the future? Although an increasing number of technological advances are now available, patients are frequently dependent on their own resources to obtain them. Whether insurers will provide reimbursement for these products will be increasingly dependent on demonstrating cost-effectiveness. An intensive educational and public relations program demonstrating improved quality of life and the long term cost-effectiveness of new technologies may lead to increased coverage.

A key issue which will affect the number of certified prosthetists/orthotists required in the future is reimbursement policies for particular categories of providers. Currently, some insurers, such as Michigan Blue Cross Blue Shield, will cover only those services provided by a certified orthotist or prosthetist. An increase in the number of insurance companies who might make this decision will certainly affect the share of the practice market serviced by certified orthotists/prosthetists, and consequently increase the need for these practitioners.

Current Population Coverage-Under 65 Years of Age

The population under 65 years of age is covered by private insurance or Medicaid, or is without coverage. The percent of the population less than 65 years of age covered by private insurance decreased from 76.9% in 1984 to 72.2% in 2001. The percent of this age group covered by public programs increased from 6.0% in 1984 to 13.4% in 2001, largely as a result of expansions

in the Medicaid program. The percent of persons of all ages with no coverage decreased slightly from 15.4% in 1997 to 14.2% in 2001.

The 2000 AOPA Business Report suggests that private insurers are an increasing source of payment for orthotic and prosthetic services. Sales paid by private insureers increased dramatically from 32.8% to 48.1% from 1998 to 1999. Medicare and Medicaid billings accounted for 34.1% of income in 1999. Self pay, not even a category in 1986, represented 4.2% of sales in 1999.

Current Population Coverage-Over 65 Years of Age

The population over 65 years of age is covered by a combination of Medicare and private insurance, or Medicare only. The proportion of this age group using a combination of Medicare and private insurance decreased from 75.1% in 1994 to 64.1% in 1999. The Medicare only group increased dramatically from 14.8% in 1994 to 26.3% in 1999 indicating a growing dependence on federal programs.

Regional Differences

In 1999, the proportion of the population without health care coverage varied among individual states from 8-25%. States with relatively low percents of uninsured persons (less than 14%) were more likely to be located in the New England, East and West North Central geographic divisions.

DATA SOURCES: HEALTH CARE COVERAGE AND REIMBURSEMENT POLICIES

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KEY POPULATION TRENDS

HIGHLIGHTS:

- By 2010 the Baby Boom population will be between the ages of 46-64 creating a rapid increase in the proportion of the population at highest risk for those diseases/disabilities requiring orthotic/prosthetic care.
- By 2020 the Baby Boom population will be between the ages of 56-74 creating a large proportion of the population at continued risk for those diseases/disabilities requiring orthotic/prosthetic care.
- The population of youth and young adults will remain essentially the same until 2020 when this proportion of the population will decrease slightly.
- The population of youth and young adults will remain essentially the same until 2020 when this proportion of the population will decrease slightly.
- A greater number of certified prosthetists will be required in Florida and California where the largest number of elderly will be located.
- A greater number of certified orthotists will be required in the West region where the highest proportion of youth and young adults will be located.

Youth Population

Short term projections (2005-2010) indicate that the Nation's youth, ages 0-19 years, will remain at about 28% of the total population. The geographic regions of the United States show some variation over the projected period. The West is projected to have the largest proportion of its population under 20 years of age (30%) in comparison with the smallest in the Northeast (27%). The Midwest and South regions would be in the middle (29%). Long term trends, 2010-2020, indicate that the youth population will decline as a fraction of the total population to 26%. The West will continue to have the highest proportion of population under 20 years of age (28%), while the Northeast will have the smallest (25%).

Elderly Population

Short term trends for the proportion of elderly, aged 65 years and over, indicate an increase of less than one percentage point. However, by 2020, the proportion of elderly will have grown from 12.6% to 16.5%. The Northeast is expected to have a high proportion of elderly at 14% while the West will have the lowest at 11%. Both the Midwest and the South are projected to have a 13% increase in the elderly population. In 2000, Florida had the largest proportion of elderly (20%) of any state.

Long term trends indicate that the size of the elderly population will increase in all states. The population 65+ is expected to double in the top eight states with the fastest growing elderly population (Nevada, Arizona, Colorado, Washington, Georgia, Utah, Alaska, California). These states are projected to have an annual rate of change of two percent or greater during 1993-2020. The aging of the Baby Boom population after 2010 will have a dramatic impact on the growth of the elderly population. By the year 2020, the survivors of the baby boom will be between the ages

of 56 and 74 creating a substantial increase in the need for certified orthotists/ prosthetists. During the period 2010 to 2020 all the states will show a rapid acceleration in the growth of the elderly population. Most of the projected growth of the elderly population is concentrated in the West and the South.

DATA SOURCES: KEY POPULATION TRENDS

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CERTIFIED ORTHOTISTS/PROSTHETISTS: CURRENT NUMBERS AND PROJECTED DEMAND

HIGHLIGHTS:

- Even with a ten percent increase in graduates in the year 2005 and in 2010, the number of prosthetists and orthotists available will be unable to serve the total population of persons with these impairments.
- The total number of persons with paralysis, deformity, or orthopedic impairments is expected to increase by 25% by the year 2020.
- The number of persons using orthoses is expected to increase by at least 31% by the year 2020.
- Without an increase in graduates, the projected number of orthotists available in the year 2010 will be able to serve only 61% or less of the population using orthoses.
- The number of orthosis users who can be served by the projected number of orthotists increases minimally until the year 2020, but remains less than 62%.
- With a ten percent increase in graduates in the year 2010, and another ten percent increase in 2015, the projected number of orthotists available in 2020 will be able to serve only 64% or less of the population using orthoses.
- The total number of persons with an amputation, and those using a prosthesis, is expected to increase by at least 47% by the year 2020.

- Without an increase in graduates, the projected number of prosthetists available in the year 2010 will be able to serve only 66% or less of the population using prostheses.
- The number of prosthesis users who can be served by the projected number of prosthetists decreases to 64% in the year 2020.
- With a ten percent increase in graduates in the year 2010, and another ten percent increase in 2015, the projected number of prosthetists available in 2020 will be able to serve only 66% of the population using prostheses.
- A dramatic increase in the older age groups after the year 2015, a reflection of the aging Baby Boomers, will significantly increase the demand for both orthotists and prosthetists.

I. CERTIFIED ORTHOTISTS/PROSTHETISTS

In April, 2002, there were 3,580 ABC certified practitioners. Of this total number 32% (1,160) were certified orthotists; 32% (1,147) were certified prosthetists, and 36% (1,275) were certified in both disciplines. The age distribution of this group (Table I) indicates that 80% are below 55 years of age. However, a significant proportion of the group is 55 years of age or older (20%) and likely to retire within the next ten years.

Currently, there are seven accredited programs offering education in orthotics and/or prosthetics leading to ABC certification. These programs graduate approximately 180 students annually. A greater number of these programs are located in the West (three) with two in the Midwest and only one in the Southwest and Northeast. Thus, large areas of the country are lacking convenient access to orthotic/prosthetic educational programs. This becomes of greater concern when long term population projections indicate high areas of future need in the South and the West. The population 65+ is expected to double in the top eight states with the fastest growing elderly population (Nevada, Arizona, Colorado, Washington, Georgia, Utah, Alaska, and California). In spite of the addition of one new program, the average number of graduates dropped from 1994-2001. Assuming that 1) 80% of the anticipated graduates actually become certified; 2) 95% are in clinical practice, and 3) two percent of the group retire annually, by the year 2010 there will be 4,068 certified orthotists and/or prosthetists (see Table III). With a ten percent increase in graduates in the year 2010 and again in 2015, by the year 2020 there will be 4,757 certified practitioners. Even with this projected growth in numbers of certified practitioners, the number will not be sufficient to meet the needs of the projected population at risk.

II. PROJECTED DEMAND FOR ORTHOTIC CARE

The projected number of persons with paralysis, deformities, or orthopedic impairments is based on rates by age group and sex determined in the 1993 Health Interview Survey. These projections (Table IV) assume that the rates will remain stable through the year 2020. The total number of persons with these impairments is expected to increase by 25% between 1995 and 2020. Of this total number of persons with impairments, 20.3% of persons with paralysis, and 16.2% of persons with orthopedic impairments are estimated to use orthoses. The population using orthoses is expected to increase by 31% between 1995 and 2020. However, other data suggests that the num-

ber of persons using orthoses is increasing at a higher rate due to improved designs and reduced costs. Thus the percent of persons using orthotic devices may actually be higher in future years than the estimates used in these calculations. In addition, these calculations do not include other categories frequently requiring orthotic care such as sprains, fractures and dislocations. Thus the estimates of the population requiring orthotic care are likely higher than this data indicates.

Assuming that the average patient using an orthosis visits an orthotist once every four years, the projected annual number of patients per certified orthotist is 840 in 2005 and 807 in 2020. (Table V). If the maximum number of patients which can be seen by an individual orthotist annually is 500, the anticipated number of certified orthotists will not be sufficient to meet the needs of this population. With a ten percent increase in graduates in the year 2010, and an additional ten percent increase in 2015 there will be 776 patients per certified orthotist in 2020. Without an increase in the number of graduates, the projected number of orthotists available in the year 2010 will be able to serve only 61% or less of the population in need of orthotic care (Table VI). Between the years 2010 and 2015 the effect of the aging of the Baby Boomers becomes apparent. The projected number of orthotists available in 2020 will be able to serve only 62% of the population in need of orthotic services. Although the percent of the population which can be served by the projected number of orthotists increases slightly, it is clear that at the current rate of graduation certified orthotists will be unable to meet the needs of a large segment of the population.

III. PROJECTED DEMAND FOR PROSTHETIC CARE

The projected number of persons with amputations (excluding tips of fingers and toes) is based on rates by age group and sex determined in the 1993 Health Interview Survey. These projections (Table VII) assume that the rates will remain stable through the year 2020. The total number of persons with an amputation is expected to increase by 47% between 1995 and 2020. Of the total number of persons with amputations it is estimated that 75% use a prosthesis. The population using a prosthesis is also anticipated to increase by 47% during this time period. With the advent of improved prosthetic designs and lighter materials it is likely that the rate of use may increase, particularly if third party payers become more aware of the benefits of these products.

Assuming that the average patient using a prosthesis visits a prosthetist once every two years, the projected annual number of patients per certified prosthetist is 379 in the year 2005 and 391 in the year 2020 (Table VIII). If the maximum number of patients which can be seen by an individual prosthetist annually is 250, the anticipated number of certified prosthetists will not be sufficient to meet the needs of the population with amputations. With a ten percent increase in graduates in the year 2010, and an additional ten percent increase in the year 2015, there will be 385 patients per certified prosthetist in 2015. Without an increase in graduates, the projected number of prosthetists available in the year 2015 will be able to serve only 65% of the population in need of prosthetic care (Table IX). Between the years 2015 and 2020, the effect of the aging of the Baby Boomers becomes apparent in a slight decline in the percent of persons with amputations who can be served by the projected number of certified prosthetists. The percent of the population which can be served by the projected number of certified prosthetists decreases between 2005 and 2020. At the current rate of graduation certified prosthetists will continue to be unable to meet the demand of the increasing numbers of persons with amputations.

In summary, with the current rate of graduates it will not be possible for certified orthotists and prosthetists to serve the total projected population with these impairments. With a ten percent increase in graduates in the year 2010, and again in 2015, certified practitioners may serve a larger

percentage of those in need, but there will continue to be a serious deficit. After the year 2020, the deficit is likely to increase dramatically as the surviving Baby Boomers reach the age groups at greatest risk for these impairments. Additional educational programs need to be planned now to provide the necessary numbers of certified practitioners for effective, individualized care in the future.

IV. THE EFFECTS OF POPULATION TRENDS

Population projections for the years 2000 through 2020 indicate slowing growth (Table X). Between 1995 and 2000 the population grew at a rate of 4.9%, but between 2015 and 2020 the population is expected to grow at a rate of only 4.0%. However, during these years the proportion of the population in the age groups at highest risk for orthotic or prosthetic care is projected to increase (Table XI). In 1995, the proportion of the population 45 to 64 years of age was 19.5%, and the proportion of the population 65 to 85+ years of age was 12.8%. In 2020, the proportion of the population 45 to 64 years of age is expected to grow to 25%, and the proportion of the population 65 to 85+ years of age is expected to increase to 18.6%. In actual numbers, there is an anticipated increase from 2002 to 2020 of 23.8% in the 45 to 64 year age group, and an increase of 71.4% in the 65 to 85+ year age group (Table XII). The increase in these age groups is primarily a reflection of the aging of the Baby Boomers who will be between the ages of 56 and 74 in 2020. This increase in the age groups at greatest risk for orthotic and prosthetic care is a key factor in planning for future needs. By the year 2020 the demand for both orthotists and prosthetists is likely to increase significantly.

DATA SOURCES: CERTIFIED ORTHOTISTS/PROSTHETISTS: CURRENT NUMBERS AND PROJECTED DEMAND

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MODEL: Number of ABC Certified Practitioners Available, 2002-2020

Assumptions:

1. Annual retirement rate will be two percent.
2. Eighty percent of graduates become certified (estimated based on average graduate/certification ratio from current programs 1 1/2 years post-graduation).
3. Ninety-five percent of certified practitioners provide patient care.
4. Annual number of graduates will remain constant through 2020.
5. Projections which increase the number of graduates are based on a ten percent increase in graduates in 2010, and an additional ten percent increase in the year 2015.
6. Fifty percent of certifees are practicing orthotics, fifty percent are practicing prosthetics (In 2002, 32% were certified orthotists; 32% were certified prosthetists, and 36% were certified in both disciplines).

MODEL: Population Requiring Orthotic Care, 2002-2020

Assumptions:

1. Rates of paralysis, deformity, or orthopedic impairment by age groups will remain constant. Rates are by age group and sex based on data in *Current Estimates for the National Health Interview Survey*, 1993. National Center for Health Statistics 10 (190). 1994.
2. Estimated number of persons with paralysis using an orthotic device (20.3%), and the estimated number of persons with deformity or orthopedic impairment using an orthotic device (16.2%) determined by population age group based on data from the National Center for Health Statistics, will remain constant.

3. Population projections by age group and sex are based on data from *Current Population Reports, Population Projections for States by Age, Sex, Race, and Hispanic Origin:1993-2020*. U.S. Department of Commerce, Bureau of the Census ; and *Projections of the Total resident Population by 5-Year Age Groups, and Sex with Special Age Categories*. U.S. Dept.of Commerce, Bureau of the Census. 2002.

4. The average orthotic patient visits practitioner once every four years.

5. Projections do not include data on persons with unquantifiable conditions such as fractures, sprains, and other conditions potentially requiring the care of an orthotist. Therefore, the population requiring this care is likely even higher than used in projections.

MODEL: Population Requiring Prosthetic Care, 2002-2020

Assumptions:

1. Rates of amputation (excluding tips of fingers and toes) by age groups will remain constant. Rates are by age group and sex based on data in Current Estimates for the National Health Interview Survey, 1993. National Center for Health Statistics 10 (190). 1994.

2. Estimated number of persons with an amputation using a prosthesis (75%) estimated from data in 1) Current Estimates for the National Health Interview Survey, 1993 ; 2) Scremin, A.M. et al. Effect of Age on Progression Through Temporary Prostheses After Below-Knee Amputation. *Am. J. of Phys. Med. and Rehab*, 1993, and 3)Nielsen, C.C. A Survey of Amputees: Functional Level and Life Satisfaction, Information Needs and the Prosthetist's Role, JPO, 1991.

3. Population projections by age group and sex are based on data from Current Population Reports for States by Age, Sex, Race, and Hispanic Origin:1993-2020. U.S. Dept. of Commerce, Bureau of the Census; and Projections of the Total resident Population by 5-Year Age Groups, and Sex with Special Age Categories. U.S. Dept.of Commerce, Bureau of the Census. 2002.

4. The average prosthetic patient visits the prosthetist once every two years.

DATA LIMITATIONS

National Health Interview Survey

The National Health Interview Surveys are annual household surveys of a probability sample of the United States population. Rates for the incidence of particular diseases/disabilities/impairments by age group were drawn from these annual surveys. A limitation of this information is that the survey may underreport the actual incidence of some diseases/disabilities/impairments. Respondents may also underreport the use of orthotic or prosthetic devices.

National Hospital Discharge Survey

The National Hospital Discharge Survey is conducted by the National Center for Health Statistics of the Centers for Disease Control and Prevention. The survey collects data on a sample of hospital discharges from a sample of short-stay nonfederal hospitals in the United States. The survey generally samples ~1 percent of discharges from U.S. short-stay hospitals. A limitation of this information is that the survey may underrepresent the incidence of some diseases/disabilities/impairments, and that it does not include federal hospitals. Federal hospitals, particularly those serviced by the Veteran's Administration, are frequently a primary source of care for persons with amputations. To address the limitations of data sources, data used in this study were coordinated from a variety of sources and cross-checked whenever possible.

TABLE I

Age Distribution of Certified Orthotists/Prosthetists, 2002

<u>Years of Age</u>	<u>Number</u>	<u>% of Total</u>
<55	2,904	83.4
55-59	326	9.3
60-64	144	4.1
65-69	49	1.4
≥ 70	58	1.7
Total	3,481*	

* Information unavailable on 99 practitioners

Table II

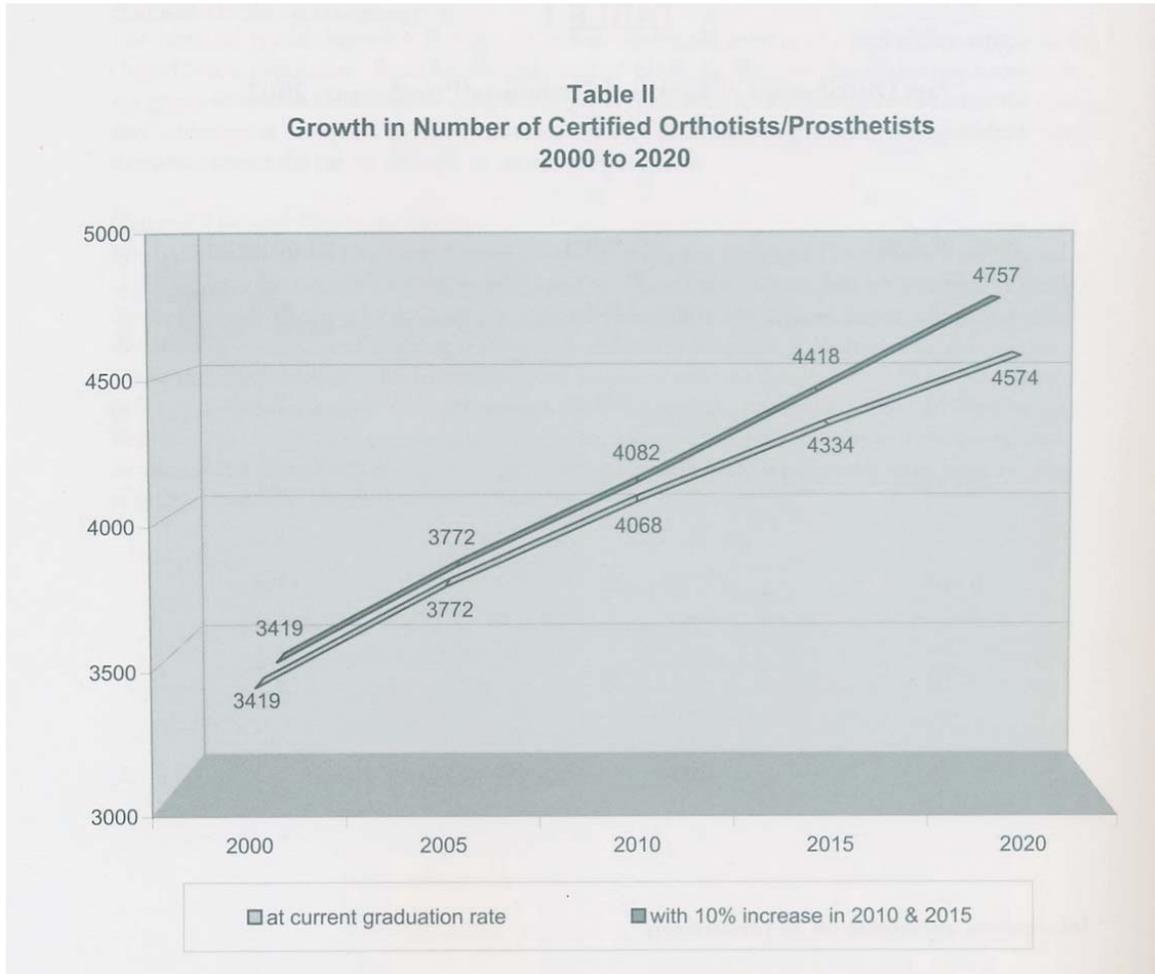


TABLE III

Number of Certified Orthotists/Prosthetists in Clinical Practice, 2002-2020*

<u>Year</u>	<u>At Current Graduation Rate</u>	<u>With 10% Increase in Graduates, 2010 & 2015</u>
2002	3,580	3,580
2005	3,772	3,772
2010	4,068	4,082
2015	4,334	4,418
2020	4,574	4,757

* Assumptions: 80% of graduates become certified; 95% of certified orthotists/prosthetists are in clinical practice; 2% retirement rate

TABLE IV

Projected Number of Persons with Paralysis, Deformities, or Orthopedic Impairments, 2000-2020

<u>Year</u>	<u>Total Number</u>	<u>No. Of Users of Orthoses*</u>
2000	36,389,672	5,975,314
2005	38,595,658	6,338,353
2010	40,823,665	6,705,757
2015	40,973,718	7,050,695
2020	42,824,471	7,382,876

*Based on 20.3% of persons with paralysis, and 16.2% of persons with orthopedic impairments.

TABLE V

Annual Number of Patients Per Certified Orthotist*

<u>Year</u>	<u>At Current Graduation Rate</u>	<u>With 10% Increase In Graduates in 2010 & 2015</u>
2000	835	835
2005	840	840
2010	824	821
2015	813	798
2020	807	776

*Assumptions: 80% of graduates become certified; 95% are in clinical practice; “average” patient visits orthotist once every four years.

Table VI

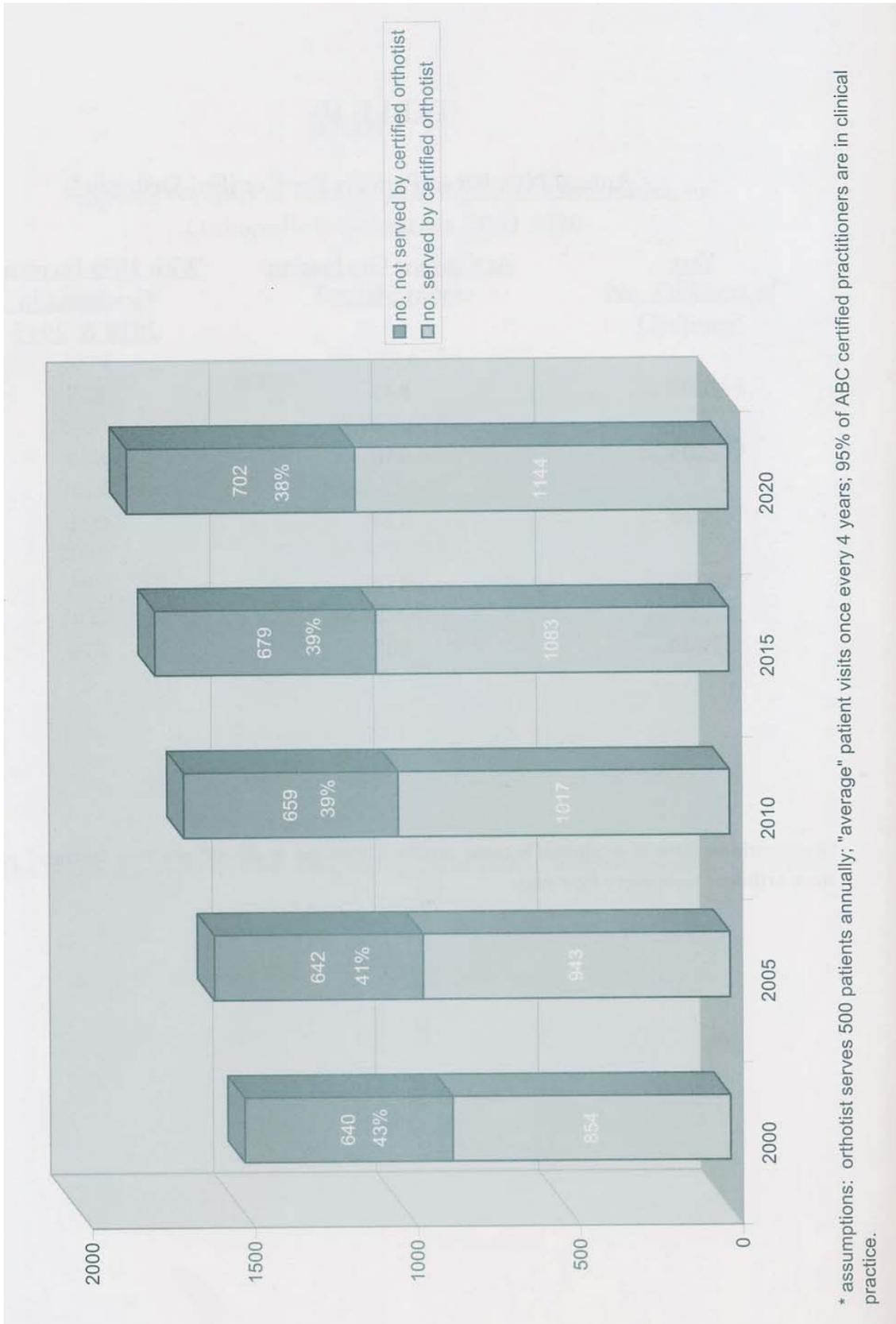


TABLE VII

Projected Number of Persons with Absence of Extremities
(excluding tips of fingers and toes) 2000-2020

<u>Year</u>	<u>Total Number</u>	<u>No. Of Users of Prostheses*</u>
2000	1,752,838	1,314,629
2005	1,904,035	1,428,026
2010	2,065,993	1,549,495
2015	2,224,022	1,668,017
2020	2,382,413	1,786,810

*Based on 75% of total numbers of persons with amputations.

TABLE VIII

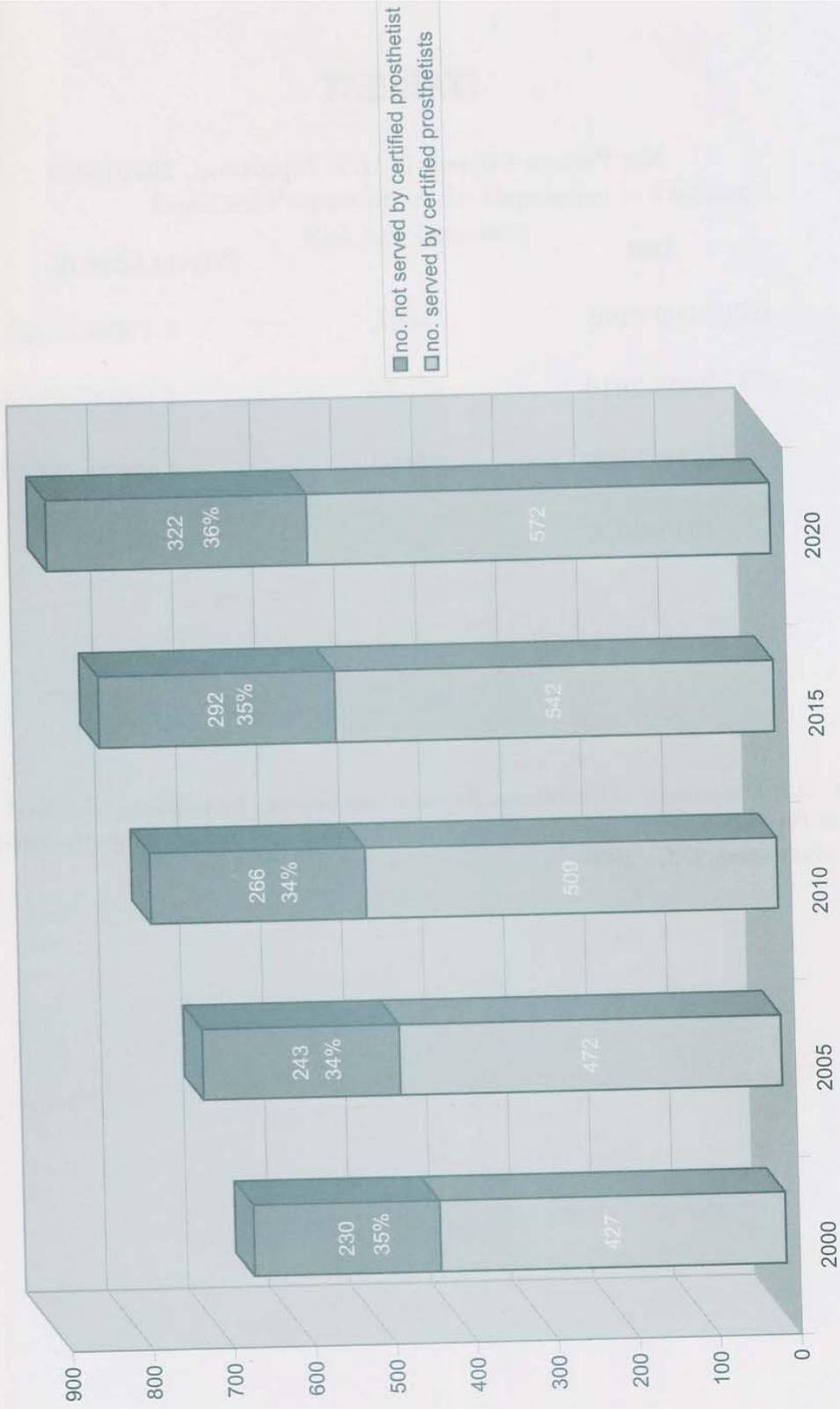
Annual Number of Patients Per Certified Prosthetist*

<u>Year</u>	<u>At Current Graduation Rate</u>	<u>With 10% Increase In Graduates in 2010 & 2015</u>
2000	385	385
2005	379	379
2010	381	380
2015	385	378
2020	391	265

*Assumptions: 80% of graduates become certified; 95% are in clinical practice; 'average' person with amputation visits the prosthetist once every two years.

Table IX

Table IX



*assumptions: prosthetist serves 250 patients annually; "average" patient visits once every 2 years; 95% of ABC certified practitioners are in clinical practice.

TABLE X

Net Percent Growth in U.S. Population, 2000-2020

<u>Year</u>	<u>Percent Growth</u>
2000-2005	4.2%
2005-2010	4.1%
2010-2015	4.1%
2015-2020	4.0%

Source: U.S. Department of Commerce, Bureau of the Census. Projections of the Total Resident Population by Five-Year Age Groups, and Sex with Special Age Categories, Middle Series. Washington, D.C., 2000.

TABLE XI

Projected Proportion of the Population in Highest Risk Age Groups

<u>Age Group</u>	<u>2002</u>	<u>2020</u>
45-64 Years	23.3%	25.0%
65-85+ Years	12.6%	18.6%

TABLE XII

Projected Population Growth in Highest Risk Age Groups, 2002-2020

Population (in thousands)

<u>Age Group</u>	<u>2002</u>	<u>2020</u>	<u>Percent Increase</u>
45-64 years	65,374	80,946	23.8%
65-85+ years	35,303	60,496	71.4%

Source: U.S. Department of Congress, Bureau of the Census. Projection of the Total Resident Population by Five-Year age Groups, and Sex with Special Age Categories, Middle Series. Washington, D.C. 2000.