

Allied Health in Tennessee

Foreword

The allied health workforce is a vital component of the U.S. health care system. The State of Tennessee is fortunate to have individuals with the expertise and interest to monitor the status of allied health in the state. This is particularly important in the current environment where nationally and in Tennessee there is an increased employer demand for graduates and workers in many of the allied health disciplines. By effective monitoring and studies such as this one conducted by Dr. Jo Edwards and her colleagues, more informed policy can result on behalf of decision makers in education and state government and for employers.

Much national attention has been given recently to workforce shortages in a number of the health professions. While concern has been focused on shortages in nursing, the nation's largest health profession, often overlooked is the greater percentage of vacancies in some of the allied health professions. Because other health professionals cannot substitute for the specialized individuals in most allied health areas, the effective functioning of the health care system depends on having the appropriate numbers and mix of allied health professionals to provide essential services to the public.

Due to an aging population with the concomitant need for a greater amount of health care per capita, advances in technology related to health care, increased demands to maintain homeland security requirements, and an increased incidence of chronic health conditions, the allied health workforce is centrally positioned to contribute to the needs of the public. With changes in employment demand and educational preparation and flux in health system dynamics, having a good picture of the allied health workforce in Tennessee is vital to a wide community of interest. Particularly valuable is the comparative perspective afforded by this third in a series of studies on allied health. Those responsible for the study and their contributors are to be commended for their work and vision; the State of Tennessee is well served by these efforts.

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Executive Summary

This study responds to the general question, What is the supply and demand for various allied health personnel in Tennessee in 2003 as compared to the region and the nation? The study provides an update to the trends described in the first and second editions of this book, published in 1993 and 2000. This edition is important because health reform in Tennessee, the implementation of TennCare in 1994, and the Balanced Budget Amendment of 1997 have had significant effects on the demand for certain health care professionals.

As states have faced decreasing resources for higher education, expensive and limited enrollment programs such as allied health have become targets for closure. Data reported by the Southern Regional Education Board (SREB)* indicates a significant decline in the number of allied health and health science graduates from 1995 to 2000. In the U.S. the number of baccalaureate graduates has fallen by 1.7 percent; SREB states have experienced a 3.5 percent increase. However, Tennessee has experienced a 3.6 percent decline during the same period. Associate degrees awarded in the allied health and health sciences have declined 13.9 percent nationally and 14.2 percent in the SREB states. Tennessee has seen a decline of 24.7 percent during the 1995–2000 period. This decline in the number of health care workforce graduates has implications for decreased access to health care by Tennessee residents.

This report provides data and information that will assist institutions and the higher education system in making responsible decisions relative to programming in the allied health field. The report also serves as a career-counseling guide to high schools and health care institutions.

Allied Health in Tennessee: A Supply and Demand Study 2004 shows that recent academic programming initiatives have addressed some of the critical programming needs in allied health care areas that existed in 1993. The shortage of physical therapists trained in Tennessee has been significantly decreased; occupational therapists are now being educated at a rate that balances annual demand.

Allied health professions in which the supply of graduates does not meet current annual demand are:

- respiratory therapy
- health information administration
- health information management
- medical assisting
- surgical technology
- nursing assistance
- EMT-paramedic training
- Medical Imaging: radiography, diagnostic medical sonography

Allied health is the largest and most diverse constituency within the nation's health care workforce according to the U.S. Department of Health Resources and Services Administration (HRSA, 1999). More than 60 percent of United States health care workers are classified under allied health in more than 200 occupational categories. For this study, 26 occupations were grouped into three of the occupational clusters as identified by the National Health Care Skills Standards Project. (Far West Laboratory, 1995): therapeutic, diagnostic, and information services. The other cluster, environmental services was not included.

In Tennessee, public institutions are providing large numbers of allied health care providers. With the rapidly changing context of health care delivery and services, educational institutions and healthcare employers will need to employ a variety of sources of data as they review and jointly plan academic programming in the allied health fields to meet Tennessee needs.

* The Southern Regional Education Board links leaders and agencies that are working on similar issues throughout its member states. The SREB covers 16 states: Alabama, Arkansas, Delaware, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia.



Section 1

Introduction

Background

The allied health field is multidisciplinary, and the choices of scope and methodology made by the authors are described in this section. The background describes the objectives, rationale, scope, and methodology of the study and the organization of the report. Allied health supply and demand data are not always comparable for the various professions, and some sources of data are not widely available.

Objectives of the Study

This report is the third edition of a study requested in 1993 by the chancellor of the Tennessee Board of Regents to determine the supply and demand for allied health programming in Tennessee. A task force of TBR allied health faculty and staff members (see Appendix D for a list of task force members) was charged to develop the original report. Many changes have occurred since the original report in 1993, most notably the implementation of TennCare. A reassessment of the supply and demand for allied health professions in Tennessee in 2000 and again in 2003 provides an opportunity to look at trends. Many of the same data sources were used for this and the second edition; new sources have been added as they have become available.

Allied health is a high-cost area that has significant implications for the quality of life of Tennessee citizens. In times of fiscal constraint, changing demographics, and technology, public postsecondary institutions and their partners in the healthcare industry must carefully plan to meet public need and expectations for improved health care.

What Is Allied Health?

The designation of allied health professional encompasses individuals in health care settings who provide diagnostic, therapeutic, informational, or environmental services. They “are responsible for making the apparatus of the health care system work when and where physicians and nurses call on it” (Hidden Health Care Workforce, 1999). Many times, allied health professionals have extended contact with patients and play a crucial role in producing positive health outcomes.

This report is being made available generally in the belief that it will be of interest to others involved in the education, training, and employment of allied health professionals and that it will be a resource for career counseling and advisement. The report describes the employment status of various allied health professions at the national, regional, and state levels; provides current supply information at the state level; identifies areas of need; and gives general state and national employment projections.

The recommendations following the analysis of supply and demand are not definitive since data sources are often not in agreement and factors that affect supply and demand in the health care field are varied and changing. Constant monitoring of external conditions and constraints is necessary to ensure that academic programming is responding to student, marketplace, and societal needs. The report identifies sources of data that institutions can use as they assess program need.

Rationale for the Study

Health reform has had significant effects on programs that prepare health professionals. The increased use of nurse practitioners and physician assistants to provide primary care is a good example of the impact of the changing health care management system. Delivery systems, payment systems, and levels of care required by federal and state programs all affect the demand for various health care disciplines and the levels of training required for them.

The implementation of TennCare had a tremendous impact on allied health. When the state's Medicaid beneficiaries were switched to a managed care system in 1994, 50 percent more individuals could be covered for the same cost. TennCare rolls expanded and universal coverage was promised. Managing the growth has been and will continue to be a challenge for TennCare. The growth in numbers of individuals served without a correlating increase in the budget has had an impact on all health care workers and specifically on allied health professionals.

A California workforce project prepared by the University of California at San Francisco revealed that allied health professionals are being affected more than other health care workers by the

changes in the health care system. Tennessee is experiencing some of the same problems California has had in maintaining proper training of an allied health work force in a rapidly changing health care environment. As in California, educators in Tennessee are having difficulties providing future workers with the appropriate skills. What is happening? Allied health workers are being asked to be more flexible and to perform a variety of tasks (multiskilling) and educators are challenged to keep the curriculum up-to-date in an environment of constant change.

These academic studies are relevant because they often influence state policy decisions and workforce initiatives. In 1989 a Tennessee Board of Regents study, "Nursing in Tennessee," demonstrated a shortage of nursing personnel, and the system responded by approving additional programming. Since 1989 both enrollments and the number of graduates from health programs have nearly doubled. Much of this growth has occurred at the two-year institutional level. In 2002 the Tennessee Hospital Association (THA) received federal funding to initiate The Center for Health Workforce Development in Tennessee. The center was established to achieve an abundant, competent, and motivated health care workforce through statewide collaborations, strategies, and solutions. The Center for Health and Human Services at MTSU, which produces this report, and The Tennessee Center for Nursing are part of the advisory committee of the Center for Health Workforce Development (www.healthworkforce.org).

In the allied health area, Tennessee offers more than 139 accredited programs at all levels, from area vocational technical schools to two- and four-year schools (see Appendix A for listing of programs by school). These programs are both credit and non-credit and range from certificate to doctorate levels. Some programs are based on a partnership model with clinical instruction delivered by other educational and medical institutions outside the system.

Scope of the Study

The study covered selected occupations in the allied health field that were grouped into three health care and occupational clusters as identified by the National Health Care Skills Standards

Project (Far West Laboratory, 1995). “Therapeutic” professionals provide treatment and work on maintaining and/or changing patient health status over the long term; “diagnostic” professionals create a picture of client health at a single point in time; and “information services” professionals document client care. Each allied health profession included in this study is included in one of these clusters according to primary function.

Therapeutic Cluster

The **rehabilitation field** includes physical therapy, occupational therapy, physical therapy assisting, occupational therapy assisting, athletic training, recreational therapy, speech-language pathology and audiology, respiratory therapy, and nutrition/dietetics.

The **medical assisting field** includes medical assistant, surgical assistant, and nursing assistant.

The **emergency medical** field includes three classes of emergency medical technicians: basic, intermediate, and paramedic.

Diagnostic Cluster

The **medical imaging field** includes diagnostic radiologic technology, radiation therapy, nuclear medicine technology, and diagnostic medical sonography.

The **clinical laboratory services field** includes clinical medical technology, clinical medical laboratory technology, and phlebotomy.

The **dental services field** includes dental hygienist, dental assistant, and dental laboratory technician.

Health Information Services Cluster

The **health information services field** includes health information administrators, health information managers (formerly medical records administrators and managers), and medical transcriptionists.

Projected growth was predicted in some occupational areas although factors used to predict future growth—such as repayment systems and level of access—are rapidly changing.

The supply and demand information presented in this report will be useful as a student counseling guide as well as a guide for

higher education. Labor market factors such as supply and demand are only one part of the academic program planning and decision-making process. Allied health programming must be evaluated in the context of an institution's overall mission. As an institution pursues its academic goals, a number of factors must be analyzed and considered including a variety of academic programming needs; student interests; the availability of qualified faculty; accessibility to appropriately equipped classrooms, laboratories, and clinical education sites; accreditation fees and other recurring costs; and the program mix of the institution.

Methodology

This section presents the five research questions that guided the study and briefly describes the supply/demand data sources that were used.

Research Questions

1. What is the supply of selected allied health personnel from Tennessee schools?
2. What is the demand for various allied health care professionals in Tennessee?
3. What is the relationship between the Tennessee supply and the regional and national supply of allied health professionals?
4. What is the relationship of the Tennessee demand to the national demand?
5. If the demand is greater than the supply, what are the recommendations to address this situation?
6. Where can students be directed for health career planning?

The answers to the first four questions are found in the occupational report. The recommendations given in answer to question 5 are found in the status summaries. The references and appendices respond to question 6.

Issues Surrounding Allied Health Supply and Demand Studies and Data

As the Institute of Medicine (1989) study noted, the allied health field “comprises occupations with varying labor market characteristics,” including levels of education and responsibility, work sites, paths of entry, wages, and job titles and descriptions; therefore, each occupation must be considered separately. The diversity of the fields and the lack of federal investment in establishing national databases contribute to the lack of consistent national data (IOM, 1989, p. 445). Although several projects have been initiated to address these data issues, such as the Hidden Health Care Workforce, 1999; the Health Professions Workforce Data Collaborative Project, 1999; and the 2001 funding of four regional Centers for Health Workforce Studies by HRSA (<http://bhpr.hrsa.gov/healthworkforce>), these observations still hold true in 2003.

Demand, if expressed as “need,” quickly becomes a qualitative question. For example, how many respiratory therapists are “needed” to provide a “quality” level of health care for Tennesseans is a different question than how many respiratory therapy positions are currently available. The definition of demand as identified by The Source, Tennessee Department of Labor and Workforce Development was used instead of attempting to survey need. Demand was determined by looking at the growth rate and job openings expected. Demand was also determined in some fields by hospital vacancy rate data.

As with previous editions, this study (1) used primarily existing data, (2) selected several allied health fields to study in depth, (3) identified “demand” rather than “need” in looking at health care, and (4) took into account general trends and available data to make a “best guess” at recommendations for programming and student recruitment.

Description of Supply and Demand Data Types

The description of national, regional, and state data sources is intended to assist the reader in evaluating the data. Institutions and others who would consider proposing additional programming in this area may use these sources. Counselors for career guidance can use it for students; human resource offices can use it to identify potential sources of graduates.

While the information contained in this document will be useful to institutions as they consider program planning, other considerations must also be a part of the process. Regional and service area needs assessments must be made to ensure a long-term demand for program graduates. The authors urge institutions to make use of the data sources identified to help assess need. Local surveys of employers, careful attention to technological advances, and tendencies of local populations to avail themselves of health care opportunities must also be considered.

All data sources in supply and demand studies have strengths and weaknesses. No single source should be used as a determining or deciding factor. To increase reliability and validity, a variety of sources must be considered in this type of study, and conclusions should be made based on aggregate information from within an occupational area and across several areas.

Occupations Not Included in This Study

Public health, health services administration, opticians, community health education, music therapy, cardiopulmonary technology, orthotic/prosthetic, pharmacy assistant, substance abuse, and environmental health are areas that may be considered allied health, but they are not included in this study. We have excluded the pre-professional categories such as pre-medical because students often transfer to other institutions for professional programs.

The background features a stylized globe with several white curved arrows indicating a clockwise flow. The globe is rendered in a light gray tone against a white background. The arrows vary in length and curvature, creating a sense of movement and interconnectedness.

Physical Therapy
Physical Therapy Assistant
Occupational Therapy
Occupational Therapy Assistant
Athletic Training
Recreational Therapy
Speech Language Pathology
Audiology
Respiratory Therapy
Nutrition/Dietetics

Therapeutic Cluster

Section 2

I. Rehabilitation Professions

Rehabilitation professions include physical therapy and physical therapy assistant; occupational therapy and occupational therapy assistant; athletic training; recreational therapy; speech-language pathology and speech-language pathology aides, and audiology; and respiratory therapy and respiratory therapy technician; and dietitian and dietetic technician.

Status

- Tennessee demonstrates a shortage of respiratory therapists. The supply continues to fall below the annual demand.
- In Tennessee, the supply and demand for occupational therapists is roughly in balance; the supply of occupational therapist assistants exceeds the demand.
- Supply and demand is nearing a balance for both physical therapists and physical therapist assistants, although conversion to the Doctor of Physical Therapy may change the supply/demand ratio.
- The supply of audiologists is likely to grow faster than the demand, but the demand for speech-language pathologists is likely to increase, according to Bureau of Labor Statistics (BLS) data. Tennessee continues to employ speech-language pathologists (SLP) at a lower rate than the nation.

Description

The therapy occupations share a common set of duties and responsibilities all revolving around the treatment and rehabilitation of patients. Specifically, therapy professionals treat and rehabilitate patients with physical and mental disabilities or disorders, develop or restore functions, prevent loss of physical capacities, and maintain optimum performance.

Practitioners in these occupations use a variety of treatment modalities. In physical and respiratory therapy, these treatments

include exercise, massage, heat, light, water, electricity, and specific therapeutic apparatuses. Therapists may participate in medically oriented rehabilitative programs including educational, occupational, and recreational activities.

The medical therapy occupations include audiology, speech pathology, occupational therapy, physical therapy, occupational therapy assisting, physical therapy assisting, respiratory therapy, respiratory therapy technology, and athletic training.

For the purposes of this section, these occupations are grouped as follows: (A) physical therapists and physical therapist assistants; (B) occupational therapists and occupational therapy assistants; (C) athletic training; (D) recreational therapists; (E) speech-language pathologists and aides and audiologists; (F) respiratory (care) therapists and respiratory therapy technicians; and (G) dietitian and dietetic technician.

A. Physical Therapy and Physical Therapy Assistant

Description

The field of physical therapy requires the evaluation and treatment of patients with movement dysfunctions such as those resulting from accidents, trauma, stroke, multiple sclerosis, cerebral palsy, nerve injuries, amputations, fractures, arthritis, and heart and respiratory diseases. Treatment is designed to relieve pain, improve functional mobility, maintain cardiopulmonary functioning, and limit the disabilities of people suffering from these injuries or diseases.

Physical therapists (PT) evaluate and treat patients with the goal to prevent, detect, eliminate, or minimize pain and physical dysfunction. Physical therapists provide inpatient, outpatient, and community-based services for patients and educate family members to provide therapy at home.

Physical therapist assistants (PTA) provide physical therapy services under the direction and supervision of a physical therapist. Under supervision, physical therapist assistants treat patients according to a plan of care, train patients in exercises and activities of daily living, use special equipment, administer modalities and

other treatment procedures, and report to the physical therapist on the patient's response.

Physical therapist and physical therapist assistant positions exist in a variety of settings and facilities. Individuals may work in rehabilitation, community health, industry, sports, research, education, or administration.

Educational Preparation

Professional preparation for physical therapists is typically obtained in master's or doctoral degree programs accredited by the American Physical Therapy Association's Commission on Accreditation in Physical Therapy Education. In 1998 Tennessee's state supported programs in physical therapy were converted to entry-level master's programs and by 2003 three programs have converted to doctor of physical therapy (D.P.T.) programs. Nationally in 2002, all physical therapy programs were required to offer master's or doctor of physical therapy degrees. As of July 2002, 85 physical therapy programs nationally have documented their intent to convert to the D.P.T. Physical therapists must also pass a licensure examination before practicing.

Physical therapist assistants receive training from associate degree programs that are accredited by the Commission on Accreditation in Physical Therapy Education.

National Supply and Demand

Bureau of Labor Statistics (BLS) data for 2000 indicates that physical therapists held about 132,000 jobs nationally, with almost two-thirds of them being in hospitals or physical therapist's offices. One in four physical therapists worked part-time. The number of jobs is greater than the number of practicing physical therapists because some physical therapists hold two or more jobs. For example, some may work in a private practice but also work part-time in another health facility.

The Balanced Budget Amendment of 1997 has resulted in cutbacks in physical therapists' hours in skilled nursing facilities and home health care. The change in reimbursement regulations has slowed the demand for physical therapists, resulting in a moderation of the earlier predictions of long-term shortages.

Reimbursement issues and the proliferation of physical therapy programs are part of the formula used by the American Physical Therapy Association (APTA) to predict the surplus. In 2003 there are 204 accredited physical therapy programs with an additional 7 under development and 247 accredited physical therapy assistant programs. This is a significant increase from 143 total programs in 1991 and only 48 in 1970 (APTA). The number of physical therapists grows at an annual rate of 5 percent; however, the conversion to the D.P.T. may result in fewer graduates per year.

Even with these changes, physical therapy still offers very good job opportunities nationwide, and employment is expected to increase faster than the average. According to the Bureau of Labor and Statistics Occupational Outlook Handbook, the elderly population, which has a high rate of illness and disabilities that require therapeutic intervention, continues to grow. The baby boomers are entering the stage of life where heart attacks and stroke often occur. In addition to clinical work, many therapists are increasingly taking on supervisory roles.

Regional Supply and Demand

The Health Professions Education Directory, published by the American Medical Association, lists 57 accredited physical therapy programs in the Southern Regional Education Board (SREB) region in 2003. Nationwide, physical therapy programs have shifted from bachelor's level to master's level training. One hundred forty programs now offer the master's degree in physical therapy (M.S./M.P.T.), and 64 programs offer the D.P.T. Tennessee is also following this trend.

TABLE 2.1

Accredited Physical Therapy Programs in SREB and U.S.

	1994	1998	2000	2003
SREB	41	48	—	57
U.S.	142	171	177	204

Source: SREB Dat-Ex, 1994, <http://www.apta.org>
 Health Professions Education Directory, 1999, 2003–2004

A review of APTA 2003 data indicates that the SREB region sponsors 58 master's and 3 D.P.T. accredited programs, or 28 percent of the nation's physical therapy programs and 34 percent of the nation's physical therapy assistant programs. The ratio of physical therapist assistants to physical therapists remains higher than other regions in the country.

State Supply and Demand

The Tennessee Department of Employment Security defines supply as the number of graduates from public institutions and demand as the average annual openings. Using these definitions, a comparison of data from 1993 to 1996 indicated an undersupply in physical therapists and physical therapy assistants, prompting programs in Tennessee to increase class size and initiate new programs.

Information from APTA indicates that the market for physical therapists in Tennessee has tightened; although there is still room for growth, the gap between supply and demand has been reduced. APTA issued a position paper stating that the organization "recommends against the development of new physical therapist and physical therapist assistant education programs and the expansion of existing programs until June 2002" (PT Bulletin, July 5, 1999).

The recent move to the master's or doctorate has resulted in fewer graduates during the transition from 187 graduates in 2000 to 97 in 2002. These program changes have served to balance the supply with decreased demand.

Table 2.2

Licensed Physical Therapists and Physical Therapy Assistants

	2000	2001	2002
Licensed Physical Therapists	3,263	3,304	3,409
Licensed Physical Therapy Assistants	1,746	1,772	1,828

Source: TN Dept of Labor and Workforce Development, Employment Securities Division, Research and Statistics Section. "Licensed" refers to the number holding active licenses on Dec. 31 of the year.

In Tennessee, there are four accredited physical therapy programs: three are at state institutions and one is private. Tennessee State University's program is under review for accreditation. The University of Tennessee at Chattanooga, University of Tennessee Health Science Center in Memphis, and East Tennessee State University offer doctoral programs in physical therapy (D.P.T.). Students may gain acceptance into the program after completing the prerequisites. Belmont University is the only private institution in the state that offers a D.P.T. These programs last between 30 and 36 months. The maximum capacity for these programs in Tennessee is 146 students per year. The number of graduates for 2001–02 declined by 48 percent due to a reduction in the number of applicants and the conversion of the programs to the D.P.T.

TABLE 2.3

Tennessee Physical Therapist/ Physical Therapist Assistant Graduates

	1988	1989	1990	1991	1992	1996	1998	2000	2002
PT	38	46	51	84	93	133	130	187	97
PTA	58	49	69	80	111	138	121	150	59

Source: "The Source," *Health Professions Education Directories, 1988–2002*

There are seven physical therapist assistant programs in Tennessee. Programs are located at Chattanooga State Technical Community College, Jackson State Community College, Roane State Community College, South College in Knoxville, Southwest Tennessee Community College, Volunteer State Community College, and Walters State Community College. All offer either an A.A.S. or A.S. degree and last between 18 and 24 months. The number of graduates from PTA programs declined due to decreased student and workplace demand.

Summary

In December 2002 there were 3,409 licensed physical therapists in Tennessee. In 2000 there were 2,320 estimated physical therapy positions in Tennessee. In 2010 that number is projected to be

2,880 with a 2.0 percent growth rate and 60 average annual job openings. The average 10-year openings for physical therapists are about 560. The number of graduates matches the number of annual openings in Tennessee in 2003. Although the number of graduates may balance with the number of new openings, there are nearly 1,100 more PTs than there are existing positions, reflecting professionals who maintain current licensure but are not in the current workforce or who may be practicing in adjacent states.

The supply and demand for physical therapy assistants is nearing a balance, with the number of annual openings matching the number of graduates. In 2000 there were approximately 1,400 physical therapy assistant positions. There were 1,828 licensed physical therapy assistants in 2002. The number of physical therapy assistants is projected to be 1,830 in 2010 with a 3.0 percent growth rate and 40 average job openings annually. The average 10-year openings for physical therapist assistants are about 440. The outlook grading system for clusters of occupations in "The Source," Tennessee Department of Labor and Workforce Development, grades both physical therapy and physical therapy assisting as competitive (grade D), meaning there are fewer job openings than there are trainees.

B. Occupational Therapy and Occupational Therapy Assistant

Description

The field of occupational therapy prepares health care providers who direct patients in activities that are designed to help them learn skills necessary to perform daily tasks, diminish or correct pathology, and promote and maintain health. There are two levels of preparation within the field of occupational therapy: occupational therapists (OT) and occupational therapy assistants (OTA).

Occupational therapists help physically, mentally, and emotionally disabled patients to develop skills that will enable them to live as independently and productively as possible and perform daily activities such as bathing, dressing, cooking, eating, and working.

Occupational therapist assistants work under the supervision of occupational therapists to carry out rehabilitation programs that help disabled persons to learn or regain their ability to lead constructive lives.

Educational Preparation

The Accreditation Council for Occupational Therapy Education (ACOTE) currently accredits programs for preparation of occupational therapists. Basic preparation is offered through the bachelor's degree, post-baccalaureate certificate, or master's degree. Occupational therapists must pass a national certification examination before practicing.

Preparation for occupational therapist assistants occurs primarily in programs offering the associate's degree or certificate from an accredited community college or technical school. This position is different from an occupational therapy aide, in which most of the training occurs on the job.

National Supply and Demand

Occupational therapists work in a variety of settings. Bureau of Labor Statistics (BLS) data show that there were approximately 78,000 jobs nationally for occupational therapists in 2000. More than one-third of occupational therapists work part-time. The largest number of jobs was in hospitals including many in rehabilitation and psychiatric hospitals. Other major employers included offices and clinics of occupational therapists and other practitioners, school systems, home health care services, nursing homes, community mental health centers, adult day care programs, job training services, and residential care facilities. In 2000, one in six occupational therapists held more than one job.

Occupational therapy assistants and aides are projected to be among the ten fastest growing occupations nationwide; however, only a small number of job openings will occur because the occupation is small. In 2000 occupational therapy assistants held 17,000 jobs and aides held 8,500 jobs. Over 30 percent worked in hospitals and about 20 percent worked in nursing and personal care facilities. About 25 percent worked primarily in offices of

occupational therapists. The remainder worked in the offices and clinics of physicians, social service agencies, outpatient rehabilitation centers, and home health agencies.

In 1999 entry-level education was offered in 88 bachelor's degree programs, 11 post-bachelor certificate programs for students with degrees other than occupational therapy, 53 entry-level master's degree programs, 19 combined bachelor's and master's degrees programs, and 2 entry-level doctoral degree programs. The trend is to convert bachelor's degree programs to the post-baccalaureate level. The American Occupational Therapy Association (AOTA) passed a resolution that calls for the essential installation of a postbaccalaureate entry-level requirement for professional OT practice.

In 2003 there were 159 accredited occupational therapy programs and 169 occupational therapy assistant programs nationally. This is compared to 98 occupational therapy programs and 108 occupational therapy assistant programs in 1995.

The outlook for employment as an occupational therapist is good, according to the Bureau of Labor Statistics, due to the medical advances which make it possible for patients with critical problems to survive. Employment is projected to increase faster than the average. Due to industry growth and more intensive care, hospitals will continue to employ a large number of occupational therapists to staff their growing health care and outpatient rehabilitation programs.

Regional Supply and Demand

In 2003 there were 53 active, accredited OT programs in the SREB region. This represented 33 percent of all programs in the nation (159 accredited programs). Historically, the number of graduates from the SREB region represents greater than 26 percent of the nation's graduates in this field.

State Supply and Demand

In 1996 there were 855 occupational therapist positions in Tennessee. In 2000 the estimated employment was 1,380. The projected employment in 2010 is 1,730 with a growth rate of 2.3

percent and 40 average annual openings. The number of average 10-year openings is 350. Licensure information for occupational therapists and occupational therapist assistants is available in Table 2.4.

The same pattern is true for occupational therapist assistants. In 1996 there were 292 positions. In 2000 the estimated employment was 290. The projected employment for occupational therapist assistants in 2010 is 390, which represents a growth rate of 3.1 percent. The number of average annual openings is 10+ and the average 10-year openings are 110. Licensure information is available in Table 2.4.

TABLE 2.4

Licensure Information for Occupational Therapists and Occupational Therapist Assistants in Tennessee in 2000, 2001, and 2002

	Licensed 2000	Licensed 2001	Licensed 2002	Graduates 1999	Graduates 2002
OT	1,287	1,321	1,401	63	86
OTA	595	623	626	41	8

Source: TN Department of Labor and Workforce Development, Employment Sec. Div., Research and Statistics Section, 2003. Health Profession Education Directory, 2000. Health Profession Education Data, 2003–2004.

Tennessee currently has five professional occupational therapy programs. Belmont University offers an M.S. degree and Milligan College offers an M.O.T. (master’s of occupational therapy). These programs last between 30 and 33 months. Tennessee State University, the University of Tennessee at Chattanooga, and the University of Tennessee Health Science Center offer bachelor’s degrees, and these programs last between 24 and 26 months. The program at the University of Tennessee at Chattanooga has been put on notice for closure due to financial cutbacks. The University of Tennessee Health Science Center program is being converted to a master’s entry-level program.

Cleveland State Community College, Roane State Community College, Nashville State Technical Institute, and South College

all offer occupational therapy assistant programs, graduating 38 occupational therapy assistants annually. All offer either A.A.S. or A.S. degrees and last between 20 and 24 months.

Programs preparing occupational therapist assistants combined with in-migration are meeting workforce needs in Tennessee as projected by the OIS. A 1996 study commissioned by the American Occupational Therapy Association indicated that there is a low vacancy rate both nationally and statewide for occupational therapists and no workforce shortages are predicted for the near future. The Tennessee Department of Labor grades OT as B—demand is equal to or greater than supply—and OTA as C—supply somewhat greater than demand.

Summary

The demand for occupational therapy providers has steadily increased over the years. Rehabilitative and long-term care needs are projected to grow due to the aging population, increased chronic debilitating conditions, federal legislation supporting expanded services to the disabled, and increased survival rates for trauma victims and low birth weight infants.

Future growth of this health care specialty will be determined by mental health insurance coverage, the availability of publicly sponsored programs, and the evolution of treatment modalities. However, unless occupational therapy can be established as facilitating early discharge of patients, the services could be to funding cuts if facility-operating margins continue to be threatened. Changes in reimbursement for rehabilitation in long-term care facilities have also reduced demand in this sector.

C. Athletic Training

Description

The certified athletic trainer (ATC) is an educated and skilled professional specializing in the prevention, treatment, and rehabilitation of injuries. In cooperation with physicians and other allied health personnel, the ATC functions as an integral member of the athletic health care team in secondary schools, colleges and

universities, sports medicine clinics, professional sports programs, industrial settings, and other health care environments. In 1990, the American Medical Association recognized athletic training as an allied health profession.

Educational Preparation

A bachelor's degree in athletic training from a National Athletic Trainer's Association (NATA) Commission on Accreditation of Allied Health Education Programs (CAAHEP) accredited entry-level program will be required by 2004 to be eligible for NATA Board of Certification (BOC) examination candidacy. Until 2004 students may be eligible for candidacy either by graduating from an NATA CAAHEP-accredited program or through an internship program. Presently, over 100 colleges and universities offer NATA-approved curricula. The curriculum requires an intense and holistic didactic and clinical component. The clinical component requires practicums within a variety of clinical settings and sports and with physically active individuals of all ages.

Certified athletic trainers assist in the prevention, identification, management, and rehabilitation of injuries to athletes and the physically active population. They have formal training in anatomy, physiology, exercise science, psychology, emergency medicine, kinesiology, and pharmacology.

National Supply and Demand

NATA reports more than 28,166 members with 22,389 certified members nationwide. In 2001 there were 3,566 new members.

Regional Supply and Demand

Regional supply and demand data was not available.

State Supply and Demand

To practice athletic training in the state of Tennessee a person must be NATABOC certified and must pass a Tennessee athletic training licensure examination. Athletic training licensure is obtained through the Tennessee Board of Medical Examiners.

In March 2000 there were 504 licensed athletic trainers in Tennessee. Most athletic training employment in Tennessee is at the university and college level and in sports medicine clinics. Demand is high for athletic trainers in the state's secondary schools. It is estimated that at the national and state levels, the demand will continue to grow. Although professional sports franchised teams are increasing, future employment for ATCs will be in high schools.

The estimated employment in 2000 for athletic trainers in Tennessee was 260. The projected employment for 2010 is 270, representing a 0.7 percent growth rate with less than one average annual opening. In 2000 there were 356 licensed athletic trainers in Tennessee. This is compared to 379 licensed athletic trainers in Tennessee in 2001, and 444 in 2002.

There are four accredited programs in Tennessee, all offering bachelor's degrees. They are at David Lipscomb University, Lincoln Memorial University, Middle Tennessee State University, and Union University.

Summary

With more licensed athletic trainers in Tennessee than employment positions identified and a slow growth rate predicted, the employment outlook for athletic trainers would be improved by combining this certification with other teaching credentials.

D. Recreational Therapy

Description

Recreational therapists, also referred to as therapeutic recreation specialists, provide treatment services and recreation activities to individuals with disabilities, illnesses, or other disabling conditions. Therapists treat and maintain the physical, mental, and emotional well-being of clients using a variety of techniques. Therapists help individuals reduce depression, stress, and anxiety. They also help individuals recover basic motor functioning and reasoning abilities, build confidence, and socialize effectively to enable greater independence and reduce or eliminate the effects

of illness or disability. Recreational therapists should not be confused with recreation and fitness workers who organize recreational activities primarily for enjoyment.

Educational Preparation

According to the BLS Occupational Outlook Handbook, a bachelor's degree in therapeutic recreation, or in recreation with a concentration in therapeutic recreation, is the usual requirement for entry-level recreational therapist positions. Persons may qualify for paraprofessional positions with an associate's degree in therapeutic recreation or a health care related field. An associate's degree in recreational therapy; training in art, drama, or music therapy; or qualifying work experience may be sufficient for activity director positions in nursing homes. There are approximately 160 programs that prepare recreational therapists. Most offer bachelor's degrees, although some also offer associate, master's, or doctoral degrees.

The National Council for Therapeutic Recreation Certification (NCTRC) certifies therapeutic recreation specialists. To become certified, specialists must have a bachelor's degree, pass a written certification examination, and complete an internship of at least 360 hours. Beginning in 2003, however, specialists will be required to complete an internship of at least 480 hours in addition to the degree and examination requirements.

National Supply and Demand

Recreational therapists held about 29,000 jobs in 2000. Almost 40 percent of salaried jobs for therapists were in nursing and personal care facilities and over 30 percent were in hospitals. Overall employment of recreational therapists is expected to grow more slowly than the average for all occupations through the year 2010. Median annual earnings for recreational therapists in 2000 were \$32,520 in hospitals and \$23,240 in nursing personal care facilities.

Regional Supply and Demand

There are 118 colleges and universities that offer academic degrees in recreational therapy or therapeutic recreation. Forty (or 34 percent) of those programs are in the SREB states.

State Supply and Demand

There are two programs offered in recreational therapy in Tennessee: Middle Tennessee State University and the University of Tennessee–Knoxville. State data previously was limited to one program reporting 41 graduates in 2000 and 34 graduates in 2002.

Summary

Although demand data for the state was not available, growth in assisted living and comprehensive long-term care facilities in Tennessee is expected. Therefore, some employment growth is expected in assisted living, outpatient physical and psychiatric rehabilitation, and services for people with disabilities.

E. Speech-Language Pathology, Speech-Language Pathology Assistant and Aides, and Audiologists

Description

Speech-language pathologists assess, treat, and help to prevent speech, language, cognitive communication, voice, fluency, and other related disorders. These health care professionals work with people who cannot make speech sounds, people with difficulty understanding and/or producing language, and those with cognitive communication impairments. They may also work with people who have oral motor problems causing eating and swallowing difficulties.

Audiologists identify, assess, and manage auditory, balance, and other neural systems. They use testing devices to measure the ability of a person to hear sounds and to determine the nature and extent of hearing loss.

The American Speech-Language Hearing Association (ASHA) has developed a voluntary registration program for speech-language pathology assistants effective January 2003. Assistants are not trained for independent practice. Most are in school-based practice.

Educational Preparation

A master's degree in speech-language pathology or audiology is the basic credential in this profession, although there are numerous programs in communication sciences and disorders at the baccalaureate level. At present, graduates of baccalaureate-level programs are permitted to practice in the public school system, nursing homes, and other settings at the assisting level.

Tennessee only recognizes SLP aides, not assistants, and there are no SLPA training programs in the state of Tennessee; however, one community college has begun program development.

Speech pathology and audiology aides must have a high school diploma or equivalent and must receive a minimum of 15 hours of training to be completed within the first 30 days of employment. Supervising licensees must register with the licensing board the name(s) of the aide(s) to be employed accompanied by a written training plan. Licensees must provide direct on-site observation for the first 10 hours of direct client contact. After the first 10 hours, indirect observation of at least 2 in every 10 consecutive clinical sessions with direct observation of at least 1 in every 15 consecutive clinical sessions must be done, with all direct and indirect observations documented.

National Supply and Demand

In 2000 there were 13,000 audiologists and 88,000 speech-language pathologists. Audiologists were more likely to work in independent health care offices; speech-language pathologists worked primarily in school settings. About one-half of speech-language pathologists and audiologists provided services in preschools, elementary schools, secondary schools, or universities. Others were in offices of speech-language pathologists or audiologists; hospitals; offices of physicians; speech, language, and hearing centers; home health care agencies; or other facilities.

The supply and demand for audiologists is currently in relative balance. Looking ahead, it is estimated that the supply of audiologists is growing faster than demand and that the balance will shift in the direction of a surplus (Vector Research, 1999). A primary cause is that the annual number of audiology graduates increased by nearly 50 percent between 1992 and 1996. This results in the number of audiologists growing at nearly five times the rate of the U.S. population. However, 2002–2003 BLS data indicate that speech-language pathology will be among the fastest growing professions in the next decade. The profession ranked among the top 30 out of the 700 occupations expected to be the fastest growing over the next decade.

Nationally, there are approximately 242 colleges and universities that offer graduate programs in speech-language pathology and 112 colleges and universities that offer programs in audiology. Speech-language pathologists can acquire the Certificate of Clinical Competence in Speech-Language Pathology (CCC-SLP) offered by the American Speech-Language-Hearing Association (ASHA) and audiologists can earn the Certificate of Clinical Competence in Audiology (CCC-A). According to ASHA, as of 2007 audiologists will need to have a bachelor's degree and complete 75 hours of credit toward a doctoral degree. As of 2012, audiologists will have to earn a doctoral degree in order to be certified.

In 2002 there were 229 accredited speech-language pathology programs and 107 audiology programs. This is compared to 222 speech-language pathology programs and 120 audiology programs in 1995.

Factors that are affecting employment of speech-language pathologists and audiologists include the 1998 implementation of Medicare’s prospective payment system for nursing homes. Many of the high paying positions were eliminated and school systems benefited from the cutbacks.

Employment of speech-language pathologists and audiologists may grow because the increasing population in older age groups is prone to medical conditions that result in hearing and speech problems.

As of May 2002, ASHA is aware of 30 operational associate degree programs for speech-language pathology assistants and 55 institutions that are considering development of such programs.

Regional Supply and Demand

ASHA provided data presented in Table 2.5 below, comparing the number of certified practitioners in the nation, region, and state. The master’s level is the certification level and the entry level to the field. Nationally as of 2002, there are 30.9 certified speech-language pathologists and 4.3 audiologists per 100,000 citizens. The SREB region has slightly fewer SLPs per 100,000 than the national average (30.0 compared with 30.9); however, the number of audiologists per 100,000 is consistent with the national average.

TABLE 2.5

Certified Personnel per 100,000 Population by Geographic Area and Certification Status

	1992		1996		2002	
	SLP	AUD	SLP	AUD	SLP	AUD
U.S.	20.4	3.6	26.1	4.2	30.9	4.3
SREB	17.2	3.2	25.5	4.3	30.0	4.2
TN	14.8	4.5	22.0	5.2	26.3	5.2

Source: ASHA, *Certified Personnel-to-Population Ratio: Annual Report*
<http://professional.asha.org/resources/factsheets/personnel.lfm>, accessed
 May 2, 2003

Personnel-to-population ratios are a measurement of the number of a given class of personnel in relation to the overall population in a given geographic area. By knowing the personnel-to-population ratio for a state or region we can compare that state or region to other states, regions, or the national average. This information can be used by institutions to support additional educational programming or for career counseling into careers of high demand.

There are three SREB community colleges in North Carolina that currently offer the technical training program for speech-language pathology assistants. Several other SREB states are developing similar programs, but no SREB program has been approved by ASHA.

State Supply and Demand

In 2000 the estimated employment of speech-language pathologists in Tennessee was 1,180. The projected employment in 2010 for speech-language pathologists is 1,500, representing a 2.5 percent growth rate with 30 average annual openings. The average 10-year openings are 330. The estimated employment of audiologists in Tennessee in 2000 was 240. The projected employment in 2010 for audiologists is 300, representing a 2.4 percent growth rate with 10 average annual openings. The average 10-year openings are 60.

TABLE 2.6

Licensure Information for Speech-Language Pathologists and Audiologists in Tennessee in 2000, 2001, and 2002

	2000	2001	2002
Speech-Language Pathologists	1,113	1,204	1,372
Audiologists	245	274	296

Source: TN Department of Labor and Workforce Development, Employment Sec. Div., Research and Statistics Section, 2003.

The personnel to population ratio in speech-language pathology indicates that although progress is being made, there are fewer SLP personnel per 100,000 in Tennessee than in the U.S. and the region. There are more audiologists than represented in the U.S. and the region. The audiology ratios are the same (5.2) for 1996 and 2002.

TABLE 2.7

Tennessee Speech Pathology and Audiology Graduates, 2001–02

	Bachelor's	Master's	Doctoral
Audiology	10	15	—
Speech-Language Pathology (SLP)	37	34	—
Speech-Language Pathology and Audiology (SLP/A)	13	82	7
TOTALS	60	131	7

Source: Tennessee Higher Education Commission

In Tennessee there are five universities that offer speech-language pathology or audiology programs. East Tennessee State University offers a master's degree in both speech-language pathology and audiology and a doctoral degree in audiology. Tennessee State University offers a master's degree in speech-language pathology. The University of Memphis offers a master's degree in both speech-language pathology and audiology and a doctoral degree in audiology. The University of Tennessee at Knoxville offers a master's degree in both speech-language pathology and audiology, as does Vanderbilt University.

One community college in Tennessee has expressed interest in developing the assistant level program, but a change in licensure in Tennessee will be required before this category will be licensed to practice.

Summary

According to the BLS occupational outlook for 2002–03, the employment of speech-language pathologists is expected to grow much faster than the average for all occupations through the year 2010. Tennessee nursing homes, home care agencies, and hospitals must compete with educational institutions and other private practice settings for speech-language-hearing professionals. Supply and demand in Tennessee appear to be in balance, although the personnel-to-population ratio in speech-language pathology continues to be lower than for the SREB states and the U.S. “The Source” grades SLP and audiologists as E, predicting fewer job openings than trainees.

F. Respiratory (Care) Therapy and Respiratory Therapy Technician

Description

The respiratory therapy or respiratory care therapy personnel provide a wide range of clinical respiratory care as prescribed by a physician. These services range from emergency care for stroke, drowning, heart failure, and shock to providing temporary relief to patients with emphysema or asthma.

Therapists often treat patients who have undergone surgery and require acute care. They may specialize in areas such as neonatal/pediatric practice or in the health care service of elderly patients with chronic lung problems. Respiratory therapy personnel are employed in hospitals, nursing care facilities, clinics, physicians’ offices, and increasingly in home health care settings.

Educational Preparation

The respiratory therapist is prepared to assume the primary responsibility for all respiratory care modalities including the respiratory therapy technician who administers general respiratory care. Educational preparation is divided into two broad categories: the associate degree or baccalaureate prepared therapist and the certificate or associate degree prepared technician.

National Supply and Demand

Nationally, respiratory therapists are not immune from the health care workforce shortages. The Respiratory Therapist Human Resource Study 2000 of the American Association of Respiratory Care projected 6,510 positions vacant, representing a vacancy rate of 5.96 percent. According to the BLS, respiratory therapists held about 110,000 jobs in 2000. About four out of five jobs were in hospital departments of respiratory care, anesthesiology, or pulmonary medicine. Respiratory therapy clinics, physician offices, nursing homes, and firms that supply respiratory equipment for home use accounted for most of the remaining jobs. The BLS expects employment of respiratory therapists to increase faster than the average of all occupations, increasing from 21 percent to 25 percent, due to the aging population and the rise of respiratory ailments and cardiopulmonary disease.

Formal training is necessary for entry into this field. Training is offered at the postsecondary level by hospitals, medical schools, colleges, universities, trade schools, vocational technical institutes, and the military. Some programs are two or four years in length and lead either to an associate or bachelor's degree, preparing graduates for jobs as respiratory therapists (advanced). Other programs last two years and lead to an associate degree, preparing graduates for jobs as respiratory therapists (entry-level). In 2002 there were 313 respiratory therapist (advanced) programs and 66 respiratory therapist (entry-level) programs. This is compared to 286 respiratory therapist (advanced) and 174 respiratory therapist (entry-level) programs in 1995.

Table 2.8

Respiratory Therapy Programs in U.S.

	1985	1990	1995	2002
Respiratory Therapist (Advanced)	232	259	286	315
Respiratory Therapist (Entry-level)	182	159	174	82

Source: Health Professions Education Data Book, 2003–2004

In 2002 the entry-level requirements changed to an associate degree. Only 26 programs remain that graduate students only at the entry level. These programs are expected to phase out.

Regional Supply and Demand

Of the 315 accredited programs preparing respiratory therapists, 177 are in SREB states. This represents 56 percent of all the programs in the U.S. Graduates from the SREB region traditionally represent 37 percent of the nation's total graduates.

State Supply and Demand

It is interesting to note that Tennessee has a high rate of tobacco-using citizens and a high prevalence rate of cardiovascular and lung disease. These may contribute to the increased demand for this profession over the years.

The estimated employment in 2000 for respiratory therapists in Tennessee was 2,210. The projected employment for 2010 is 3,040, representing a growth rate of 3.2 percent, with 80 average annual openings. The average 10-year openings in Tennessee are 830. In 2000, there were 1,805 licensed respiratory therapists in Tennessee. This is compared to 1,852 licensed respiratory therapists in 2001 and 1,913 in 2002.

There are eight respiratory therapist (advanced) programs in Tennessee. Programs at Chattanooga State Technical Community College, Columbia State Community College, Roane State Community College, and Jackson State Community College offer A.A.S. degrees and programs last between 21 and 24 months. Volunteer State Community College offers a certificate, the program for which lasts 9 months, or an A.S. degree, with a program lasting 24 months. East Tennessee State University offers a certificate, which takes 12 months, or a B.S. degree program lasting 20 months, plus general education requirements. Baptist College of Health Sciences in Memphis offers a B.H.S. (bachelor of health sciences) degree in a program lasting 22 months, and Tennessee State University offers a B.S. degree program requiring 37 months. There were 72 graduates from these programs in 2001–02.

Three programs are offered for respiratory therapist (entry-level). These programs are located at Volunteer State Community College, which offers a diploma, certificate, and A.A.S. Tennessee Technology Center–Memphis awards an A.S. degree, and Walters State Community College has a program leading to an A.A.S. degree. There were 42 graduates in 2001–02 from these institutions.

According to “The Source,” there were 81 completers in Tennessee available in 2000; 78 completers or 96.3 percent were employed. Although there are 2,210 estimated positions in 2000, only 1,913 were licensed in respiratory therapy in 2002. This represents a vacancy rate of 19 percent. A grade of A, above average for all occupations, is identified for this classification.

Summary

Hospitals will continue to employ more than 9 out of 10 therapists, but a growing number will work outside of hospitals under contract to home health agencies and nursing homes. Job opportunities will be best for therapists who work with newborns and infants.

The biggest shortage in medical therapy occupations in Tennessee is in respiratory therapy.

G. Dietitian and Dietetic Technician

Description

Dietitians are health professionals who apply the science and art of human nutrition to client needs. They help individuals and families of all ages, cultures, and economic means choose foods for adequate nutrition in health or disease throughout the life cycle. Dietitians also supervise the preparation and service of food to groups, develop modified diets, participate in nutrition research, and supervise the nutritional aspects of health care.

Dietitians may work in hospitals and other health care facilities or in private practice. They may work for government or community agencies, food industries, restaurants, schools, universities or the military or in communications, sales, or a variety of other situations. Major areas of practice include clinical, community, management, and consultant dietetics.

Registered dietetic technicians work independently or in teams with registered dietitians in a variety of employment settings including health care, business and industry, public health, food service, and research.

Educational Preparation

The Commission on Accreditation for Dietetics Education (CADE) currently accredits programs for preparation of registered dietitians and dietetic technicians. Dietitians and nutritionists need at least a bachelor's degree in an accredited program in dietetics, foods and nutrition, food service systems management, or a related area. After completing the degree, individuals must complete a CADE-accredited supervised practice program at a health care facility, community agency, or a food service corporation or supervised practice program in combination with undergraduate or graduate studies. Typically, a practice program is six to twelve months in length. The final requirements are to pass a national examination administered by the Commission on Dietetics Registration (CDR) and completion of continuing professional education requirements to maintain registration.

To become a registered dietetic technician, individuals must complete at least a two-year associate's degree and complete a dietetic technician program accredited by CADE including 450 hours of supervised practice experience in various community programs, health care, and food service facilities. The individual must then pass a national written examination administered by the CDR and complete continuing professional education requirements to maintain registration.

National Supply and Demand

The Bureau of Labor Statistics indicates that dietitians and nutritionists held about 49,000 jobs in 2000. More than half were in hospitals, nursing homes, or offices and clinics of physicians. State and local governments provided about one job in ten—mostly in health departments and other public health related areas.

Other jobs were in restaurants, social service agencies, residential care facilities, diet workshops, physical fitness facilities,

school systems, colleges and universities, and the federal government—mostly in the U.S. Department of Veterans Affairs. Some dietitians and nutritionists were employed by firms that provide food services on contract to such facilities as colleges and universities, airlines, correctional facilities, and company cafeterias. Some dietitians are self-employed, working as consultants to facilities such as hospitals and nursing homes or providing dietary counseling to individual clients.

As of 2001 there were 234 bachelor's and master's degree programs approved by CADE. Supervised practice experience can be acquired in two ways. The first requires completion of a CADE-accredited coordinated program. As of 2001 there were 51 accredited programs, which combined academics and supervised practice experience and generally lasted four to five years. The second option requires completion of 900 hours of supervised practice experience in any of the 258 CADE-accredited internships. Internships may be full-time programs lasting 6 to 12 months, or part-time programs lasting 2 years. Students interested in research, advanced clinical positions, or public health may need an advanced degree.

According to the U.S. Bureau of Labor Statistics, employment of dietitians is expected to grow about as fast as the average for all occupations through the year 2005 because of increased emphasis on disease prevention, a growing aging population, and public interest in nutrition. Employment in hospitals is expected to show little change because of anticipated slow growth and reductions in patients' lengths of hospital stay. Faster growth, however, is anticipated in nursing homes, residential care facilities, and physician clinics. The job market for dietetic technicians is assumed to be similar to that for dietitians and nutritionists.

State Supply and Demand

Approximately 1,200 registered dietitians are employed in the state of Tennessee. The distribution of jobs follows the national average of approximately 33 percent employed in hospitals, 10 percent in long-term care facilities, 9 percent in community and public health, 10 percent in clinics and ambulatory care, and

11 percent in private practice as consultants. The number of registered dietetic technicians is fewer than 100, reflecting the low number of dietetic technician training programs in the state.

There are ten private colleges and public universities in the state that offer didactic programs in dietetics including the University of Tennessee at Chattanooga, Tennessee Technological University, Carson-Newman College, East Tennessee State University, the University of Tennessee at Knoxville, the University of Tennessee at Martin, the University of Memphis, Middle Tennessee State University, David Lipscomb University, and Tennessee State University. According to 2001 data, 215 juniors and seniors (freshman and sophomore enrollments are not available) are enrolled in dietetics education programs with the largest enrollment at Middle Tennessee State University.

In Tennessee, there are six postgraduate dietetic internships that provide the supervised practice component of dietetics training. These programs are located at East Tennessee State University, the University of Tennessee at Knoxville, the University of Tennessee at Martin, the University of Memphis, National Health Corporation, and Vanderbilt University Medical Center. These programs accept 66 students per year with Vanderbilt having the largest program.

There is only one dietetic technician training program in Tennessee, indicating an unmet need in providing opportunities for dietetic technician positions in the state. An associate degree is offered at Shelby State Community College with an enrollment of 21 students annually.

Summary

The demand for registered dietitians and dietetic technicians is expected to increase about as fast as the average for all occupations through 2010 as a result of increasing emphasis on disease prevention through improved dietary habits. A growing and aging population will increase the demand for meals and nutritional counseling in nursing homes, schools, prisons, community health programs, and home health care agencies. In addition to employment growth, job openings also will result from the need to replace experienced workers who leave the occupation.

The number of dietitian positions in hospitals is expected to grow slowly as hospitals continue to contract out food service operations. On the other hand, employment is expected to grow fast in contract providers of food services, social services agencies, and offices and clinics of physicians.

TABLE 2.9

Tennessee Outlook Grading System for Clusters of Occupations

Occupation	Grade
Audiology/Speech Pathology	E
Physical Therapist	D
Physical Therapist Assistant	D
Occupational Therapy	B
Occupational Therapy Assistant	C
Respiratory Therapy	A
Dietitian and Dietetic Technician	A

Source: "The Source"

Grades are assigned to indicate the potential for employment based on openings, number of trained job seekers, and occupational growth. The grading system used is as follows: A for Excellent; B for Very Good; C for Favorable; D for Competitive; E for Very Competitive; and U for Ungraded because the number of trained job seekers is unknown, no formal training is required, and/or few job openings are expected.

II. MEDICAL ASSISTING

Medical assisting professions include medical assistant, surgical technologist, and nursing assistant.

Status

- Medical assistant is expected to be one of the 10 fastest growing occupations through the year 2010, growing much faster than the average for all occupations.
- Hospitals will continue to be the primary employer of surgical technologists, although much faster employment growth is expected in offices and physician clinics, including ambulatory surgical centers.
- Job prospects for nursing assistants will be good because of fast growth and high turnover in this large occupation.
- Some 5.7 million to 6.5 million long-term care workers will be required to meet the needs of American seniors by 2050, up from 1.9 million employed in 2000. (HHS Secretary Tommy Thompson, 2003)

Medical assisting personnel (medical assistants, surgical technologists, and nursing assistants) perform routine administrative and clinical tasks to keep clinics, home health agencies, private medical practices, and other health care facilities running smoothly.

A. Medical Assistant

Description

Medical assistants perform a variety of administrative and clinical duties in accordance with the regulations of the state in which they practice. Administrative duties may include scheduling and receiving patients, maintaining medical records, preparing patients for examinations, and assisting physicians during examinations. Medical assistants may also collect and prepare laboratory specimens, dispose of contaminated supplies, and

sterilize medical instruments. They instruct patients about medication and special diets, prepare and administer medications as directed by physicians, telephone prescriptions to the pharmacy, draw blood, prepare patients for x-rays, take electrocardiograms, remove sutures, and change dressings (BLS, 2003).

Educational Preparation

Most employers prefer to hire graduates of formal programs in medical assisting, according to the BLS. Postsecondary programs usually last either one year and result in a certificate or diploma or last two years and result in an associate degree. Accredited programs ensure entry-level competencies and require an internship.

National certification is provided by two recognized associations: the Commission on Accreditation of Allied Health Education Programs (CAAHEP) and the Accrediting Bureau of Health Education Schools (ABHES).

National Supply and Demand

In 2002 there were 495 medical assistant programs, up from 221 programs in 1995. These numbers indicate the increasing use of this profession.

State Supply and Demand

The estimated employment in Tennessee for medical assistants was 5,470 in 2000. The projected employment for 2010 is 8,070, representing a 4.0 percent growth rate and 260 average annual openings. The average 10-year openings are 2,600.

There are 10 accredited programs for medical assisting in Tennessee. Graduates of the program receive a certificate, diploma, or an associate degree. The certificate and diploma programs last between 8 and 15 months. The programs awarding an associate degree last 24 months.

Table 2.10

Tennessee Medical Assisting Programs

School	Program Offers
Northeast State Technical Community College	A.A.S.
Cleveland State Community College	A.A.S.
Chattanooga State Technical College	Certificate
Miller Motte Business College	A.A.S.
West Tennessee Business College	Diploma
South College	A.S.
Tennessee Technology Center–Knoxville	Diploma
Tennessee Technology Center–McMinnville	Diploma
Concorde Career Center	Diploma, A.A.S.
National College of Business and Technology (Nashville)	A.S.

Source: Health Professions Education Directory, 2003–2004

B. Surgical Technologist

Description

Surgical technologists work with surgical personnel delivering patient care and assuming appropriate responsibilities before, during, and after surgery. They prepare the operating room by selecting and opening sterile supplies. Preoperative duties also include assembling, adjusting, and checking non-sterile equipment to ensure that it is in proper working order. Common duties include operating sterilizers, lights, suction machines, electrosurgical units, and diagnostic equipment.

Educational Preparation

Certificate programs for surgical technology are offered in vocational schools, technical schools, and universities. Programs vary from 9 to 24 months and lead to a certificate, diploma, or associate degree.

National Supply and Demand

In 2002 there were 363 accredited surgical technologist programs. This is up from a previous figure of 143 programs. Surgical technologists held about 71,000 jobs in 2000 with almost 75 percent employed by hospitals. Others are employed in clinics or surgical centers and in the offices of physicians and dentists who perform outpatient surgery.

State Supply and Demand

Estimated employment for surgical technologists in 2000 was 1,980 with projected employment in 2010 of 2,760, representing a 3.4 percent growth rate. The average 10-year openings are 780 with average annual openings of 80 positions. The outlook grade is C with supply somewhat greater than demand. There are 13 surgical technologist programs graduating 177 students in 2002 according to the Health Professions Education Data Book, 2003–2004. The THA reports a 5 percent vacancy rate for surgical technologists.

Accredited surgical technologist programs are located at Northeast State Technical Community College, Chattanooga State Technical Community College, Tennessee Technology Center–Crossville, Tennessee Technology Center–Dickson, Tennessee Technology Center–Hohenwald, Tennessee Technology Center–Jackson, Ft. Sanders Regional Medical Center, Tennessee Technology Center–Knoxville, Tennessee Technology Center–McMinnville, Tennessee Technology Center–Memphis, Tennessee Technology Center–Murfreesboro, Nashville State Technical Community College, and Tennessee Technology Center–Paris. These programs either lead to a certificate or diploma.

C. Nursing Assistant

Description

Nursing assistants perform routine tasks under the supervision of nursing and medical staff. They answer patients' call bells; deliver messages; serve meals; make beds; and help patients eat, dress, and bathe. Nursing assistants may be employed in hospitals, nursing homes, and home health agencies.

Educational Preparation

The majority of nursing assistants receive their training in hospital or long-term care based programs where the average program is 6 to 12 weeks in length. Students receive a certificate of completion and must take the state-administered nursing assistant test to practice in the state of Tennessee.

There is a "care gap" emerging between the number of those requiring long-term care assistance and those available to provide that assistance. By the year 2010 more than 78,000 additional aides must be found to fill long-term care direct staff positions, an increase of 39 percent over the year 2000.

National Supply and Demand

The BLS (2002–2003) estimates that medical assistants held about 329,000 jobs in 2000. About 60 percent of jobs were in physician offices and about 15 percent were in offices of other health practitioners such as chiropractors, optometrists, and podiatrists. The rest were in hospitals, nursing homes, and other health care facilities.

The turnover rate for nursing assistants in nursing homes ranges from 45 percent to 105 percent and turnover for home health aides is estimated to be 28 percent. The census bureau predicts that by 2020 there will be over 60 million people aged 65 and older. As the population ages, the demand for nursing assistants and home health aides will increase significantly. Nursing assistants held about 1.4 million jobs in 2000. About one-half worked in nursing homes and about one-fourth in hospitals. The rest worked in residential care facilities or private households.

State Supply and Demand

Nursing assistant programs are located in a variety of settings in Tennessee: high school vocational programs, area technology centers, acute and long-term care centers, and private training programs. Licensure or registration in these areas varies and is not required although a certificate of completion and an exam is mandatory for nursing assistants to practice.

Home health aides vary in background and training. According to the Health Resources and Services Administration, there were 5,130 home health aides working in Tennessee in 1998. Tennessee ranked 40th in the nation in the number of aides per population. Home health aide employment in Tennessee was predicted to increase by 75.7 percent between 1996 and 2006. By some estimates the country will need three times as many long-term care workers by mid-century due to the aging population. A report that outlines new approaches to address the potentially large workforce shortage in long-term care can be found at <http://aspe.hhs.gov/daltcp/reports/ltcwork.htm>.

Table 2.11

Tennessee Supply and Demand Data for
Medical Assisting Personnel 1998–2002

	1998 Openings	2002 Average Annual Openings
Medical Assistant	425	260
Surgical Technologist	93	80
Nursing Assistant	1,060	1,350

Source: Tennessee Department of Employment Security, Research and Statistics 1999, 2002

III. EMERGENCY MEDICAL SERVICES

Status

- The Bureau of Labor and Statistics (BLS) projects that employment of emergency medical technicians (EMTs) will grow much faster than average for all occupations through the year 2006. Much of the growth will occur as positions change from volunteer to paid positions.
- Additional job openings will occur as more states begin to allow EMT-paramedics to perform primary care on the scene without transporting the patient to a medical facility, especially where supported by telemedicine technology.
- Private ambulance companies tend to offer fewer wages and benefits than do fire departments and hospitals. Thus, demand may be greatest in private companies.

A. Emergency Medical Technicians (EMTs)

Description

Emergency medical service providers give care to people in prehospital emergencies and transport them to hospitals or other health care institutions. Emergency medical technicians are generally divided into three categories: basic EMT, intermediate EMT, and paramedic EMT. EMTs employ procedures they are certified to use to give appropriate medical care. All EMTs may open airways, restore breathing, control bleeding, treat for shock, assist in childbirth, bandage wounds, treat and assist heart attack victims, give initial care to poison and burn victims, and use external defibrillators to care for patients experiencing cardiac arrest (BLS, 2003).

Intermediate EMTs have more advanced training that allows them to administer intravenous fluids, use advanced airway techniques to assist patients experiencing respiratory emergencies, and use other intensive care procedures.

EMT-Paramedics provide the most extensive pre-hospital care. They may administer drugs orally and intravenously, interpret electrocardiograms, perform intubations and use complex equipment (BLS, 2003).

Educational Preparation

Training is offered at three progressive levels: EMT basic, intermediate, and paramedic. EMT training is offered in all 50 states and the District of Columbia and is offered by police, fire, and health departments; training may also be provided in hospitals and as nondegree courses in colleges and universities.

EMT basic is the minimum training needed to qualify for an EMT job. The basic training is 110–120 hours of classroom work plus 10 hours of internship in a hospital emergency room. Graduates of approved EMT basic training programs who pass a written and practical examination administered by the state certifying agency or the National Registry of Emergency Medical Technicians earn the title of Registered EMT Basic.

Intermediate EMT training requirements vary from state to state. Most graduates of intermediate EMT training continue their education and receive the paramedic EMT certification. These programs last about two years.

All 50 states possess a certification procedure. In 38 states and the District of Columbia, registration with the National Registry is required at some or all levels of certification. Other states require their own certification examination or provide the option of taking the National Registry exam. To maintain certification, EMTs and paramedics must reregister, usually every two years (BLS, 2003).

National Supply and Demand

The BLS projects that employment of EMTs will grow much faster than average for all occupations through the year 2010. Much of the growth will occur as positions change from volunteer to paid positions. Additional job openings will occur as more states begin to allow paramedic EMTs to perform primary care on the scene without transporting the patient to a medical facility.

EMTs held about 172,000 jobs in 2000. About four in ten worked in local and suburban transportation or private ambulance services. About three in ten worked in fire, public ambulance, and emergency medical services (EMS). About two in ten worked in hospitals, and one in ten worked in various other industries providing emergency services. In addition, there are many volunteer EMTs. The salaries of EMTs may vary greatly according to the type of employer (see Table 2.12).

Table 2.12

Average Annual Salaries of Emergency Medical Technicians, by Type of Employer 1996, 2000.

Employer	EMT-	EMT-	EMT-	EMT-
	Basic	Basic	Paramedic	Paramedic
	1996	2000	1996	2000
All employees	\$25,051	\$31,670	\$30,407	\$35,689
Fire departments	\$29,859	\$36,566	\$32,483	\$42,161
Hospital based	\$18,686	\$21,381	\$28,373	\$31,130
Private ambulance services	\$18,617	\$21,614	\$23,995	\$30,020

Source: *Journal of Emergency Services*
www.jems.com/jms/sept2000/salarysurvey00.pdf

Because of the discrepancies in pay scales, opportunities in hospitals and private ambulance services are expected to be excellent. The competition will be greater for positions in fire, police, and rescue squads due to higher salaries.

In 2002 there were 149 paramedic EMT programs in the United States. The number of accredited programs has continually grown since 1985, as Table 2.13 illustrates.

Table 2.13

National Accredited Paramedic
Emergency Medical Technicians Programs

Year	1985	1990	1995	1998	2002
Number of Programs	20	72	96	109	149

Source: Health Professions Education Directory, 2003–04

Regional Supply and Demand

A total of 79 of the accredited 149 programs are in the SREB region, representing 53 percent. Many of the programs are concentrated in three states: Alabama, Florida, and Texas, while other states such as Georgia and West Virginia do not have any accredited programs. Florida alone has 24 programs and graduated 871 students in 2001–2002.

State Supply and Demand

The estimated employment for emergency medical technicians and paramedics in Tennessee in 2000 was 2,710. The projected employment for 2010 is 3,760, representing a 3.3 percent growth rate and 110 average annual openings. The average 10-year openings in Tennessee for emergency medical technicians and paramedics are 1,050.

In 2000 there were 10,531 licensed emergency medical technicians and paramedics in Tennessee. This is compared to 10,901 licensed emergency medical technicians in 2001 and 11,280 in 2002.

Tennessee offers eight paramedic EMT programs. Four of the programs offer certificates. These programs are located at Northeast State Technical Community College, Chattanooga State Technical Community College, Columbia State Community College, and Southwest Tennessee Community College. The four certificate and A.A.S. degree programs are through Volunteer State Community College, Jackson State Community College, Roane State Community College, and Walters State Community College. These programs last between 12 and 24 months.

In 2000 there were 350 paramedic EMT completers in Tennessee.

Summary

Demand is expected to grow as paid positions replace volunteer positions and paramedic EMTs are increasingly allowed to provide primary care in emergency situations without transporting the patient to a medical facility. The expanding population, particularly in older age groups that are the greatest users of emergency medical services, will also play a part in the growth in this field.



Diagnostic Radiologic Technology
Radiation Therapy
Nuclear Medical Technology
Diagnostic Medical Sonography
Medical Technology
Medical Laboratory Technician
Phlebotomist
Dental Hygienist
Dental Assistant
Dental Laboratory Technician

Diagnostic Cluster

Section 3

I. MEDICAL IMAGING

Medical imaging professions include diagnostic radiologic technologist, radiation therapist, nuclear medical technologist, and diagnostic medical sonographer.

Status

- Tennessee's radiography programs are adequate to meet current and projected needs although regional and national shortages are being reported.
- Numbers of graduates in Tennessee continue to decline, which may result in shortages in the future. While national population ratios for radiographers have increased, the ratios have decreased in Tennessee.
- Technologists trained in both nuclear medicine and radiologic technology will have the best employment prospects.
- The professional organization continues to study the move to the B.S. degree as the standard of practice.
- Federal studies to determine the impact of educational standards on the quality of care in ultrasound are underway and may lead to increased regulations.

Description

The medical imaging field encompasses a range of occupations that primarily use noninvasive techniques to produce internal images of the body and to treat diseases. Imaging professionals operate in a variety of settings, including hospitals, freestanding clinics, HMOs, and outpatient clinics, where they provide medical imaging and therapeutic services. These occupations emerged from x-ray technology and evolved from using radiation to create a simple internal body image to methods as varied as using radionuclides, sound waves, and magnetic fields to visualize internal organs, bones, and tissues.

Imaging professions reported in this study include diagnostic radiologic technology (radiography), including computed tomography (CT) and magnetic resonance imaging (MRI); radiation therapy; nuclear medicine technology; and diagnostic medical sonography. Radiographers are also trained to perform studies on osteoporosis.

For the purposes of this section, these occupations are grouped as follows: (A) diagnostic radiologic technology, including CT and MRI; (B) radiation therapy; (C) nuclear medicine technology; and (D) diagnostic medical sonography.

A. Diagnostic Radiologic Technology (including CT and MRI)

Description

Radiographers provide patient services using imaging equipment as directed by physicians qualified to order and/or perform radiologic procedures. For radiographers, a gradual shift has taken place toward expanded job responsibilities and increased diagnostic latitude.

Educational Preparation

Over time, radiography programs, which are two or four years in length, have moved from being hospital-based to predominantly college-based programs. As of January 2003, there were 585 accredited radiography programs in the United States, with one inactive program. The Joint Review Committee on Education in Radiologic Technology (JRCERT) accredits radiography programs. In 2002 these programs prepared 8,168 graduates who sat for the American Registry of Radiologic Technologist (ARRT) examination.

In 2003 four universities began radiologist assistant (RA) programs. The RA is an advanced clinical role for an ARRT certified radiographer. The RA will extend the capacity of the radiologist by performing patient assessment, patient management, and fluoroscopy and by making initial observations of diagnostic images.

National Supply and Demand

The BLS projects that radiologic technologists have a high rate of growth, with employment greater than average. In 2000 there were 167,000 radiographers working in the United States. Due to fewer graduates of accredited programs, a decline in the number of new RTs in 1999–2000 was reported. The Journal of the American Society of Radiologic Technologists reported in April 1999 that the “current rate of growth in the number of new RTs is not sufficient to replace normal attrition from the profession, let alone the impending large scale declines due to retirements. Just when the need for health care is projected to increase, the supply of radiologic science professionals may well be decreasing” (vol. 70, no. 4, p. 379). The ARRT 2002 annual report indicates an overall increase of 9.6 percent in first-time candidates, which is the second consecutive increase following several years of decreasing volume. However, American Society of Radiologic Technologist (ASRT) research shows that even with this increase, the nation will produce only about 52,300 more radiographers by 2010. This is 30 percent fewer than the 75,000 radiographers that the BLS estimates will be needed.

Table 3.1
New Certificates in Radiography, 1994–2002

Year	1994	1995	1996	1997	1998
New Certificates	10,628	10,330	9,427	8,691	8,146
Year	1999	2000	2001	2002	
New Certificates	7,595	7,149	7,434	8,168	

Source: ARRT Annual Report, 1994–2002

The location of employers for radiographers is changing. A study by the American Registry of Radiologic Technologists reported that between 1972 and 1990 the percent of radiographers who worked in the hospital setting dropped from 72 percent to 65 percent, and the rate has continued to decline. Although hospitals remain the principal employers of radiologic technologists, employment is growing most rapidly in physician offices and

clinics, including diagnostic imaging centers. The 2003 American Hospital Association report, "In Our Hands," reported vacancy rates in the fall of 2001 of 15.3 percent nationally for imaging technologists. Sixty-eight percent of hospitals reported more difficulty recruiting between 1999 and 2001. Imaging job categories in which hospitals are experiencing workforce shortages include radiology, nuclear medicine, and ultrasound imaging, with 71 percent of hospitals reporting shortages. This is second only to registered nurse vacancies, with 84 percent of hospitals reporting shortages.

The U.S. labor force is aging. The median age of the labor force in 1998 was 38.7 with 40.7 years predicted in 2008, while the average age of the working radiologic technologist today is 41. Over 66 percent of the imaging labor force is above the age of 35, which is a higher percentage than the age distribution of all other professions (ARRT and BLS, 1998). Only 14.5 percent of radiologic technologists working today are younger than 30 (www.ASRT.org/ASH.htm).

From 1984 to 1991, the number of radiography programs nationwide declined by 80 programs, from 760 to 680. The number continued to decline to 585 in 2003. The Department of Labor estimates that the annual graduation rate will not satisfy the growth from increased demand and attrition and that 50,000 more radiologic technologists will be needed within the next 10 years.

Despite the upturn in students choosing to study radiologic technology, the overall shortage in RTs could continue to grow because of looming retirements. At an average age of 41, it is one of the oldest groups among the allied health professions. In 15 to 20 years, when the demand for health care is expected to skyrocket, a large number of RTs will be retiring.

Regional Supply and Demand

The SREB data shows a total of 233 accredited programs that graduated 3,238 students in 1998. This number represented 40.6 percent of the graduates in the nation that year. In 2002 there were 243 programs that graduated 3,587. This number represents 41 percent of the 585 programs and 50 percent of the graduates in the U.S.

State Supply and Demand

Although there are currently 5,373 RTs registered in good standing with the ARRT who reside in Tennessee, only 3,998 indicate they work full-time and 619 indicate part-time employment. Of those registered, 2,117 identify radiography as their primary discipline of employment.

The Tennessee Hospital Association reports vacancy rates for hospitals by county. They report that of the 2,441 budgeted positions for radiographers, 306 of those are vacant, representing a 13 percent vacancy rate for hospitals in Tennessee. This is similar to the national vacancy rate of 15 percent. Considering there were only 202 new candidates prepared for registration in Tennessee during 2002, a worsening shortage is predicted for Tennessee. The occupational outlook for Tennessee in this field is excellent.

TABLE 3.2

Tennessee Registered Radiographers, 1989–2003

	1988	1989	1990	1991	1992	1999	2003
Registered Radiographers	2,997	3,255	3,446	3,557	3,907	4,891	5,367
Full-time Practice	—	—	—	—	—	—	3,998

Source: American Registry of Radiologic Technology, 1988–2003, Annual Reports

In Tennessee, there are 11 radiography programs. Six of the 11 offer an A.A.S. degree and two offer a B.S. degree. These programs are located at Chattanooga State Technical Community College, Columbia State Community College, Volunteer State Community College, Jackson State Community College, Southwest Tennessee Community College, and Roane State Community College. The University of Tennessee Medical Center at Knoxville, Metropolitan Nashville General Hospital, and Methodist Healthcare in Memphis offer a certificate. The Baptist College of Health Sciences in Memphis and East Tennessee State University offer B.S. degree programs.

TABLE 3.3

Tennessee Radiography Programs and Graduates, 1989–2002

	1989	1990	1991	1992	1999	2001-02
Programs	11	11	13	13	12	11
Graduates	120	172	179	189	160	148*

Source: THEC – graduation data, 2002

*graduation rates from THEC are lower than data acquired on new registrants

The ARRT Annual Report indicated that 179 candidates sat for the ARRT exam in 1999, and 202 candidates each year sat for the ARRT exam in 2000, 2001, and 2002. This represents no growth in supply for the last three years in Tennessee.

Post-primary examinations offered through the American Registry of Radiologic Technology include cardiovascular-interventional technology, mammography, computed tomography, magnetic resonance imaging quality management, sonography, vascular cardiac-interventional technology, vascular-interventional technology, and bone densitometry. Formal training programs for these areas have been initiated in some institutions that also offer entry-level programs.

A limited practice x-ray technician is allowed to practice in Tennessee. These personnel are prepared through a 40 clock-hour course approved through the Tennessee Board of Medical Examiners, and completers take a state exam. The limited areas of practice presently include examinations of chest and extremities.

Technicians and technologists must be licensed to work in most office settings. The Tennessee Occupational Information System reports continued growth with a 2 percent growth rate expected until 2010 for technicians.

Summary

Tennessee is not educating an adequate number of radiographers as indicated by hospital vacancy rate data and state supply and demand data. National shortages continue even though there

is an increase in the number of radiography applicants and graduates. A telephone survey of the programs in Tennessee indicates they are at capacity for the number of funded faculty positions. In addition to post-primary certificates, the professional organization ASRT has proposed a radiologist assistant as an extender of the role of radiologist.

Tennessee has converted two programs into baccalaureate-level programs in radiography. Baccalaureate-level programs are sources of graduates who may be potential faculty members or managers in this discipline.

B. Radiation Therapy

Description

Radiation therapists administer radiation treatments to patients using a planned design to treat cancers in the body that have been previously diagnosed. The progressive improvement in the technology has led to a gradual increase in both cognitive abilities and general knowledge necessary to perform the tasks.

Educational Preparation

The increase in the role requirements caused the professional organization ASRT to support a minimum requirement of a bachelor's degree for entry into the field. Although many programs now offer a B.S. degree, no mandate by the ARRT has been approved.

National Supply and Demand

Radiation therapy departments are facing several staffing shortages that could affect patient care and increase the number of hours worked and the quality of patient care, according to a study in the June 2003 *International Journal of Radiation Oncology, Biology, and Physics*. The study cites an 18.3 percent vacancy rate nationally, or 1,800 radiation therapists.

A workforce study by the radiologic professional association found that over a four-year period, the number of full-time radiation therapists nationwide increased by 26 percent, from 4,242 in 1986

to 5,353 in 1990 (Lang, 1991) and 60 percent between 1990 and 2003 with 13,465 registered radiation therapists in 2003. The BLS predicts that the U.S. will need 7,000 more radiation therapists by 2010. With over 1,800 vacancies reported in 2003 and less than one-third enough graduates to fill those vacancies, the shortage is predicted to continue for at least the next eight to ten years.

In 1985 there were 101 accredited radiation therapy programs nationally. In 1990, this number increased to 104 programs. In 1995, there were 120 accredited programs nationally, but this number dropped to 71 in 2002. The 2002 data show a smaller number of programs (71) producing more graduates.

TABLE 3.4

U.S. Radiation Therapy Programs and Graduates

	1985	1990	1991	1992	1994
Programs	101	104	111	121	—
Graduates	—	—	659	792	1045
	1998	1999	2000	2001	2002
Programs	84	—	80	79	71
Graduates	388	389	399	579	652

Source: *Health Professions Education Directory, 1991–2002*,
<http://www.arrt.org>

Regional Supply and Demand

In 1992 there were 40 radiation therapy programs in the SREB states and 111 programs in the U.S. In 2003 there are 27 in the SREB states and 71 programs across the country.

The number of graduates who qualified to sit for the ARRT therapy exam from SREB programs was 252 in 2002, representing 38.6 percent of all radiation therapy graduates in that year.

State Supply and Demand

In 2003 there were 305 radiation therapists in Tennessee. The number needed is projected to be 350 in 2008. This represents a growth rate of 2.11 percent with 10 job openings annually, 6 due to growth and 4 due to replacement. There were 33 successful candidates for the ARRT in 2002.

In 2002 there were three accredited radiation therapist programs in Tennessee. Two certificate programs, which last 12 months, are at Chattanooga State Technical Community College and Vanderbilt University Medical Center, which is affiliated with Middle Tennessee State University to offer a B.S. degree. One program leading to a B.S. degree is located at Baptist College of Health Sciences in Memphis. This program also offers night and weekend classes and lasts 48 months.

Thirty-nine graduates from these programs in Tennessee qualified to sit for the radiation therapy ARRT exam in 2002.

Summary

Tennessee has made progress toward educating an adequate supply of radiation therapists. Two of the three programs in the state are sponsored by hospitals and one is a public community college that requires a certification in radiography for admission. This results in a 36-month educational investment and two certifications for practice, although typically graduates practice radiation therapy rather than radiography. Although this add-on approach provides career change opportunities for the radiographer, the national trend has been to provide training for radiation therapists at the bachelor's or associate degree for entry-level with bachelor's degree programs showing the most growth.

C. Nuclear Medicine Technology

Description

Nuclear medicine technology is the medical specialty that uses the nuclear properties of radioactive nuclides to make diagnostic evaluations of the anatomic or physiologic conditions

of the body and to provide therapy with unsealed radioactive sources. These procedures typically involve preparing radioactive substances or isotopes, administering them to patients, operating equipment that takes images of radioactive substances within the body, and reading the results. Nuclear medical technologists prepare stock solutions of radioactive materials and calculate doses to be administered by radiologists. They execute blood volume, red cell survival, and fat absorption studies following standard laboratory procedures. The skills of nuclear medicine technologists complement those of nuclear medicine physicians and other professionals in the field.

Nuclear medicine technology has been dramatically altered by computer enhancement. At the same time, government regulation has continued to grow, increasing the knowledge that the technologist must have of regulatory areas and radioactive materials management. The use of new technologies such as CT, MRI, and PET has reduced the number and types of studies performed by the nuclear medicine technologist. The expanded approval of PET by the Centers for Medicare and Medicaid Services will increase the use of this imaging technology.

Professional Education

The professional portion of the program is one year in length. Institutions offering accredited programs may provide an integrated educational sequence leading to a certificate, an associate degree, or a baccalaureate degree over a period of two or four years. Courses cover physical sciences, the biological effects of radiation exposure, radiation protection and procedures, the use of radiopharmaceuticals, imaging techniques, and computer application. Certification is voluntary. The two organizations that currently certify technologists in nuclear medicine are the Nuclear Medicine Technology Certification Board (NMTCB) and the American Registry of Radiologic Technology (ARRT).

National Supply and Demand

The Department of Labor has indicated that the supply of nuclear medicine technologists has varied widely. The supply of technologists increased rapidly in the 1980s but declined in the mid- and late 1990s; however, technological innovations such as PET may increase the diagnostic uses of nuclear medicine. Another example is the use of radiopharmaceuticals in combination with monoclonal antibodies to detect cancer at far earlier stages than is customary today and without resorting to surgery. Another is the use of radionuclides to examine the heart's ability to pump blood. Wider use of nuclear medical imaging to observe metabolic and biochemical changes for neurology, cardiology, and oncology procedures will also spur some demand for these professionals (BLS, 1999).

Employment is expected to grow about as fast as average for all occupations through the year 2006. Growth will arise from an increase in the number of middle-aged and older persons who are the primary users of diagnostic procedures, including nuclear medicine tests. A 2001 NMTCB salary survey reported a national vacancy rate of 12.5 percent.

In 2000 there were 18,000 nuclear medicine technologists in the United States. Two-thirds were employed in hospitals and the rest worked in physician offices and diagnostic imaging centers.

In 1985 there were 141 accredited nuclear medicine technology programs but this number dropped to 107 in 1990. This number rose in 1995 to 120 programs but dropped in 2002 to 92 accredited programs.

TABLE 3.5

U.S. Nuclear Medicine Technologists

	1988	1989	1990	1993	1999	2000	2003
ARRT	9,491	9,784	10,815	11,022	11,109	—	10,634
NMTCB	—	—	—	—	—	—	21,989
BLS	—	—	—	—	—	18,000	—

Source: ARRT *Annual Report of Registered Technologists*, April 1999, 2001, 2003

Two agencies provide certification/registration, ARRT and NMTCB, and practitioners often hold both. Accurate data on the total number of practitioners are not available.

Regional Supply and Demand

In 2003 there were 39 accredited nuclear medicine programs in SREB states and 92 programs nationally. The SREB states graduated 240 in 1999, representing 40 percent of the national total. This figure is relatively unchanged in 2003.

State Supply and Demand

In 2000 the estimated employment for nuclear medicine technologists in Tennessee was 710. This number is projected to be 820 in 2010. This represents an annual growth rate of 1.5 percent, with 10 annual job openings. Certification is voluntary; however, as of 2003 a total of 687 nuclear medicine technologists hold certificates in Tennessee. Of these, 467 hold NMTCB certification and 220 hold ARRT certification.

In 2002 there were 37 graduates from five nuclear medicine technology programs in Tennessee. Three programs are hospital-based and offer certificates and/or bachelor's degrees. Methodist Hospital of Memphis awards certificate degrees, Vanderbilt University Medical Center awards a certificate but articulates with several universities which offer the bachelor's degree upon completion, and the University of Tennessee Medical Center at Knoxville awards certificate and bachelor's degrees. Two nonhospital based programs—Chattanooga State Technical Community College and Baptist Memorial College of Health Science—also offer certificate degrees.

There is no overall shortage of nuclear medicine technologists in Tennessee although some regions report vacancies. Supply of these professionals is currently provided by five programs that graduate a number equal to the projected state demand. The five border states produce fewer graduates in these areas and out-migration of Tennessee's graduates to other states may be occurring.

D. Diagnostic Medical Sonography

Description

Sonographers, also known as ultrasound technologists, direct nonionizing, high-frequency sound waves into areas of the patient's body; the equipment then collects reflected echoes to form an image. The image is viewed on a screen and may be recorded on videotape or photographed for interpretation and diagnosis by physicians. Sonographers explain the procedure, record additional medical history, and then position the patient for testing. Viewing the screen as the scan takes place, sonographers look for subtle differences between healthy and pathological areas, decide which images to include, and judge whether the images are satisfactory for diagnostic purposes. Sonographers may specialize in abdomen, breast, neurosonology, obstetrics and gynecology, and ophthalmology (RDMS); adult and pediatric echocardiography (RDCS); and noninvasive vascular technology (RUT).

The rapid growth of high-frequency ultrasound and real-time imaging for diagnostic purposes has demonstrated a need for quality education in this field. The initiation of prospective payment systems fostered the establishment of freestanding imaging centers and satellite diagnostic centers. An increasing number of private offices installing ultrasound scanners for their own use has increased the demand for highly trained sonographers.

The net effect of new providers and expanded use of this modality has resulted in a marked increase in the number of patients being examined with ultrasound because of the reduced risks associated with the imaging modality.

Educational Preparation

Programs may be several months or one, two, or four years in duration and result in certificate or baccalaureate degrees. One-year programs are for applicants who already possess qualifications in a clinically related allied health profession.

National Supply and Demand

In 2000 there were 38,594 diagnostic medical sonographers. More than half worked in hospitals. Many sonographers, like radiologic technologists, have moved from hospitals to outpatient practices. Ultrasound has been used in medical diagnosis since 1970, and initially training consisted of one or two weeks of in-hospital training. Because licensure to practice is not required, sonographers often are still trained in short programs that are initiated and terminated based on local need, making determination of supply and demand difficult.

The Joint Review Committee on Education in Diagnostic Medical Sonography accredits most formal diagnostic medical sonography training programs. In 1985 there were 24 accredited diagnostic medical sonography programs. This number rose to 42 in 1990 and grew to 77 in 1995. In 2003 there are 102 diagnostic sonography programs in the United States.

Sonographers can obtain national certification from the American Registry of Diagnostic Medical Sonographers. As relatively few risks are associated with this modality, licensure or certification is not nationally required. However, the registry recorded 18,264 registered sonographers in June 1993 and 38,594 in March 2000, representing a significant increase in the use of this imaging modality and a trend toward acquiring national certification.

From 1988 to 1998, the number of sonography programs nationally grew from 34 to 77, an increase of over 100 percent. Enrollment and the number of graduates have each increased substantially from 1988 to 1998, as shown in Table 3.6. As of the end of December 2002, the number of programs had increased by 24 (or 32 percent) since 1998.

TABLE 3.6

U.S. Diagnostic Medical Sonography Programs, 1988–2002

Year	Total Programs	Total Enrollment	Graduates
1988	34	461	264
1989	38	567	316
1990	43	635	338
1991	47	887	443
1992	56	977	565
1998	77	1,366	730
2002	96	1,452	829

Source: AMA Allied Health Education Fact Sheet, 1990 and 1992; Allied Health Education Directory, 1993 and AMA Health Professions Education Directory, 1999–2000, 2003–2004

Regional Supply and Demand

Data from the SREB indicate that there are 29 regional programs that graduated 246 students in 1998, representing 33.6 percent of the total graduates in the nation. In 2002 there were 41 programs graduating 347, representing 41 percent of the total graduates in the nation.

TABLE 3.7

U.S. and SREB Accredited Sonography Graduates

	1989	1990	1991	1998	2002
SREB	84	74	101	246	347
National	316	338	443	730	829

Source: SREB Dat-Ex, 1992; AMA, 1999–2000, 2003–2004

State Supply and Demand

Population ratios are not available because sonographers are not licensed in Tennessee and accurate numbers of practitioners are not available. Many sonographers have been trained on the job and are not registered. The Tennessee Department of Employment Security does not keep figures on supply and demand in this category.

Tennessee has two accredited sonography programs. Chattanooga State Technical Community College offers a certificate based on a 12-month program. Baptist Memorial College of Health Sciences in Memphis offers a certificate as well and the program lasts 48 months. Several other hospitals and community college programs offer training based on analysis of local need.

According to the Health Profession Education data book for 2003–2004, Tennessee graduated 26 sonographers from the two accredited programs in 2001. Regional shortages are reduced by local training programs.

TABLE 3.8

Tennessee New ARRT Candidates

Nuclear Medicine Technologist						
	1993	1998	1999	2000	2001	2002
	23	30	8	8	11	37*
Radiologic Technologist (Radiographer)						
	1993	1998	1999	2000	2001	2002
	189	160	171	202	202	202
Radiation Therapist						
	1993	1998	1999	2000	2001	2002
	32	13	7	9	25	39

Source: Telephone Survey, ARRT

*ARRT and NMTCB, some may hold both certifications

Summary

Tennessee is not educating an adequate number of radiographers based on reported vacancies. A telephone survey of the programs indicates they are enrolling at capacity for clinical sites and/or staffing levels. Tennessee has two baccalaureate programs: East Tennessee State University and Baptist Memorial College of Health Sciences.

There has been no increase in the number of radiographers over the last 3 years. The vacancy rates identified by hospitals indicate a growing shortage in this area. With decreased funding for higher education this situation may not improve.

While statewide statistics help clarify the supply and demand situation, consideration must be given to the mobility of graduates, which contributes to regional shortages.

Sonography is showing growth and this growth is being met in Tennessee by two accredited programs and local training opportunities. Directors of human resources have reported shortages across the state. Beginning in 2005, an associate or higher degree from an accredited program will be required for registration. Since neither registration nor licensure is required, the supply/demand data is difficult to assess except through anecdotal reports of shortages from hospital human resource officers.

II. CLINICAL LABORATORY SERVICES

Clinical laboratory services professions include medical technologist, medical laboratory technician, and phlebotomist.

Status

- National shortages in laboratory personnel are becoming significant according to the results of a survey conducted by the American Society of Clinical Pathologists' Board of Registry.
- The Clinical Laboratory Improvement Act (CLIA) requires technologists who perform certain highly complex tests to have at least an associate degree.
- Tennessee's vacancy rate for clinical medical technologists and clinical medical technicians is 13 percent.
- Shortages in the clinical laboratory sciences need to be addressed through student recruitment.

Description

Clinical and medical laboratory personnel perform a wide array of tests that are used to help physicians prevent, detect, diagnose, and treat diseases. The generalized medical technologist is the most widely recognized practitioner in this field, but there are many specialties within the field including cytotechnology (the study of body cells), hematology (the study of blood cells), and histology (the study of tissue specimens). The medical laboratory services occupations surveyed for this report include medical technologist, medical laboratory technician, and phlebotomist.

Educational Preparation

Medical technologists or clinical laboratory scientists (CLS) and medical laboratory technicians or clinical laboratory technicians (CLT) are divided into two broad categories: baccalaureate-prepared technologists, and associate degree- and certificate-prepared technicians. Technologists are expected to recognize the interdependency of tests and have knowledge of physiological conditions affecting test results that allow them to confirm results and develop data useful to a physician in determining the presence, extent, and, as far as possible, the cause of disease. Generally, technicians perform routine tests under the supervision or direction of pathologists or other physicians, scientists, or experienced medical technologists.

There are three models for training medical technologists: university-based, hospital-based, and university/hospital partnerships. University-based programs train baccalaureate-prepared technologists and develop relationships with area hospitals to provide appropriate clinical practicum opportunities. Hospital-based programs accept students with B.S. degrees and certain prerequisites into a one-year professional curriculum. Sponsored by hospitals or clinics that hold the program accreditation, partnership programs develop agreements with universities who provide three years of preprofessional academic preparation. The hospital or clinic provides the fourth year professional curriculum and the degree is awarded by the university. The

Clinical Laboratory Improvement Act (CLIA) requires technologists who perform highly complex tasks to have at least an associate degree.

Medical laboratory technicians are prepared at the associate degree or certificate program level. Sponsored by community colleges or hospitals, these graduates complete one- or two-year programs.

Phlebotomists are limited practice, certificate-prepared practitioners who draw blood for lab analysis. Programs may be started or discontinued based on local need and little information is available on national or regional supply and demand. There are two phlebotomist programs in Tennessee: at Roane State Community College and Southwest Tennessee Community College.

Other occupations in this category include cytotechnologist, blood bank technologist, and histologic technician/technologist. The numbers of positions needed in these categories are relatively small, and programs usually address a specific regional need. No programs in Tennessee are available for a specialist in blood bank technology or for a histologic technician or technologist. There is one cytotechnologist program at the University of Tennessee Health Science Center in Memphis that lasts 12 months after three years of general studies and prerequisites and awards a B.S. degree.

National Supply and Demand

In 2000 there were 295,000 estimated clinical laboratory technologists and technicians employed in the United States, more than half of whom worked in hospitals.

Technological advances have two opposing effects on employment and will continue to have those effects through 2006. New, more powerful diagnostic tests will encourage more testing and spur employment. However, advances in laboratory automation and simpler tests make it possible for each worker to conduct more tests and thereby possibly reduce demand.

A biannual survey sponsored by the American Society of Clinical Pathologists (ASCP) showed that job vacancy rates are

high in medical laboratories. The following data, presented in Table 3.9, includes hospital, blood bank, clinic, and independent clinical medical laboratories. ASCP has targeted recruitment of qualified students and retention of practicing professionals as ways to reduce shortages.

TABLE 3.9

National Vacancy Rates for Clinical Laboratory Positions, 1988–2002

	1988	1990	1994	1996	1998	2002
Medical Technologists						
Staff	9.3	11.6	9.6	8.2	10.2	7.2
Supervisor	5.0	10.2	10.3	8.6	9.3	5.8
Manager	5.2	7.1	15.4	7.7	15.4	3.1
Medical Lab Technicians	6.5	11.1	14.8	12.5	12.3	8.3
Phlebotomists	8.2	12.2	14.8	12.5	12.3	9.0
Cytotechnologists	13.6	27.3	19.2	7.1	10.5	6.3
Histologic Technologists	NA	14.3	17.4	5.3	10.3	10.9
Histologic Technicians	6.2	9.5	8.7	13.0	12.9	9.1

Source: American Society of Clinical Pathologists, 1999; American Society of Clinical Pathologists, 2002, Hospital Vacancy Rates

The decline in the number of medical technology (MT) programs, as shown in Table 3.10, has been dramatic. In 1990–1992, ten programs closed. In a seven-year period, 205 programs closed resulting in a decline from 615 programs in 1984 to 410 in 1991. In 1998 there were 288 active programs; by 2003, the number of active programs had declined to 254.

The number of graduates declined nationally by 3 percent between 1990 and 1991: from 3,024 to 2,932 graduates. A slight increase to 3,201 graduates in 1992 was coupled with a decline in the number of programs from 410 to 404. The increase of graduates was due to increased enrollments. In 1998 there were 2,667 graduates, 265 fewer than in 1991.

Medical laboratory technician (MLT) programs increased by 21.3 percent in the 10-year period from 1981 to 1991. From 1991 to 1998, the number of programs fluctuated and in 1998 returned to approximately the same number that existed in the early 1990s. Some increase in the number of programs is seen from 2002 to 2003.

TABLE 3.10

U.S. Trends in Clinical Laboratory Programs: Number of Programs

Year	Medical Technologist	Medical Lab Technician
1971	773	212
1976	696	191
1981	640	211
1986	516	261
1991	410	256
1992	404	255
1995	357	223
1998	288	249
2002	238	222
2003	254	226

Source: SREB Dat-Ex, 1993; Health Professions Education Directory, 1999; Health Professions Education Data Book, 2003–2004

TABLE 3.11

U.S. Clinical Laboratory Graduates

	1989	1990	1991	1992	1998	2002
Medical Technologist	3,148	3,024	2,932	3,201	2,667	1,753
Medical Lab Technician	2,292	2,292	2,437	2,559	2,412	1,273

Source: Allied Health Education Directory, 1993 Health Professions Education Directory, 1999 Health Professions Education Data Book, 2003–2004

TABLE 3.12

Accredited Programs in the United States for Clinical Laboratory Scientist/Medical Technologist (CLS/MT); Clinical Laboratory Technician/Medical Laboratory Technician (CLT/MLT), associate degree, and Clinical Laboratory Technician/Medical Laboratory Technician (CLT/MLT), certificate

	1985	1990	1995	2003
CLS/MT	584	420	357	254
CLT/MLT – associate degree	225	215	223	210
CLT/MLT – certificate	56	41	37	16

Source: Health Professions Education Data Book, 2003–2004

Regional Supply and Demand

There are 91 medical technology programs in the SREB in 2003 and 115 medical laboratory technician programs. Data from the SREB in Table 3.13 show that the number of clinical medical technology graduates in 1998 in the region is equivalent to the number of graduates in 1989. The numbers of graduates for both medical technologist and medical laboratory technicians has declined drastically since 1998.

TABLE 3.13

Regional Clinical Laboratory Graduates

	1989	1990	1991	1998	2002
Medical Technologist	1,033	968	937	1,040	627
Medical Lab Technician	1,207	1,206	1,196	1,030	692

Source: SREB Dat-Ex, 1992; Health Professions Education Directory, 1999; Health Professions Education Data Book, 2003–2004

In 2003 there were 19 accredited cytotechnologist programs in the SREB region and 48 in the U.S. This number represents 40 percent of the nation's programs.

State Supply and Demand

In 2000 the estimated employment of medical and clinical laboratory technologists in Tennessee was 4,130. This number is projected to be 4,610 in 2010, with a growth rate of 1.1 percent and 50 average annual openings. The average 10-year openings for medical and clinical laboratory technologists are 480.

The estimated employment for medical and clinical technicians in 2000 in Tennessee is 5,440. The projected employment for 2010 is 6,150 with a 1.2 percent growth rate and 70 average openings. The average 10-year openings for medical and clinical laboratory technicians are 710. Licensure information for each is located in Table 3.14.

TABLE 3.14

Number of Licensed Medical and Clinical Laboratory Technologists and Medical and Clinical Laboratory Technicians in 2000, 2001, and 2002

	2000	2001	2002
Medical and Clinical Laboratory Technologists	2,737	2,664	2,562
Medical and Clinical Laboratory Technicians	1,980	1,952	1,942

Source: TN Department of Labor and Workforce Development, Employment Sec. Div., Research and Statistics Section, 2003

There are six programs in clinical laboratory scientist/medical technologist (CLS/MT) in Tennessee. Vanderbilt University Medical Center offers a certificate and the program lasts 12 months. Austin Peay State University and the University of Tennessee Medical Center at Knoxville offer certificates and B.S. degrees. These programs last 12 or 13 months. Lincoln Memorial University and Tennessee State University offer B.S. degrees through programs lasting between 12 and 18 months. University of Tennessee Health Science Center in Memphis offers a B.S. degree through a 21-month program and an M.S. degree through a 48-month program.

There are six programs in clinical laboratory technician/medical laboratory technician (CLT/MLT, associate degree) in Tennessee. These programs are at Med Vance Institute in Cookeville, Northeast State Technical Community College (formerly at East Tennessee State University), Jackson State Community College, and Southwest Tennessee Community College. (Both Roane State Community College and Columbia State Community College discontinued their programs in 2000 due to budget cuts and enrollment issues.) These programs offer A.A.S. degrees and last between 18 and 24 months. There are no programs in Tennessee that offer a certificate.

In 2001 the supply of clinical medical technology graduates did not equal the state's demand. There were 272 vacant positions in hospitals alone, due to a combination of growth

and replacement, but only 21 graduates to fill those positions. Hospital vacancy rates in Tennessee are 13 percent according to a THA study.

Additionally, there is a shortage of clinical medical technician graduates in Tennessee. The projected annual need is 70. In 2002, there were 16 graduates in the field (certificate and associate degree combined).

Summary

The 2002 survey data indicate some significant positive changes that should translate to an overall increase in enrollment and should lead to more graduates in all programs within the next two years. This should reduce the shortage to some degree. In addition to a boost in the number of applicants and total enrollment for all categories, clinical sites appear to be more willing to provide clinical rotation sites. There was no significant decline in the number of programs in 2002 as compared to 2000. A telephone survey of all programs in May 2003 indicates an increased number of applicants for the 2003–2004 class. Austin Peay State University has increased its enrollment capacity due to outside funding and partnership with the Tennessee Hospital Association.

III. DENTAL SERVICES

Dental services professions include dental hygienists, dental assistant, and dental laboratory technician.

Status

- Currently in Tennessee, there are supply shortages in all three basic dental auxiliary categories: hygienist, assistant, and laboratory technician.
- Dental hygienists and dental assistants are increasingly responsible for patients' routine dental care so that dentists may focus on more complex procedures. This has increased the demand for hygienists and assistants.
- The demand for dental assistants should be addressed by additional programming.

Description

The three basic dental auxiliary categories that make up the dental team are the dental hygienist, dental assistant, and dental laboratory technician.

The registered dental hygienist is a licensed, professional, oral health educator and clinician, who, as a co-therapist with the dentist, provides preventive, educational, and clinical services in a variety of settings including private dental practices, public health clinics, public schools and hospitals, and at research facilities, in business, and in industry. Dental hygienists' duties may include patient screening procedures, taking and developing dental radiographs, removing calculus and plaque from all surfaces of the teeth, applying preventive materials to teeth, making impressions of patients' teeth for study casts, and counseling patients on good dental health.

Depending upon the state in which the hygienist practices, supervision by a licensed dentist occurs at one of three levels: general supervision, meaning that the dentist does not have to be physically present; indirect supervision, meaning the dentist is in the facility; and direct supervision, when the dentist must evaluate each patient at the end of the dental hygiene procedure.

Dental assistants perform their primary duties chair-side with the dentist, and they also perform a variety of related office and laboratory procedures under the direction or supervision of the dentist. Duties of dental assistants include preparing and sterilizing equipment, assisting the dentist during a variety of treatment procedures, asking about the patient's medical history, and taking impressions of patients' teeth for study casts. In addition, dental assistants often perform office management tasks such as scheduling and billing.

The dental laboratory technician performs laboratory operations primarily concerned with the fabrication of appliances such as fixed and removable prostheses (e.g., dentures and crowns) according to specifications provided by the dentist. The majority of dental laboratory technicians work in commercial dental laboratories.

Educational Preparation

A minimum of two years of college education is necessary to become a dental hygienist. The majority of community college dental hygiene programs take two years to complete, with graduates receiving associate degrees. University dental hygiene programs may offer baccalaureate and master's degrees, which generally require at least two years of additional schooling. Programs are accredited by the Commission on Dental Accreditation of the American Dental Association.

Almost all states require that dental hygienists be graduates of commission-accredited dental hygiene programs to be eligible for state licensure. Additionally, nearly all states require candidates for licensure to obtain a passing score on the National Board Dental Hygienic Examination in addition to passing the state exam.

Dental assistants receive their formal training through academic programs at community colleges, vocational schools, technical institutes, universities, or dental schools. Graduates usually receive certificates. The Commission on Dental Accreditation also accredits these programs. The majority of academic dental assisting programs take 9 to 11 months to complete. In some areas of the country, dental assistants can begin their careers without a college degree; however, education is encouraged in order to ensure training in the latest procedures and techniques.

Dental laboratory technicians may either be trained on the job or be graduates of an accredited program and certified. Programs vary in length and accreditation is not required.

National Supply and Demand

The American Dental Association estimated that in 2000 there were 152,000 professionally active dentists in the United States. About 80 percent are sole proprietors while 13 percent are in a partnership. Tennessee ranks below the national average with only 41.2 dentists per 100,000 people in 1998. Dental hygienists and assistants work directly with dentists.

As members of the baby-boom generation advance into middle age, a large number will need maintenance on complicated dental work such as bridges. In addition, elderly patients are more likely to retain their teeth than they have been in past, so they will continue to require dental care as they age. Interestingly, the demand for dentists will not grow as rapidly as the demand for dental services, indicating that dental hygienists and assistants may increasingly serve as supply substitutes.

The BLS predicts that dental hygiene will be one of the 30 fastest growing occupations in the coming years. Job opportunities should continue to be good if graduates of dental hygiene programs do not increase greatly in number. Dental hygienists held 147,000 jobs in 2000. Over one-half of dental hygienists worked part-time. Almost all dental hygienists work in private dental offices. Some work in public health agencies, hospitals, and clinics.

This prediction is based on a more effective use of the hygienist by younger dentists entering the field and the increasing availability and use of dental insurance. The American Dental Hygienist Association estimated that there were approximately 81,000 actively practicing dental hygienists in the United States. However, 17 percent of the individuals holding active dental hygiene licenses do not practice.

According to the Commission on Dental Accreditation of the American Dental Association, there are 235 accredited dental hygiene programs in the country in 2003. Since 1991, the number of graduates has increased by 23 percent.

Dental assistants held about 247,000 jobs in 2000. Almost two out of five worked part-time, sometimes in more than one dental office. Virtually all dental assistants work in private dental offices. Though a small number work in dental schools, private and government hospitals, state and local public health departments, or clinics.

Dental assisting programs reached a high in 1988, declined in 1990, and stabilized in the late 1990s. The number of graduates grew from 3,848 in 1992 to 5,270 in 1998, an increase of 27 percent. This trend occurred at national, regional, and state levels.

Dental laboratory technicians held about 43,000 jobs in 2000. Most jobs were in commercial dental laboratories, which usually are small, privately owned businesses with fewer than five employees. However, some laboratories are large; a few employ more than 50 technicians. Some dental laboratory technicians work in dentists' offices. Others work for hospitals providing dental services including U.S. Department of Veterans Affairs hospitals. Some technicians work in dental laboratories in their homes in addition to their regular jobs.

The 45 accredited dental laboratory technology programs graduated 404 laboratory technicians in 1991. In 1998 the number of programs had dropped to 35 and the graduates to 381. From 1988 to 1991, there was a 29 percent decline in the number of graduates; from 1991 to 1998 there was an additional small decline of 6 percent.

TABLE 3.15

Accredited Dental Assistant, Dental Hygienist, and
Dental Laboratory Technician Programs in the United States

	1985	1990	1995	2002
Dental Assistant	290	244	229	260
Dental Hygienist	198	202	212	267
Dental Laboratory Technician	58	49	37	26

Source: Health Professions Education Data Book, 2003–2004

Regional Supply and Demand

In 1995 there were 153,346 active dentists in the United States, which translates into 58.3 dentists per 100,000 people. However, dentists are not evenly dispersed throughout the country. Dentist-to-population ratios vary widely from one region of the country to another. As of 1995 the Northeast region had 72.1 active dentists to 100,000 population, the West had 61.6, and the South had 47.3 dentists per 100,000 population. At 50.8 dentists per 100,000 population, Tennessee ranks above the regional average, but below the national average (estimated by the Bureau of Health Professions based on unpublished data from the ADA, 1999).

Data from SREB showed 89 active programs in dental hygiene in the region, which graduated 1,744 students in 1998. This represented 38 percent of the nation's programs and 33.4 percent of its graduates.

The numbers of dental laboratory programs in the SREB region decreased by 82 percent, while the number of graduates increased. In 1990 SREB states sponsored 31 dental laboratory technology programs graduating 171 students. In 1998 the number of programs decreased to 17 but produced 270 graduates. The SREB regions produced 71 percent of all the nation's graduates in that year (Health Professions Education Directory, 1999).

State Supply and Demand

Tennessee state data reveals that the dental professions continue to be occupations where opportunities will continue to grow (Table 3.16). In 1998 there were 117 graduates of accredited dental hygiene programs and 160 openings, leaving an unmet need of 43. The unmet need for dental assistants was even greater. In 1998 Tennessee graduated 100 dental assistants yet there were 222 openings. The same pattern was true for dental lab technicians, although the numbers were substantially smaller. In 1998 there were only 8 graduates and 39 openings.

TABLE 3.16
Tennessee Supply and Demand Data

	Openings 2000	Openings 2010	Average Annual Openings	Annual Rate of Growth (%)
Dental Hygienist	1320	1630	30	2.1
Dental Assistant	4150	5120	100	2.1
Dental Laboratory Technician	830	740	0	0.0

Source: Tennessee Department of Employment Security, Research and Statistics, 2002

In 2000 there were 140 dental hygienist graduates, 123 dental assistant graduates and 122 dentists in Tennessee.

In 2000 the estimated employment of dental hygienists in Tennessee was 1,320. The projected number of dental hygienists in 2010 is 1,630. The growth rate is 2.1 percent, with 30 average annual openings. The average 10-year openings for dental hygienists in Tennessee are 310. The estimated employment of dental assistants in 2000 in Tennessee was 4,150. The projected employment for 2010 is 5,120 dental assistants in Tennessee. The growth rate is 2.1 percent with 100 average annual openings and 970 average 10-year openings in Tennessee. The estimated employment of dental laboratory technicians in 2000 in Tennessee is 830. The projected employment in 2010 is expected to drop to 740, representing a negative growth rate of 1.1 percent. There will be 0 job openings annually and 0 10-year openings.

TABLE 3.17

Number of Licensed Dental Hygienists and Dental Assistants in Tennessee in 2000, 2001, and 2002

	2000	2001	2002
Dental Hygienists	2,920	3,011	3,090
Dental Assistants	3,720	3,814	4,018

Source: TN Department of Labor and Workforce Development, Employment Sec. Div., Research and Statistics Section, 2003

There are eight dental assistant programs in Tennessee. The programs that offer a certificate are located at Chattanooga State Technical Community College, East Tennessee State University, and Volunteer State Community College. The programs that award a diploma are located at Tennessee Technology Center–Dickson, Tennessee Technology Center–Knoxville, Tennessee Technology Center–Memphis, and Tennessee Technology Center–Murfreesboro. Concorde Career Center offers both a certificate and A.A.S. degree. All programs last between 9 and 12 months.

Tennessee has five programs in dental hygiene. Chattanooga State Technical Community College, East Tennessee State University, and Roane State Community College offer A.A.S. degrees with programs that last between 19 and 21 months. The University of Tennessee Health Science Center offers a B.S. degree designed to be completed in 21 months. Tennessee State University offers a certificate with a 17-month program and an A.A.S. degree with a 24-month program.

There is one dental laboratory technician program in Tennessee. East Tennessee State University awards an A.A.S. degree with a program that lasts 18 months.

Statewide demand figures show that the greatest unmet need in dental services is in dental assisting. Given the potential for on the job training and the ability of AVT schools to respond to dental assistant programming needs, AVT schools should be a potential source for new programming.

The Tennessee Department of Labor Assessment rated the demand for dental hygienists and dental assistants as D or Favorable Adjusted, which means not all information is favorable but trainees have excellent job placement rates from a technology center, community college, or technical institute. Dental laboratory technician was rated U since supply could not be determined for this occupation. (The Source, 2002)



**Health Information
Services Cluster**
(Medical Records)

Section 4

HEALTH INFORMATION SERVICES

Health information services professions include health information administrator, health information manager, and medical transcriptionist.

Status

- The number of applicants and graduates from Health Information Management (HIM) programs in Tennessee is declining.
- Health information technicians are projected to represent one of the 20 fastest growing occupations in the country through 2010.
- Currently in Tennessee, the supply of health information technicians (HIT) is not meeting annual demand.

Description

The health information management profession (HIM) is concerned primarily with the management of patient records and involves medical, administrative, ethical, and legal requirements in the storage and safekeeping of physical records. Patient records include medical histories, the results of physical examinations, reports of x-ray and laboratory tests, diagnosis and treatment plans, physicians' orders and notes, and other sources of information. Although the record is primarily used for the medical care of the patient, the information is also used for legal, financial, research, and other purposes.

The field has undergone significant change in recent years due to stricter reimbursement requirements, an expanded regulatory scope, new technologies, greater demand for information, and cost-containment mandates. In 1991 members of the American Medical Record Association adopted new nomenclature and became the American Health Information Management Association (AHIMA).

The health information management field consists of baccalaureate-degreed health information administrators (HIA) and associate-degreed health information technicians (HIT). These individuals were previously known as medical records administrators and medical records technicians.

HIAs are trained in data collection, interpretation, and analysis. They often serve as managers and participate in staffing, budgetary, and evaluation procedures. Some of the most common positions for these professionals are system manager, data quality manager, information security officer, college instructor, and consultant. As more facilities integrate patient records into the national health information infrastructure, HIAs will increasingly have roles that contribute to the computer-based system of record keeping, data vital for patient care.

HITs ensure the quality of medical records by verifying their completeness, accuracy, and proper entry into the computer systems. They often specialize in coding diagnoses for reimbursement and research. Common position titles for these professionals are health data analyst, insurance claims analyst, records technician specialist, clinical coding specialist, and patient information coordinator.

A few programs also offer master's degrees in health information management and related fields.

In addition to administrators and technicians, medical transcriptionists also play an important role in health information management. Medical transcriptionists listen to recordings by physicians and other health care professionals, dictating a variety of medical reports such as medical room visits, chart reviews, and treatment summaries. These reports eventually become part of patient records. According to the BLS, employers prefer medical transcriptionists who have completed a vocational school or community college program.

National Supply and Demand

While hospitals are still one of the primary employers of health information professionals, HMOs, ambulatory care facilities, nursing homes, group practices, insurance agencies, accounting companies, and law firms also employ these personnel.

Organizations not involved in direct care such as insurance companies and health insurance agencies employ medical records specialists to help set policy, analyze data, and evaluate provider performance. Other employers, such as contract agencies and consulting firms, supply medical records personnel to these institutions and organizations, usually on a temporary and intermittent basis.

Medical records and health information technicians held about 136,000 jobs in 2000. About four out of ten jobs were in hospitals. The rest were mostly in nursing homes, medical group practices, clinics, and home health agencies. Medical and health services managers (administrators) held about 250,000 jobs in 2000. Almost two out of five jobs were in hospitals. About one in five were in nursing and personal care facilities or physician offices and clinics. Medical transcriptionists held about 102,000 jobs in 2000. About two out of five worked in hospitals and another two out of five in physician offices and clinics.

The BLS projects a 49 percent growth for new medical record and health information technicians through 2010. This translates to a need for 97,000 technicians to fill new jobs and replace workers who leave the field, making this one of the fastest growing health occupations. The BLS also projects the need for 123,000 new medical and health services managers, the category that includes health information administrator with bachelor's or higher degrees between 2000 and 2010. These data represent an estimate of 6,000 graduates per year. According to AHIMA, HIA and HIT programs are graduating about 2,000 HIM professionals per year, one-third of the number needed.

Complicating this is the looming retention of the workforce. The median years of age of the U.S. labor force in 1998 was 38.7. AHIMA member data show that the median age of its membership is around 50.

The BLS reports that the demand for medical transcriptionists is expected to grow as well. Individuals who earn an associate degree or an American Association for Medical Transcriptionist certification, should have favorable job prospects.

In 2003 there were 47 CAAHEP accredited health information administrator programs and 186 health information technician

programs. In 2002 there were 49 accredited health information administrator programs and 175 accredited health information technician programs in the United States. In 1995 and 1990 there were 53 and 55 health information administrator programs, respectively, and 142 and 108 health information technician programs, respectively.

Table 4.1

U.S. Accredited Health Information Administrator (HIA) and Health Information Technician (HIT) Programs

	1985	1990	1995	2002	2003
HIA	54	55	53	49	47
HIT	85	108	142	175	186

Source: *Health Professions Education Data Book, 2003–2004*
www.caahep.org

The number of CAAHEP-accredited programs in health information administration has declined from a high of 57 programs in 1982 to 55 programs in 1992, 50 in 1998, and 47 programs in 2003. During 1982–1992 the number of CAAHEP-accredited HIT programs increased from 85 to 115 programs. By 1998 there were 168 programs. The number of graduates in HIT programs grew from 808 in 1982 to 1,351 in 1992, a 67 percent increase; by 1998 the number of graduates had increased another 56 percent to 2,110, and there are now 186 HIT programs in 2003. This indicates an increasing reliance on health information technicians to perform the health data management duties.

Technicians may also gain training through an independent study program in health information technology offered by AHIMA. Hospitals sometimes advance promising health information clerks to jobs as health information technicians, although this practice may be less common in the future (BLS, 1998).

Regional Supply and Demand

According to the Health Profession Education Directory, there are 20 HIA programs in the SREB region in 2003, representing 42 percent of the total programs nationwide. There are 84 HIT programs representing 45 percent of the programs in the U.S.

State Supply and Demand

The Tennessee Department of Employment Security reported that the employment base for health information technologists in 1996 was 2,310. That number is expected to increase to 3,575 in 2006, representing an annual growth rate of 5.5 percent. In 1996 the supply or number of graduates for the health information technology area was 44 and the average annual openings were 171 for an unmet demand of 127. The Tennessee Department of Employment Security does not collect data on HIAs. However, employment projections for data base administrators, a related field, indicate that there are 45 annual openings. Tennessee graduated 29 in 1998 and 21 in 2002 from its two HIA programs.

In Tennessee, there are two baccalaureate programs in HIA and four programs in health information technology. The administration programs are located at Tennessee State University and the University of Tennessee Health Science Center at Memphis. The health information technician programs that award both a certificate and an A.A.S. degree are located at Chattanooga State Technical Community College, Dyersburg State Community College, and Roane State Community College. These programs last between 21 and 24 months. Volunteer State Community College awards an A.A.S. degree with a program that lasts 11 months. The THEC reports 55 graduates in HIT programs in 2002.

In 2000 the estimated employment of medical transcriptionists in Tennessee was 2,740. The projected employment for 2010 is 3,400, representing a 2.2 percent growth rate and 70 average annual openings. The average 10-year openings for medical transcriptionists in Tennessee are 660. Because this field does not require certification or licensure, the vacancies are not easily identified. The THEC reports 37 certificates from higher education programs in Tennessee for 2002.

TABLE 4.2

Tennessee Graduates in Health Information Management

	1988	1989	1990	1991	1992	1998	2002	2003
HIA	23	26	24	20	28	29	11	21
HIT	25	26	20	33	18	44	63	55
Medical Transcriptionist	11	8	4	12	14	—	37	—

Source: THEC, SIS, 1992, 2003; Health Professions Education Directory, 1999; Health Professions Education Data Book, 2003–2004

Summary

In general, the reports discussed in this section indicate an increased need for medical record technicians in the future, more so than medical record administrators. Both fields are experiencing growth; however, the administration occupation has fewer annual openings.

The national demand is projected to increase rapidly and regional reports appear to follow national trends. There should be an increased need for coders and/or medical record technicians and medical transcriptionists. Consideration should be given to statewide distribution of health information technician programs.



References and Appendices

Section 5

REFERENCES

Bibliography

- American Association for Respiratory Care, <http://www.aarc.org/>
- American Dental Hygienists Association. (2001). *Access to care position paper* available at <http://www.adha.org/>.
- American Healthcare Radiology Administrators,
<http://www.ahraonline.org/>.
- American Medical Association. (1993). *Allied health education directory*. Chicago, IL: AMA Press.
- American Medical Association. (1992). *Allied health education fact sheet*, May-June 1992 and April 1990. Chicago, IL: AMA Press.
- American Medical Association. (1999). *Health professions education directory*. Chicago, IL: AMA Press.
- American Physical Therapy Association, <http://www.apta.org/>.
- American Society for Clinical Pathology, <http://www.ascp.org/>.
- American Speech-Language-Hearing Association, <http://www.asha.org/>.
- Association of Schools of Allied Health. (1998). *Health professions data collaborative*. <http://www.asahp.org>. Accessed May, 2001.
<http://www.hsc.missouri.edu/~shrp/asahp/wfproj.html>. Accessed September 2003.
- Board of Registry, American Society for Clinical Pathology
<http://www.ascp.org/bor/>. Accessed September 2003
- Business and Public Policy News. (2000). Healthcare trends report: 2000 industry outlook, 14 (1).
- Center for the Health Professions. (1999). *The hidden healthcare workforce: Recognizing, understanding, and improving the allied and auxiliary healthcare workforce*. Executive summary available at <http://futurehealth.ucsf.edu/AHexecsum.html>. Accessed September 2003.

- Davis, B., and Wyatt, D. (Eds.). (1992). *1992 Educator's survey report*. Memphis, TN: University of Tennessee, Tennessee Society for Medical Technology and the Medical Technology Program at UT-Memphis.
- American Occupational Therapy Association. (1996). *Healthcare and market reform: Workforce implications for occupational therapy*. Washington, DC: Health Policy Alternatives.
- Institute of Medicine. (1989). *Allied health services: Avoiding crises*. Washington, DC: National Academic Press.
- Lindler, V., and Chapman, S. (2003). *The clinical laboratory workforce in California*. Center for the Health Professions. Available at <http://www.futurehealth.ucsf.edu/publications/index.html>.
- Morris, L. (1992). *Education and the workforce: Georgia's health professions in the 1990s*. Athens, GA: Institute of Higher Education.
- National Center for Research in Vocational Education (NCRVE). (1992). *Meeting the personnel needs of the health care industry through vocational educational programs*. Berkeley, CA: NCRVE.
- Southern Regional Education Board (SREB). (1993). Inventory of health and human services programs, Dat-Ex. (database file)
- Tennessee Department of Labor and Workforce Development. (2001). *The source for Tennessee employment information*. Available at <http://www.state.tn.us/labor-wfd/source>.
- Tennessee Division of Employment Security. (1993). Occupational Information System.
- Tennessee Division of Information Resources. (1993). Licensure data. <http://www2.state.tn.us/health/licensing.htm>.
- Tennessee Higher Education Commission (THEC). (1992). Student Information System (SIS).
- U.S. Department of the Census. (2000). Available at <http://www.census.gov>.
- U.S. Department of Health and Human Services. (1992). *Health personnel in the United States: Eighth report to Congress*. (DHS Publication No. HRS-P-OD-92-1). Washington, DC: U.S. Government Printing Office.

- U.S. Department of Health and Human Services, Health Resources and Services Administration. (1999). *United States workforce personnel factbook, 1999*. Washington, DC: U.S. Government Printing Office.
- U.S. Department of Labor, Bureau of Labor Statistics. (2003). *Occupational outlook handbook*. Available at <http://www.bls.gov/oco>
- U.S. Department of Labor, Bureau of Labor Statistics. (1998). *Occupational Outlook Handbook*.
- U.S. Department of Labor, Bureau of Labor Statistics. (1991). *Outlook: 1990-2005*.
- Vector Research, Inc. (1997). *Workforce study*. American Physical Therapy Association. Available at http://www.apta.org/WorkforceStudy_DEL.
- Vector Research, Inc. (1999). *Report on current and future supply of audiologists and speech-language pathologists*. American Speech-Language-Hearing Association.
- WestEd Regional Research Laboratory. (formerly Far West Lab) (1995, 2001). *National health care skill standards*.

Web Sites of Interest

- American Association for Respiratory Care
www.aarc.org
- American Dental Hygienists Association
www.adha.org
- American Occupational Therapy Association
www.aota.org
- American Physical Therapy Association
www.apta.org
- American Society for Clinical Pathology
www.ascp.org
- American Speech-Language-Hearing Association
www.asha.org

American Healthcare Radiology Administrators
www.ahraonline.org

Association of Educators in Radiological Sciences
www.aers.org

Association of Schools of Allied Health Professions
<http://www.asahp.org/>

HealthWeb
www.healthweb.org
Allied Health links on HealthWeb
www.healthweb.org/browse.cfm?subjectid=23

Tennessee Department of Health
www2.state.tn.us/health
TDH Licensing Information
www2.state.tn.us/health/licensing.htm

Tennessee Department of Labor and Workforce Development
www.state.tn.us/labor-wfd

Tennessee Higher Education Commission
www.state.tn.us/thec

Tennessee Hospital Association Career Moves
www.tha.com/career/index.htm

U.S. Dept. of Labor, Bureau of Labor and Statistics,
Occupational Outlook Handbook for 2002–2003
www.bls.gov/oco

U.S. Department of the Census
www.census.gov

APPENDIX A

ACCREDITED ALLIED HEALTH PROGRAMS IN TENNESSEE, 2003

Blountville

Northeast State Technical Community College

www.nstcc.cc.tn.us

Clinical Laboratory Technician/Medical Laboratory Technician,
Emergency Medical Technician-Paramedic, Medical Assistant,
Surgical Technologist

Chattanooga

Chattanooga State Technical Community College

www.cstcc.cc.tn.us

Dental Assistant, Dental Hygienist, Diagnostic Medical Sonographer,
Emergency Medical Technician-Paramedic, Health Information
Technologist, Medical Assistant, Nuclear Medicine Technologist,
Physical Therapy Assistant, Radiation Therapist, Radiographer,
Respiratory Therapist-Advanced, and Surgical Technologist

University of Tennessee at Chattanooga

www.utc.edu

Dietetics-Didactic, Occupational Therapy, Physical Therapy

Clarksville

Austin Peay State University

www.apsu.edu

Clinical Laboratory Scientist/Medical Technologist

Miller-Motte Technical College

www.miller-motte.com/clarksvillemain.html

Medical Assistant

Cleveland

Cleveland State Community College

www.clscs.cc.tn.us

Medical Assistant, Emergency Medical Technician

Columbia

Columbia State Community College

www.coscc.cc.tn.us

Clinical Laboratory Technician/Medical Laboratory Technician,
Emergency Medical Technician-Paramedic, Radiographer,
Respiratory Therapist-Advanced

Cookeville

Med Vance Institute

<http://www.medvance.org/Cookeville/>

Clinical Laboratory Technician/Medical Laboratory Technician

Tennessee Technological University

www.tntech.edu

Dietetics-Didactic

Crossville

Tennessee Technology Center–Crossville

www.crossville.tec.tn.us

Surgical Technologist

Dickson

Tennessee Technology Center–Dickson

www.dickson.tec.tn.us

Dental Assistant, Surgical Technologist

Dyersburg

Dyersburg State Community College

www.dscc.cc.tn.us

Health Information Technician

Gallatin

Volunteer State Community College

www.vsccl.cc.tn.us

Dental Assistant, Emergency Medical Technician-Paramedic, Health
Information Technologist, Physical Therapy Assistant, Radiographer,
Respiratory Therapist-Advanced, Respiratory Therapist-Entry Level

Harriman

Roane State Community College

www.rsccl.tn.us

Clinical Laboratory Technician/Medical Laboratory Technician, Dental Hygienist, Emergency Medical Technician-Paramedic, Health Information Technologist, Occupational Therapy Assistant, Ophthalmic Dispensing Optician, Phlebotomist, Physical Therapy Assistant, Radiographer, Respiratory Therapist-Advanced

Harrogate

Lincoln Memorial University

www.lmunet.edu

Athletic Training, Clinical Laboratory Scientist/Medical Technologist

Hohenwald

Tennessee Technology Center – Hohenwald

www.hohenwald.tec.tn.us

Surgical Technologist

Jackson

Jackson State Community College

www.jscc.tn.us

Clinical Laboratory Technician/Medical Laboratory Technician, Emergency Medical Technician-Paramedic, Physical Therapist Assistant, Radiographer, Respiratory Therapist-Advanced

Tennessee Technology Center– Jackson

www.jackson.tec.tn.us

Pharmacy Technician, Surgical Technologist

Union University

www.uu.edu

Athletic Training

West Tennessee Business College

www.wtbc.com

Medical Assistant

Jefferson City

Carson-Newman College

www.cn.edu

Dietetics-Didactic

Johnson City

East Tennessee State University

www.etsu.edu

Audiologist, Community Counseling, Dental Assistant, Dental Hygienist, Dental Laboratory Technician, Dietetic Internship, Dietetics-Didactic, Physical Therapist, Radiographer, Respiratory Therapist-Advanced, School Counseling (not in report), Speech-Language Pathologist

Knoxville

Ft. Sanders Regional Medical Center

www.fsregional.com

Surgical Technologist

South College

www.kbcollege.edu

Medical Assistant, Occupational Therapy Assistant, Physical Therapist Assistant

Tennessee Technology Center – Knoxville

www.knoxville.tec.tn.us

Dental Assistant, Medical Assistant, Surgical Technologist

University of Tennessee Medical Center at Knoxville

www.utmedicalcenter.org

Clinical Laboratory Scientist/Medical Technologist, Nuclear Medicine Technologist, Radiographer

University of Tennessee at Knoxville

www.utk.edu

Audiologist, Dietetic Internship, Dietetics-Didactic, Mental Health Counselor, Rehabilitation Counseling, School Counseling (not in report), Speech-Language Pathologist, Therapeutic Recreation Specialist

Martin

University of Tennessee at Martin

www.utm.edu

Dietetic Internship, Dietetics-Didactic

McKenzie

Bethel College

www.bethel-college.edu

Physician Assistant

McMinnville

Tennessee Technology Center – McMinnville

www.mcminnville.tec.tn.us

Medical Assistant, Surgical Technologist

Memphis

Baptist Memorial College of Health Science

www.bchs.edu

Diagnostic Medical Sonographer, Nuclear Medicine Technologist,
Radiation Therapist, Radiographer, Respiratory Therapist-Advanced

Concorde Career Center

www.concordecareers.com/memphis

Dental Assistant, Medical Assistant, Pharmacy Technician

Methodist Healthcare

www.methodisthealth.org

Nuclear Medicine Technologist, Radiographer

Southwest Tennessee Community College

www.southwest.tn.edu

Clinical Laboratory Technician/Medical Laboratory Technician,
Dietetic Technician, Emergency Medical Technician-Paramedic,
Phlebotomist, Physical Therapy Assistant, Radiographer

Tennessee Technology Center – Memphis

www.memphis.tec.tn.us

Dental Assistant, Pharmacy Technician, Respiratory Therapist-Entry
Level, Surgical Technologist

University of Memphis

www.memphis.edu

Audiologist, Community Counseling, Dietetic Internship,
Dietetics/Didactic, Rehabilitation Counseling, School Counseling
(not in report), Speech Language Pathologist

University of Tennessee Health Science Center

<http://www.utmem.edu/>

Clinical Laboratory Scientist/Medical Technologist, Cytotechnologist,
Dental Hygienist, Health Information Administrator, Occupational
Therapist, Physical Therapist

Milligan

Milligan College

www.milligan.edu
Occupational Therapist

Morristown

Walters State Community College

www.wsc.c.c.tn.us
Emergency Medical Technician-Paramedic, Physical Therapist
Assistant, Respiratory Therapist-Entry Level

Murfreesboro

Middle Tennessee State University

www.mtsu.edu
Athletic Trainer, Communication Disorders (B.S.), Nutrition/
Dietetics-Didactic, Medical Technology, Nuclear Medicine
Technology, Radiation Therapy, Recreation Therapy, School
Counseling (not in report)

National Healthcare LP

www.nhccare.com
Dietetic Internship

Tennessee Technology Center – Murfreesboro

www.murfreesboro.tec.tn.us
Dental Assistant, Pharmacy Technician, Surgical Technologist

Nashville

Belmont University

<http://www.belmont.edu/>
Occupational Therapist, Physical Therapist

David Lipscomb University

www.lipscomb.edu
Athletic Trainer, Dietetics-Didactic

Metropolitan Nashville General Hospital

www.nashville.org/hosp/general
Radiography

Nashville State Technical Community College

www.nsti.tec.tn.us
Occupational Therapy Assistant, Surgical Technologist

National College of Business and Technology

www.ncbt.edu

Medical Assistant

Tennessee State University

www.tnstate.edu

Clinical Laboratory Scientist/Medical Technologist, Dental Hygienist, Dietetics-Didactic, Health Information Administration, Occupational Therapist, Respiratory Therapist-Advanced, Speech-Language Pathologist

Tennessee Technology Center – Nashville

www.nashville.tec.tn.us

Pharmacy Technician

Trevecca University

www.trevecca.edu

Physician Assistant

Vanderbilt University

www.vanderbilt.edu

Community Counseling, School Counseling (not in report)

Vanderbilt University Medical Center

www.mc.vanderbilt.edu

Audiologist, Clinical Laboratory Scientist/Medical Technologist, Dietetic Internship, Nuclear Medicine Technologist, Perfusionist, Radiation Therapy, Speech-Language Pathologist

Paris

Tennessee Technology Center – Paris

www.paris.tec.tn.us

Surgical Technologist

Source: Health Professions Education Directory,
2003–2004 American Medical Association

PROGRAMS AND DEGREES

Tennessee Schools and Allied Health Degrees Offered, 2003

Austin Peay State University

Clarksville, Tenn.

- B.S. Medical Technology
- B.S. Nuclear Medicine Technology

Baptist Memorial College of Health Sciences

Memphis, Tenn.

- B.S. Medical Radiology
- B.S. Nuclear Medicine Technology
- B.S. Radiation Therapy Technology
- B.S. Medical Sonography

Belmont University, College of Health Sciences

Nashville, Tenn.

- M.S. Occupational Therapy

Chattanooga State Technical Community College

Chattanooga, Tenn.

- R.D.A., C.D.A. Dental Assisting
- A.A.S. Dental Hygiene
- EMT Paramedic
- A.A.S. Health Service Management
- A.A.S. Physical Therapy Assistant
- A.A.S. Radiologic Technology
- A.A.S. Respiratory Care
- T. Cert. Nuclear Medicine Tech.
- T. Cert. Radiation Therapy Tech.
- T. Cert. Medical Sonography
- Inst. Cert. Phlebotomy
- Inst. Cert. Nursing Assistant
- Inst. Cert. Medical Terminology

Cleveland State Community College

Cleveland, Tenn.

- Certificate EMT

Columbia State Community College

Columbia, Tenn.

- Certificate EMT-Paramedic Tech.
- A.A.S. Medical Laboratory Tech.
- A.A.S. Radiologic Technology
- A.A.S. Respiratory Care Technology

Dyersburg State Community College

Dyersburg, Tenn.

- Certificate EMT
- A.A.S. Medical Records
- Certificate Medical Transcription
- A.A.S. Physical Therapy Assistant
- Certificate Surgical Technologist
- A.A.S. or Certificate Paramedic

East Tennessee State University

Johnson City, Tenn.

- AUD Audiology
- M.S. Speech-Language Pathology
- B.S.D.H. Dental Hygiene
- B.S. Medical Technology
- B.S., M.S. Microbiology
- B.S. Radiography
- B.S. Cardiopulmonary Science
- D.P.T. Physical Therapy

Jackson State Community College

Jackson, Tenn.

- A.A.S. Medical Laboratory Tech.
- A.A.S. Physical Therapy Assistant
- A.A.S. Radiography
- A.A.S. Respiratory Care Technology
- Certificate EMT-Paramedic

Lincoln Memorial University

Harrogate, Tenn.

- B.S. Medical Technology

Middle Tennessee State University

Murfreesboro, Tenn.

- B.S. Communication Disorders
- B.S. Recreation Therapy
- B.S. Athletic Training
- B.S. Medical Technology
- B.S. Nuclear Medicine Technology
- B.S. Radiation Therapy

Roane State Community College

Harriman, Tenn.

- A.A.S. Dental Hygiene Technology
- A.A.S. Medical Lab. Technology
- A.A.S. Health Information Technology
- A.A.S. Occupational Therapy Assistant
- A.A.S. Physical Therapy Assistant
- A.A.S. Radiologic Technology
- A.A.S. Respiratory Therapy Tech.
- Certificate EMT-Paramedic
- Certificate Medical Transcriptionist

Shelby State Community College

Memphis, Tenn.

- Certificate EMT
- A.A.S. Medical Assistant
- A.A.S. Medical Lab. Technology
- A.A.S. Physical Therapy Assistant
- A.A.S. Radiologic Technology

Tennessee State University

Nashville, Tenn.

- A.A.S., B.S. Dental Hygiene
- B.S. Health Information Management
- B.S. Medical Technology
- B.S. Occupational Therapy
- M.P.T. Physical Therapy
- B.S./M.S. Speech-Path./Audiology
- B.S. Health Care Administration and Planning
- B.S. Cardiorespiratory Care Science

Trevecca University

Nashville, Tenn.

B.S. Medical Technology

The University of Memphis

Memphis, Tenn.

M.A., Ph.D. Speech-Path./Audiology

University of Tennessee at Chattanooga

Chattanooga, Tenn.

B.S.P.T. Physical Therapy

University of Tennessee at Memphis

Memphis, Tenn.

B.S. Medical Technology

B.S. Cytotechnology

B.S. Dental Hygiene

B.S. Health Information Management

B.S., M.S. Physical Therapy

B.S. Occupational Therapy

Volunteer State Community College

Gallatin, Tenn.

Certificate Dental Assisting

Certificate Medical Sonography

Certificate EMT-Paramedic

A.A.S. Health Information Technology

A.A.S. Physical Therapy Assistant

A.A.S. Radiologic Technology

Certificate Respiratory Care Tech.

Walters State Community College

Morristown, Tenn.

A.A.S. Physical Therapy Assistant

Acad. Cert. Respiratory Care Tech.

Tech. Cert. Medical Transcriptionist

APPENDIX B

PROFESSIONAL ORGANIZATIONS AND WEB SITES

American Physical Therapy Association
www.apta.org

American Occupational Therapy Association
www.aota.org

American Medical Association
www.ama.org

American Dental Association
www.ada.org

National Athletic Trainers' Association
www.nata.org

American Therapeutic Recreation Association
www.atra-tr.org

American School Health Association
www.ashaweb.org

American Dietetic Association
www.eatright.org

American Speech-Language Hearing Association
www.asha.org

Assn. of Educators in Radiological Sciences
www.aers.org

American Association for Respiratory Care
www.aarc.org

APPENDIX C

ACCREDITATION INFORMATION

Accreditation Council for Occupational Therapy Education (ACOTE)

www.aota.org
Occupational Therapist, Occupational Therapy Assistant

Accreditation Review Commission on Education for the Physician Assistant (ARC-PA)

www.arc-pa.org
Physician Assistant

American Art Therapy Association (AATA)

www.arttherapy.org
Art Therapist

American Orthoptic Council (AOC)

www.orthoptics.org
Orthoptist

American Physical Therapy Association (APTA)

www.apta.org
Physical Therapist, Physical Therapist Assistant

American Society of Health System Pharmacists (ASHP)

www.ashp.org
Pharmacy Technician

Association for Education and Rehabilitation of the Blind and Visually Impaired (AERBVI)

www.aerbvi.org
Low Vision Therapist, Orientation and Mobility Specialist,
Rehabilitation Teacher, Teacher of the Visually Impaired

Commission on Accreditation of Allied Health Education Programs (CAAHEP)

www.caahep.org

Anesthesiologist Assistant, Athletic Trainer, Cardiovascular Technologist, Cytotechnologist, Diagnostic Medical Sonographer, Electroneurodiagnostic Technologist, Emergency Medical Technician-Paramedic, Health Information Administrator, Health Information Technician, Kinesiotherapist, Medical Assistant, Medical Illustrator, Ophthalmic Medical Technician/Technologist, Orthotist/Prosthetist, Perfusionist, Respiratory Therapist (Advanced), Respiratory Therapist (Entry-Level), Specialist in Blood Bank Technology, Surgical Technologist

Commission on Accreditation for Dietetics Education (CADE) of the American Dietetic Association

www.eatright.org/cade

Dietetic Technician, Dietitian/Nutritionist

Commission on Dental Accreditation (CDA) of the American Dental Association

www.ada.org

Dental Assistant, Dental Hygienist, Dental Laboratory Technician

Commission of Opticianry Accreditation

www.COAccreditation.com

Ophthalmic Dispensing Optician, Ophthalmic Laboratory Technician

Council on Academic Accreditation in Audiology and Speech-Language Pathology

<http://professional.asha.org/academic/council.cfm>

Audiologist, Speech-Language Pathologist

Council on Accreditation of the National Recreation and Park Association

www.nrpa.org

Therapeutic Recreation Specialist

Council on Rehabilitation Education (CORE)

www.core-rehab.org
Rehabilitation Counselor

Joint Review Committee on Education in Radiologic Technology (JRCERT)

www.jrcert.org
Radiation Therapist, Radiographer

Joint Review Committee on Educational Programs in Nuclear Medicine Technology (JRCNMT)

www.jrcnmt.org
Nuclear Medicine Technologist

National Accrediting Agency for Clinical Laboratory Sciences (NAACLS)

www.naacls.org
Clinical Laboratory Technician/Medical Laboratory Technician-Associate Degree, Clinical Laboratory Technician/Medical Laboratory Technician-Certificate, Clinical Laboratory Scientist/Medical Technologist, Diagnostic Molecular Scientist, Histologic Technician/Technologist, Pathologists' Assistant, Clinical Assistant, Cytogenetic Technologist, Phlebotomist

National Association for Schools of Music (NASM)

www.arts-accredit.org
Music Therapist

APPENDIX D

1992 TBR Allied Health Task Force Members

Dr. M. Jo Edwards

Dr. Barbara Baker

Ms. Brenda Coleman

Mr. Tom Coley

Dr. Donna Pierce

Dr. Tonya Purdie

Dr. Robert Crews

Mr. Glen Swinny

Ms. Sandra Wakefield

Dr. Guy Lanza

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Mr. David Esa

Dr. George Malo

Dr. Kaylene Gebert

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