THE STATE OF ALLIED HEALTH IN NORTH CAROLINA

A focus on :

The Clinical Laboratory Sciences Workforce

August 2004

The State of Allied Health Report is a collaborative effort of:

The Council for Allied Health in North Carolina
The North Carolina Area Health Education Centers (AHEC) Program
The Cecil G. Sheps Center for Health Services Research, UNC-Chapel Hill

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A Focus on the Clinical Laboratory Sciences Workforce

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- Konrad, T., Thaker, S. *Maintaining Balance: The Physical Therapy Workforce in North Carolina in the Year 2000*. Chapel Hill, North Carolina. The Council for Allied Health in North Carolina, May 2000.

- Fraher, E., Smith, L. *Communicating the Trends: The Speech-Language Pathology Workforce in North Carolina*. Chapel Hill, North Carolina. The Council for Allied Health in North Carolina, June 2001.

- Dyson, S., Fraher, E., Smith, L. *The Health Information Management Workforce in North Carolina: Current Trends, Future Directions. A Report of the Technical Panel on the Health Information Management Workforce.* Chapel Hill, North Carolina. The Council for Allied Health in North Carolina, October 2002.

- Dyson, S., Fraher, E., Wilkins, B., Smith, L. *Scanning the Radiologic Sciences Workforce in North Carolina.* Chapel Hill, North Carolina. The Council for Allied Health in North Carolina, July 2003.

- Dyson, S. *The State of Allied Health in North Carolina: A Focus on the Respiratory Therapy Workforce*. Chapel Hill, North Carolina. The Council for Allied Health in North Carolina, August 2004.

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The State of Allied Health in North Carolina:

A Focus on the Clinical Laboratory Sciences Workforce

- *Who are clinical laboratory sciences practitioners and what do they do?*
- *How many are practicing in North Carolina and where do they work?*
- *Is this workforce diverse?*
- *What is the capacity of existing clinical laboratory sciences educational programs?*
- *Is there a current shortage of practitioners or faculty in North Carolina?*
- *Will there be a shortage in the future?*

I. INTRODUCTION

The State of Allied Health in North Carolina: A Focus on the Clinical Laboratory Sciences Workforce examines the North Carolina clinical laboratory sciences workforce, which for the purposes of this report includes medical technologists and medical laboratory technicians. The report also examines the State's educational training programs and provides information about issues that will impact clinical laboratory sciences practitioners. This report can assist educators, employers, health professionals and other policy-makers with an interest in the clinical laboratory sciences and other health workforce professions. Clinical laboratory sciences practitioners is the sixth allied health profession to be analyzed under the joint collaborative efforts of the Council for Allied Health in North Carolina, the North Carolina Area Health Education Centers (NC AHEC) Program, and the Cecil G. Sheps Center for Health Services Research at The University of North Carolina at Chapel Hill. Funding for the allied health workforce reports is provided through The Duke Endowment.

II. BACKGROUND ON THE CLINICAL LABORATORY SCIENCES WORKFORCE

Medical technologists (also known as clinical laboratory scientists) and medical laboratory technicians (also known as clinical laboratory technicians) examine blood, body fluids and tissues and perform laboratory tests necessary for the detection, diagnosis and treatment of diseases. Medical laboratory technicians (MLTs) typically perform routine and moderately complex tests whereas medical technologists (MTs) typically conduct more technically advanced and complex tests, supervise laboratory personnel or oversee laboratory operations. These clinical laboratory sciences practitioners perform laboratory tests in conjunction with pathologists and other physicians and scientists. Clinical laboratory sciences practitioners are employed in hospitals, private reference laboratories, physician practices and clinics, blood centers, pharmaceutical companies, and medical research and biotechnology facilities.[1,2] Unlike many other health professions, clinical laboratory sciences practitioners have little to no contact with patients, yet they play a critical role in the delivery of health care services. Without the tests and procedures performed by MTs and MLTs, health care providers would be unable to make diagnoses, establish treatment regimens or monitor patient health status.

The need for clinical laboratory sciences practitioners will moderately grow over the period 2000 to 2010, according to the North Carolina Employment Security Commission.[3] The number of medical technologists is expected to increase 23% from 4,300 to 5,290 practitioners over that time period. These figures represent the number of projected new job openings and openings necessary to replace workers who leave the workforce, retire or die. Similarly, the medical laboratory technician workforce is expected to increase 22% from 4,400 to 5,380. Like other health professions, the growing demand for the clinical laboratory workforce is due to a number of factors. These include: population growth and aging; changes in the delivery and regulation of health care; development of new tests for diagnosis and treatment of diseases and conditions; increases in disease prevalence and patient acuity; and concerns about the impact of bioterrorism, disease outbreaks and other catastrophic events which affect health care systems and personnel. As the population increases, the demand for healthcare, including laboratory testing, increases. The use of information technology in laboratories is creating more demand for a technologically savvy laboratory workforce. This report will look specifically at medical technologists and medical laboratory technicians; other laboratory personnel such as cytotechnologists, histotechnologists and pathologists will not be covered.

III. NORTH CAROLINA'S CLINICAL LABORATORY SCIENCES WORKFORCE

The practice of clinical laboratory sciences in North Carolina is not regulated by licensure, certification or registration. However, many employers prefer or require laboratory practitioners to hold national certification. Three national, voluntary credentialing organizations certify the majority of laboratory practitioners: American Society of Clinical Pathology-Board of Registry (ASCP)[4], National Credentialing Association (NCA)[5] and American Medical Technologists, Inc. (AMT)[6]. All three organizations certify medical technologists/clinical laboratory scientists and medical laboratory technicians/clinical laboratory technicians in addition to offering other laboratory credentialing exams. ASCP is the largest, with over 80,000 MT and 29,000 MLT associates and registrants across the United States in 2004.[7]

Data on the North Carolina clinical laboratory sciences workforce were obtained from the three national certifying organizations. Individual-level data were not available from all organizations and therefore data sets could not be merged to remove duplicate practitioners. The largest numbers of practitioners in North Carolina hold certification with ASCP, and therefore statistics derived from the three data sets are heavily weighted by the demographic and employment characteristics of ASCP-certified practitioners. The data sets exclude clinical laboratory sciences practitioners who are not credentialed with ASCP, NCA and/or AMT and therefore may underestimate the actual MT and MLT workforce in North Carolina. Where possible, data from these three organizations will be used to describe the North Carolina workforce. If data were not available or unknown, alternative data were used.

Table 1a: Medical Laboratory Technicians per 10,000 Population, 2002

State	MLTs per 10,000 Population
US	5.00
TN	7.96
SC	6.97
NC	**5.61**
GA	5.47
VA	3.47

Table 1b: Medical Technologists per 10,000 Population, 2002

State	MTs per 10,000 Population
US	5.09
TN	6.98
NC	**5.82**
SC	5.39
VA	5.24
GA	4.99

Sources: Bureau of Labor Statistics; US Census Bureau.

A. Supply

According to the Bureau of Labor Statistics, there were an estimated 4,830 medical technologists and 4,660 medical laboratory technicians in North Carolina in 2002.[8]

In 2002, North Carolina's ratio of medical laboratory technicians and medical technologists was 5.6 and 5.8 practitioners per population, respectively [Tables 1a and 1b]. Both ratios exceeded the national ratio of practitioners per population. Of North Carolina's four neighboring states, Tennessee had the highest ratios for both MLTs and MTs.

B. Distribution

Data on practice location or residence were not available from all organizations and therefore determining distribution of North Carolina's clinical laboratory sciences workforce was not possible for this report.

C. Demographic Characteristics:

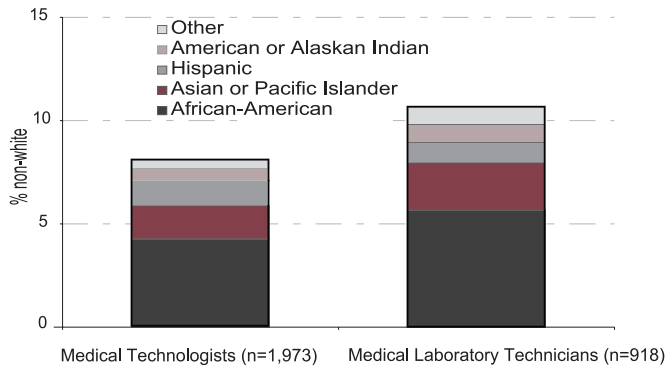
- *Gender*

  Consistent across many other allied health professions, the clinical laboratory sciences workforce is predominately female; males account for less than 15% of both MTs and MLTs in North Carolina.[9]

- *Race and Ethnicity*

  Based on data from ASCP, approximately 8% of MTs and 10% of MLTs in North Carolina are non-white [Figure 1].[10] If these figures are representative of all clinical laboratory sciences practitioners in the State, then the workforce does not reflect the racial and ethnic diversity of North Carolinians, in which 27.9% of the population in 2000 was from a racial or ethnic minority.[11]

Figure 1. Percent of Clinical Laboratory Sciences Practioners by Race/Ethnicity, Non-White, North Carolina, 2004



Source: American Society for Clinical Pathology-Board of Registry, 2004.
Notes: Percentages exclude records for which race/ethnicity was missing or unknown: MTs (n=237), MLTs (n=179).

♦ *Average Age*

The average age of North Carolina's medical laboratory technicians (43 years) is slightly younger than medical technologists (47 years). Both MLTs and MTs are younger than their national counterparts, who are on average 45 years (MLTs) and 49 years old (MTs).[12]

D. Educational Background

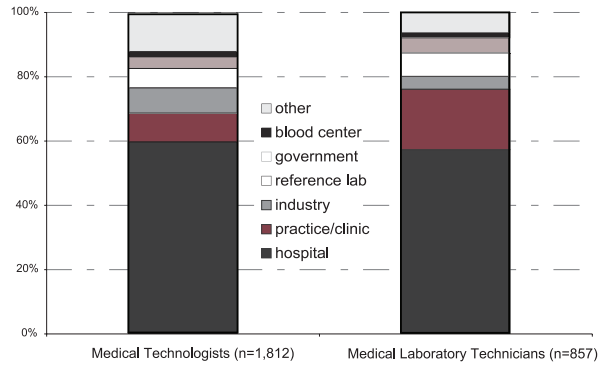
Data on the highest educational attainment of clinical laboratory sciences practitioners were not available.

E. Employment Setting

According to ASCP, the majority of both MTs and MLTs practice in hospitals (59.7% and 57.3%, respectively). MLTs are more likely to be employed in clinics or physician practices (18.8%) than are MTs (8.9%) [Figure 2].

Although North Carolina is home to several regional and national commercial laboratories which provide laboratory testing services for many health care facilities across the country, the percentage of the North Carolina workforce employed in reference laboratories is simliar to that of the national workforce. In North Carolina 7.4% of MLTs and 6.0% of MTs practice in reference labs, compared with 7.3% of MLTs and 7.8% of MTs nationwide.

Figure 2. Clinical Laboratory Sciences Practitioners by Employment Setting, North Carolina, 2004



Source: American Society for Clinical Pathology-Board of Registry, 2004.
Notes: Percentages exclude MTs and MLTs who were retired, unemployed or had unknown employment setting information: MTs (n=398) MLTs (n=240).

Table 2a: Annual Wage Estimates for Medical Laboratory Technicians, 2002

State	MLTs Mean Annual Wage
US	$ 30,300
SC	$ 29,860
NC	**$ 28,480**
VA	$ 28,280
TN	$ 26,330
GA	$ 25,970

Table 2b: Annual Wage Estimates for Medical Technologists, 2002

State	MTs Mean Annual Wage
US	$ 43,670
GA	$ 41,510
VA	$ 41,430
TN	$ 40,220
SC	$ 39,060
NC	**$ 38,970**

Source: Bureau of Labor Statistics; 2002 State Occupational Employment Wages and Estimates.

F. Salary

Wages earned by both medical laboratory technicians and medical technologists in many of the southeastern states fall below the national averages. The average annual salary of medical laboratory technicians in North Carolina in 2002 was $28,480 and $38,970 for medical technologists. [Tables 2a and 2b].

North Carolina ranked in the bottom ten states for wages earned by MTs and below all of its neighboring states. Salary estimates for both MTs and MLTs are relatively low compared with other health professions in North Carolina requiring the same educational preparation to enter the field [Table 3].

Table 3. Mean Annual Salaries for Health Professions, North Carolina, 2002

Profession	Minimum Educational Degree	Annual Salary
Occupational Therapist	Baccalaureate Degree	$ 55,940
Radiation Therapist	Associate Degree	$ 48,820
Dental Hygienist	Associate Degree	$ 46,600
Registered Nurse	Diploma	$ 46,370
Respiratory Therapist	Associate Degree	$ 40,270
Nuclear Medicine Technologist	Associate Degree	$ 40,200
Medical Technologist	**Baccalaureate Degree**	**$ 38,970**
Radiologic Technologist	Certificate/Diploma	$ 38,300
Surgical Technologist	Certificate/Diploma	$ 30,570
Medical Laboratory Technician	**Associate Degree**	**$ 28,480**
Medical Records Technician	Associate Degree	$ 25,420

Source: Bureau of Labor Statistics; 2002 State Occupational Employment Wages and Estimates.

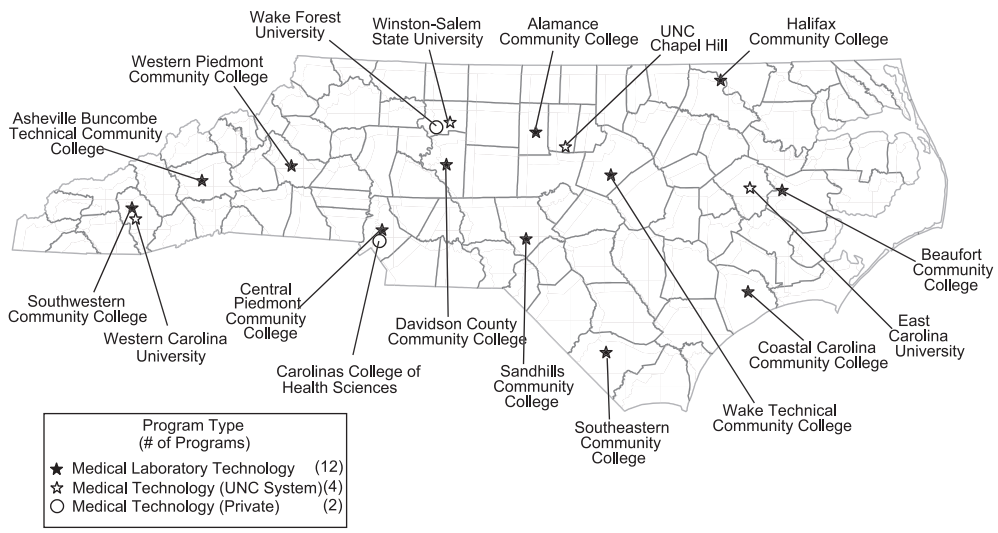
IV. CLINICAL LABORATORY SCIENCES EDUCATION

North Carolina lacks state licensure or regulations for the minimum educational credential needed to enter the laboratory sciences workforce and therefore it is possible to work in the field after obtaining various educational degrees. While some practitioners working in the field have obtained education in another science field or experience through on-the-job training, many employers prefer or require successful completion of an accredited clinical laboratory sciences program and/or certification from one of the national certifying organizations. The National Accrediting Agency for Clinical Laboratory Sciences (NAACLS) accredits both medical technologist and medical laboratory technician programs.

A. Medical Technologists

The path to become a medical technologist typically occurs after completion of a baccalaureate degree from an accredited MT program. However, some in the field hold degrees in other science disciplines or have obtained their education and experience through years of on-the-job training. There are four baccalaureate programs in the UNC System: East Carolina University, The University of North Carolina at Chapel Hill, Winston-Salem State University and Western Carolina University [Figure 3].

Figure 3. Accredited Laboratory Sciences Educational Programs, North Carolina, 2004



Produced by:
North Carolina Health Professions Data System,
Cecil G. Sheps Center for Health Services Research,
The University of North Carolina at Chapel Hill.

Sources:
National Accrediting Agency for Clinical Laboratory Sciences: North Carolina Community College System; North Carolina Independent Colleges and Universities, 2004.

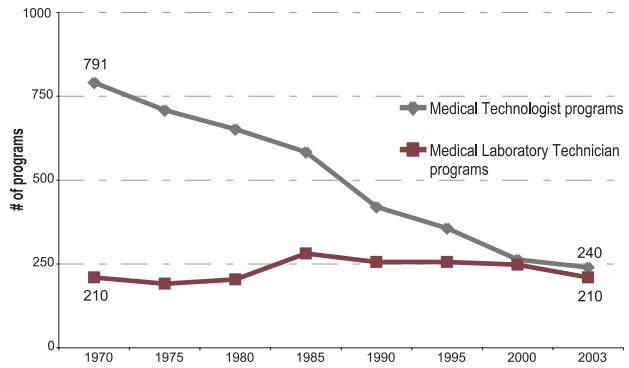
Notes: Collaborative MLT programs exist with Beaufort (College of the Albemarle and Pitt Community College), Davidson (Forsyth Technical Community College and Guilford Technical Community College), Southeastern (Bladen Community College, Brunswick Community College, Cape Fear Community College and James Sprunt Community College). Collaborative MT programs exist with Carolinas College of Health Sciences (Gardner-Webb University, Bennett College and Lenoir Rhyne College), and Wake Forest University (Bennett College, Catawba College, Elon University, Gardner-Webb University, High Point University, Lenoir Rhyne College and Salem College).

In addition, there are two schools of medical technology at Wake Forest Baptist University Medical Center and Carolinas College of Health Sciences, which offer certificate programs and/or baccalaureate degrees in collaboration with other public and private universities across the State. East Carolina, Winston-Salem State and Western Carolina Universities offer articulation programs for MLTs to obtain a baccalaureate degree in medical technology.

B. Medical Laboratory Technicians

Although some of the medical laboratory technician workforce obtained their education and experience through on-the-job training or in another science discipline, MLTs typically hold an associate's degree from an accredited MLT program, of which there are 12 in North Carolina [Figure 3]. These programs are all located in community colleges.

Figure 4. Accredited Clinical Laboratory Sciences Programs, United States, 1970-2003



Source: National Accrediting Agency for Clinical Laboratory Sciences, 2004.

Program Closures:
Closing of clinical laboratory sciences programs across the United States has been a trend over the last 30 years. From 1970 to 2003 there was a dramatic decline in the number of medical technologist programs - a 70% decrease, from 791 to 240 programs [Figure 4]. The number of MLT programs across the country has changed little over the same time period. While showing slight growth during the 1980-1990's, the number of programs in 2003 was back at 1970 levels (210 programs). North Carolina has not been immune to this trend. Several hospital-based MT programs have closed, the most recent at Moses H. Cone Memorial Hospital in Greensboro in 2000.

ACCREDITATION REQUIREMENTS FOR CLINICAL LABORATORY SCIENCES PROGRAM FACULTY

The National Accrediting Agency for Clinical Laboratory Sciences Program (NAACLS) accreditation standards require that program directors of both medical technologist and medical laboratory technician programs must be both nationally certified and hold at least a master's degree.[17]

V. NORTH CAROLINA EDUCATIONAL PROGRAMS[16]

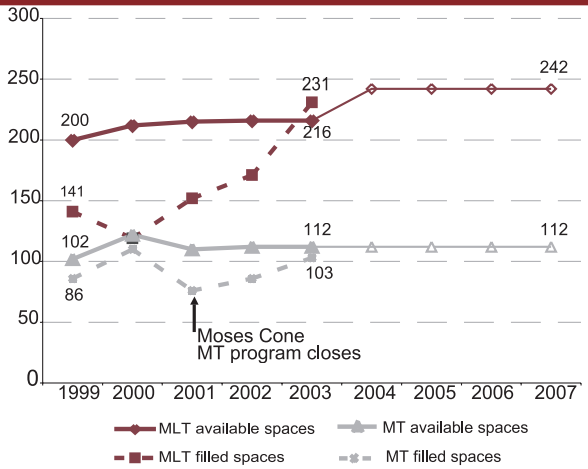
Data on the educational programs for clinical laboratory sciences programs were obtained from The University of North Carolina Office of the President, the North Carolina Community College System and from the individual directors and faculty in the medical technologist and medical laboratory technician programs across North Carolina.

A. Enrollments

Enrollment in North Carolina's 12 MLT programs has grown considerably over the last five years. The number of first year enrollees has increased 64% over the period 1999 to 2003 from 141 to 231 students [Figure 5]. In fact, enrollment in 2003 exceeded expected capacity of 216 spaces, which was the result of several programs admitting more students than the number of available spaces. This increased enrollment is largely due to workforce needs in private reference laboratories in community college service areas.

Enrollment in the MT programs has remained relatively flat since 1999. Enrollment was highest in 2000 with 110 first year enrollees. However, with the closing of the program at Moses Cone in 2000, the number of enrollees in the six remaining programs dropped to 76 in 2001. In 2003, 92% of available spaces were filled (103 of 112 spaces). Not all students enrolled in the MT programs are new to the clinical laboratory sciences field; some are MLTs who enter articulation programs to obtain a baccalaureate degree in medical technology. In addition, some of the articulation programs offer web-based learning, therefore attracting students from outside of North Carolina.

Figure 5. Enrollment in Accredited Clinical Laboratory Sciences Programs, North Carolina, 1999-2007



Source: Clinical Laboratory Sciences Educational Program Survey, 2004. Cecil G. Sheps Center for Health Services Research.

B. Attrition

Attrition from the MT programs is relatively small. On average, less than 10% of MT students fail to complete the program. In stark contrast, an estimated 47% of students in MLT

According to directors of both MT and MLT programs, the main reasons for unfilled spaces are inadequate numbers of applicants and few qualified applicants.

programs drop out before reaching graduation, with wide variation across programs. Among the programs, 100% of the MLT directors and 75% of the MT directors report academic difficulty as the primary reason students drop out. Financial problems are also a leading cause of attrition in both associate's and bachelor's degree programs.

C. Expansion

Beginning in 2004, an estimated 26 additional enrollment spaces will be available in MLT programs, bringing the total capacity to 242 spaces across North Carolina. These additional spaces will be created among three of the 12 programs, which are responding to local employer demand for medical laboratory technicians. Programs find it increasingly hard to find employers to agree to serve as clinical sites for their students. In addition, several programs do not receive enough applicants to the existing spaces to warrant expansion.

None of the baccalaureate degree programs anticipate expansion over the next four years, leaving only 112 available MT spaces. Program directors report that the small number of applicants to the existing programs does not warrant program growth.

D. Student Diversity

In contrast to the clinical laboratory sciences workforce, students enrolled in North Carolina's clinical laboratory sciences programs are racially and ethnically diverse. Nearly half (43%)[17] of the students in both MT and MLT programs were from an underrepresented minority group in 2002-03, which exceeds the diversity of the general population in North Carolina (27.9% from an underrepresented minority in 2000).[18] Approximately one-third of both MT and MLT students are African-American. The gender breakdown of clinical laboratory sciences students has remained relatively constant since 1998. Between 80-85% of students in both types of programs are female, which mirrors the gender breakdown of the workforce.

E. Graduates

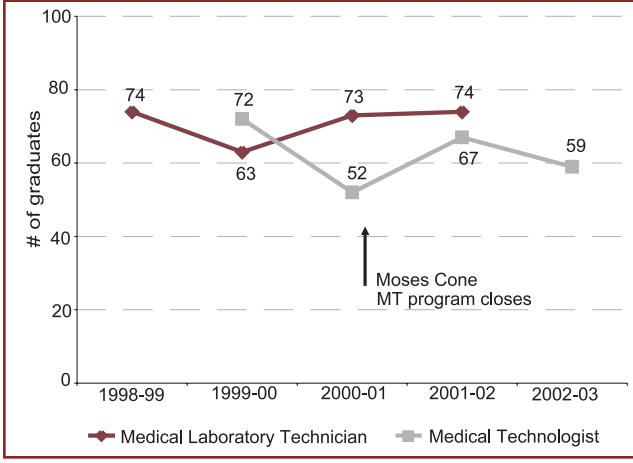
The number of graduates from the State's medical laboratory technician programs has remained relatively stable over the last few years. The programs had between 63 and 75 graduates from 1998-99 to 2001-02 [Figure 6]. The number of MT graduates declined from 72 graduates in 1999-00 to 59 in 2002-03. This is partly attributed to the program closure at Moses H. Cone Memorial Hospital in 2000. It is important to note that the number of graduates from the MT programs does not correspond to an equivalent increase in the supply of new practitioners. The number of graduates includes MLTs who complete articulation programs in medical technology. Program directors report:

- 94% of MLT graduates and 97% of MT graduates find employment in the clinical laboratory sciences field;
- 96% of MLT graduates and 88% of MT graduates remain in North Carolina to practice;
- The majority of graduates seek employment opportunities in hospital laboratories, public health settings and in research.

F. Faculty Shortages

The MLT programs have faced more difficulty in finding sufficient numbers of individuals willing to supervise students in clinical rotations (33% of programs) in comparison to the MT programs. However, one-third of MT programs have experienced difficulty in finding qualified faculty to teach coursework in recent years.

Figure 6. Graduates from Accredited Clinical Laboratory Sciences Programs, North Carolina, 1998-2003



Source: Clinical Laboratory Sciences Educational Program Survey, 2004. Cecil G. Sheps Center for Health Services Research.

VI. FACTORS AFFECTING CLINICAL LABORATORY SCIENCES

News of a shortage of clinical laboratory sciences practitioners and the resulting impact on diagnostic testing has been commonplace over the last few years. Several professional organizations and governmental agencies formed the Coordinating Council on the Clinical Laboratory Workforce to examine the national laboratory workforce and develop strategies to address the shortage. Members include national professional associations, accrediting agencies, credentialing organizations and employer groups with an interest in clinical laboratory issues.[19] Decreasing numbers of programs, declining numbers of graduates, low salaries and the lack of advancement opportunity in the field are some of the primary factors contributing to national workforce imbalances.

Job satisfaction factors are typical reasons many practitioners leave the field. The ASCP's longitudinal study of medical technologists reveals that many leave because of low salaries and lack of increased responsibility.[20] Many MTs continue to perform routine testing rather than more technically advanced tests or management functions that they have been trained to perform. Low salaries for entry-level and experienced clinical laboratory sciences practitioners continue to contribute to workforce shortages and reasons why practitioners leave the field.[21,22]

The demand for tests to monitor genetic disorders and chronic diseases is expected to increase with the aging population and with advances in molecular knowledge. Genetic testing is often conducted in large reference laboratories, but it is predicted that clinical laboratories will become more involved; thereby requiring a laboratory sciences workforce prepared with new skill sets.[23]

Clinical laboratory sciences practitioners serve a critical role in the surveillance of infectious diseases and are often responsible for the early detection and identification of biologic agents, whether naturally occurring or the result of bioterrorism.[24] Public health laboratories and the clinical laboratory sciences workforce faced significant challenges after the 2001 anthrax attacks, including testing for possible biothreat agents and addressing response networks to handle bioterrorism preparedness. Many states were not prepared to handle possible bioterrorism attacks and the events highlighted the need for a skilled laboratory workforce.

VII. VACANCY RATES FOR CLINICAL LABORATORY SCIENCES PRACTITIONERS IN NORTH CAROLINA

Health professional vacancy data are often difficult to determine and interpret. Employers may have low vacancy rates due to the availability of higher cost substitute workers, such as "travelers" – workers who stay for relatively short periods of time in jobs where there is short-term demand for replacement or seasonal increases. Vacancy rates change frequently. A high vacancy rate may signal a short-term expansion of services or an internal, systemic change in the delivery of health care services. These caveats aside, vacancy rates can provide a point-in-time estimate of need and demand for health professions across various settings.

A. The North Carolina Hospital Association's (NCHA) 2002 Workforce Study

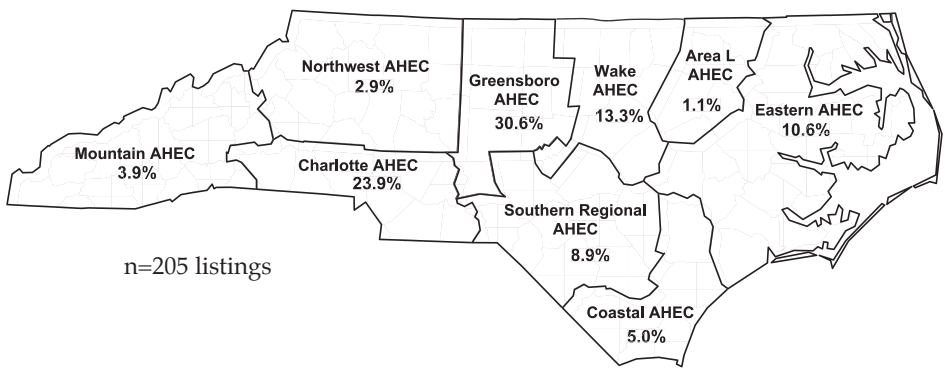
The North Carolina Hospital Association's (NCHA) 2002 Workforce Study[25] collected information on vacancy rates and average placement times for many health professions, including a category referred to in the report as "laboratory techs." NCHA estimated a 7.3% and 9.0% vacancy rate for laboratory techs in hospitals across North Carolina in 2001 and 2002, respectively. Higher vacancy rates were seen in rural hospitals in 2002 than in urban facilities (13.3% versus 7.7%). Radiologic technologists, pharmacists and operating room technicians had higher vacancy rates. NCHA found that hospitals needed, on average, 60-66 days to fill a vacant laboratory tech position, a moderate placement time compared with other health professions surveyed in the study. Longer times were reported for certified registered nurse anesthetists, radiologic technologists, pharmacists and registered nurses. Vacancy rates reported by NCHA were higher than national vacancy rates for MTs (4.3%) and MLTs (5.9%) found in the American Society for Clinical Pathology Board of Registry's 2003 Wage and Vacancy Survey.[26]

B. The North Carolina Allied Health Vacancy Tracking Pilot Project

The North Carolina Allied Health Vacancy Tracking Pilot Project, conducted by the Cecil G. Sheps Center for Health Services Research at The University of North Carolina at Chapel Hill tracks newspaper employment advertisements across North Carolina to identify trends in frequency, practice type, location and use of incentives in job listings.[27] Advertisements for several allied health positions, including clinical laboratory sciences practitioners were tracked for 12 weeks (February 1 to April 18, 2004) across 10 regional newspapers. This pilot project only tracked newspaper listings and does not reflect other recruiting methods utilized by some employers, such as company websites or staffing agencies. In addition, employment listings do not reflect unique job vacancies: repeated advertisements were counted each time they appeared in one of the newspapers over the 12-week period. Preliminary data on the analysis of advertisements for clinical laboratory sciences positions revealed the following:

- 205 employment listings for clinical laboratory sciences positions were found (91 for medical laboratory technicians, 73 for medical technologists and 41 listings for either a medical laboratory technician or a medical technologist). Individually, the number of vacancy listings for medical laboratory technicians or medical technologists falls below listings for other allied health professions tracked in the pilot. However, added together, the number of positions for clinical laboratory sciences (MTs and/or MLTs) trails only listings for occupational therapists in the highest number of vacancy listings.
- The largest number of employer listings for MTs and/or MLTs was found in the Greensboro Area Health Education Center (AHEC) region (30.6%). This was followed by 23.9% of listings advertising vacancies in the Charlotte AHEC region [Figure 7].
- Several health care organizations in neighboring states, particularly South Carolina and Virginia, used North Carolina newspapers to attract applicants.
- Hospital-based laboratory positions accounted for 76.4% of listings; 12.6% were in private laboratories and 7.3% in medical practices or clinics.
- Ten listings (5%) advertised sign-on bonuses ranging up to $6,000. Three employers offered relocation assistance or tuition reimbursement up to $3,500. Surprisingly, nearly half of these incentive packages were offered by employers in South Carolina; the remainder by hospitals in Eastern North Carolina, which may indicate regions that have difficulty recruiting clinical laboratory sciences practitioners to their areas.
- The number of weekly advertisements across all 10 newspapers was relatively stable across the 12-week tracking period, which may suggest sustained recruitment needs over time.

Figure 7. Clinical Laboratory Sciences Job Listings by AHEC Region North Carolina, 2004



Produced by: North Carolina Health Professions Data System, Cecil G. Sheps Center for Health Services Research, The University of North Carolina at Chapel Hill.

Source: North Carolina Allied Health Vacancy Tracking Pilot Project, 2004. Cecil G. Sheps Center for Health Services Center.

Notes: Includes listings tracked from North Carolina newspapers for positions advertising medical technologists (n=73), medical laboratory technicians (n=91) and medical laboratory technicians/medical technologists (n=41) from February 1 to April 16, 2004. Percentages do not include listings for positions outside of North Carolina (n=11) and those with missing location (n=14).

VIII. SUMMARY

1. Is there a current shortage of clinical laboratory sciences practitioners across North Carolina?

North Carolina's ratio of 5.8 medical technologists and 5.6 medical laboratory technicians per 10,000 population surpasses the national ratios. Without individual-level data to assess distribution of clinical laboratory sciences practitioners, it is difficult to determine if there are geographic imbalances in the distribution of the workforce. However, vacancy data gathered from hospital surveys and newspaper listings appear to reveal that there may be greater need for laboratory practitioners in rural settings and in some geographic regions across North Carolina.

2. Will there be a shortage in the near future?

A shortage of medical technologists and medical laboratory technicians is dependent on both demand and supply factors. Demand for laboratory practitioners in North Carolina will increase moderately as both the general and elderly population continues to grow as does the need for diagnostic and other medical testing. Genetic testing continues to show promise, and demand for this health care service will affect the laboratory workforce.

Although vacancy rates and job advertisement tracking provide only point-in-time estimates, it appears that there is consistent and strong demand for clinical laboratory sciences practitioners in North Carolina.

Supply is an issue of whether the educational system can produce enough graduates from the clinical laboratory sciences programs and whether or not the educational system will be able to recruit faculty with appropriate credentials.

3. Are North Carolina's educational programs sufficient to meet current and future need?

North Carolina has 12 MLT and six MT programs. Following national trends, North Carolina has experienced several program closures over the last two decades, most recently the loss of a MT program in 2000 at Moses H. Cone Memorial Hospital. First year enrollments have increased 64% across MLT programs and 20% across MT programs from 1999 to 2003. Although many programs have reached or exceeded available capacity in recent years, several spaces in both MT and MLT programs remain unfilled due to a lack of qualified applicants.

While enrollments in the programs have improved, student retention across programs, particularly MLT programs is troubling. Across the 12 associate's degree programs, on average 47% of students fail to complete the program. The number of MLT graduates from the 12 programs will increase only slightly unless efforts are undertaken to decrease attrition. Attrition from MT programs, while only at 10%, still affords an opportunity for improvement.

Many program directors report a limited number of applicants to fill available spaces, which may hint at the quality of some students entering the programs. Improved promotion of clinical laboratory sciences careers and the implementation of best practices to improve student retention are necessary in order to attract and retain qualified students into the existing MT and MLT programs. To strengthen the existing clinical laboratory sciences programs, it is necessary to employ a more rigorous screening of applicants as well as provide financial, personal and academic support to currently enrolled students.

The number of graduates from MLT programs has remained stable over the last four years, while the number of MT graduates has declined slightly. Further compounding the decreasing number of MT graduates is the fact that some of these students are already MLTs who have returned to obtain a bachelor's degree. Therefore, these articulation program graduates do not result in new practitioners entering the workforce. Without improvement in recruitment or retention of students in existing programs, the number of graduates will likely remain stable. The result may be continued challenges in filling current and future clinical laboratory vacancies.

4. Is there a faculty shortage?

While some programs cite difficulty finding both clinical supervisors and faculty to teach curriculum, this does not appear to be wide-spread across North Carolina. One reason may be salaries. Health professions faculty often can earn higher salaries working in a clinical environment than in an academic setting. Salaries earned by clinical laboratory sciences practitioners are lower than many other allied health professions with equivalent educational preparation. The incentive to work in a clinical setting for higher wages may not play as much of a role in recruitment for clinical laboratory sciences faculty.

5. Is North Carolina's clinical laboratory sciences workforce diverse?

The clinical laboratory sciences workforce in North Carolina is predominantly female (85%) and less than 10% of the workforce is from a racial or ethnic minority. While the majority of students in MT and MLT programs are female, the current student population is much more racially and ethnically diverse. Nearly half (43%) are non-white.

6. Are there concerns about the "graying" of clinical laboratory sciences practitioners in North Carolina?

In North Carolina, the average age of MTs is 47 and of MLTs is 43 years. While younger than their national counterparts, a moderate proportion of the workforce will be nearing retirement in the next 15 to 20 years. Ensuring that there will be an adequate supply of clinical laboratory practioners to replace the workforce that will retire is necessary.

7. How do wages earned by clinical laboratory sciences practitioners affect supply?

Salaries earned by both MLTs and MTs are relatively low compared to other health professions requiring the same educational preparation. Low wages for entry-level and experienced practitioners has been referenced nationally as being a major factor in laboratory workforce shortages. Additionally, many directors and faculty in North Carolina's clinical laboratory sciences educational programs cite low salaries as to why students choose other career paths, including other health professions. It is also likely that low earnings are a contributor to the lack of applicants and qualifed applicants to many of the programs across the State.

IX. CONCLUSION

Clinical laboratory sciences practitioners play a critical role in the health care system and the demand for both medical technologists and medical laboratory technicians will continue with increased population and the corresponding growth in the number of diagnostic tests requiring laboratory personnel. Demand will also be dependent on expansion in the use of genetic testing, the likelihood of disease outbreaks and concerns over the capacity of health care systems, including laboratories, to deal with possible bioterrorism events.

The supply of medical technologists is predicted to remain relatively stable over the short term. The MT educational programs are fairly successful in filling available spaces, attrition from the programs is less than 10%, and no expansion across the six MT programs is expected. There may be a small increase in the supply of medical laboratory technicians in North Carolina with the modest expansion in class sizes across three MLT programs. However, the large percentage of students who drop out of MLT programs (nearly one out of every two students) could mitigate any gains achieved through program expansion.

The large numbers of students who fail to complete the curriculum reveal an opportunity to improve retention across all clinical laboratory sciences programs. Academic rigor of the program remains the primary reason students drop out, which could be addressed with better applicant screening before entering the programs and providing academic support during the course of study.

Directors of both MT and MLT programs report that a limited number of qualified applicants apply to fill the available spaces – a factor that is almost certainly linked to the salaries paid to both MTs and MLTs. Students can earn higher wages by electing a program of study in another health care field of equivalent length. Additionally, salaries earned by medical technologists and medical laboratory technicians in North Carolina are lower than the national averages. While marketing the laboratory professions and improving recruitment efforts to attract qualified applicants will have positive effects, the low salaries paid to MTs and MLTs will continue to impact both those who choose careers in clinical laboratory sciences and those who remain in the field.

This report provides an assessment of North Carolina's clinical laboratory sciences workforce and educational programs in 2004 and serves as a reference to be used by educators, employers and professional organizations in discussions about workforce and educational planning for medical technologists and medical laboratory technicians.

Notes:

[1] Health Professions Career and Education Directory, 2004-2005. American Medical Association. http://www.ama-assn.org/ama1/pub/upload/mm/40/0405clinicallabtech.pdf.

[2] North Carolina Health Careers, 2001/2003. North Carolina Area Health Education Centers. Chapel Hill, NC: 2001.

[3] North Carolina Occupational Trends, 2000-2010. Employment Security Commission of North Carolina. http://eslmi12.esc.state.nc.us/projections/EmpByOccGrp.asp?AreaType=01&Area=000037&PeriodID=05&soc-group=29&soctitle=Healthcare+Practitioners+and+Technical+Occupations. Includes new positions and replacement of workers due to death, retirement and career changes.

[4] American Society of Clinical Pathology-Board of Registry, 2004. Data account for 2,210 medical technologists and 1,097 medical laboratory technicians in North Carolina.

[5] National Credentialing Association, 2004. Data account for 210 clinical laboratory scientists/medical technologists and 30 clinical laboratory technicians/medical laboratory technicians in North Carolina.

[6]American Medical Technologists, Inc., 2004. Data account for 288 medical technologists and 54 medical laboratory technicians in North Carolina.

[7] American Society of Clinical Pathology-Board of Registry, May 2004.

[8] Bureau of Labor Statistics. http://www.bls.gov/oes/2002/oes_nc.htm#b29-0000.

[9] Combined, unduplicated data from American Society for Clinical Pathology-Board of Registry, National Credentialing Association and American Medical Technologists, Inc. N=2,459 MTs and 1,010 MLTs. Excludes records with missing/unknown gender: MTs (n=249), MLTs (n=171).

[10] American Society of Clinical Pathology-Board of Registry, 2004. MTs and MLTs with missing race/ethnicity data excluded from percentages (n=237 and n=179, respectively).

[11]US Census Bureau, 2000. http://factfinder.census.gov/servlet/BasicFactsTable?_lang=en&_vt_name=DEC_2000_SF1_U_DP1&_geo_id=04000US37

[12] American Society of Clinical Pathology-Board of Registry, 2004. MTs and MLTs with missing age data excluded from averages (n=214 and n=167 respectively).

[13]American Society for Clinical Pathology – Board of Registry, 2004. MTs and MLTs with missing employment data and those who indicated retirement or unemployed are excluded from the figures (n=398 and n=240 respectively).

[14] Bureau of Labor Statistics. 2002 State Occupational Employment Wages and Estimates. www.bls.gov/oes/2002/oessrcst.htm

[15]National Accrediting Association for Clinical Laboratory Sciences. *Standards for Accredited Educational Programs for the Clinical Laboratory Scientist/Medical Technologist* (http://www.naacls.org/PDFviewer.asp?mainUrl=/docs/standards_ cls-mt.pdf); Standards for Accredited Educational Programs for the Clinical Laboratory Technician/Medical Laboratory Technician (http://www.naacls.org/PDFviewer.asp?mainUrl=/docs/standards_clt-mlt.pdf)

[16] *Clinical Laboratory Sciences Educational Program Survey, 2004*. Cecil G. Sheps Center for Health Services Research, The University of North Carolina at Chapel Hill.

[17] Race, ethnicity and gender data were not obtained from the private MT programs. Therefore data represent the racial and ethnic diversity and gender composition of the MT programs in the UNC System schools.

[18] US Census Bureau, 2000. http://factfinder.census.gov/servlet/BasicFactsTable?_lang=en&_vt_name=DEC_2000_SF1_U_DP1&_geo_id=04000US37

[19]Griffith, J. "Coordinating Council on the Clinical Laboratory Workforce." Carolinas Clinical Connection. Wilmington, NC. March 5, 2004.

[20] Ward-Cook, K. and Edgar, L. "The Practice Analysis: A Roadmap to the Future." Clinical Laboratory Educators' Conference. Milwaukee, WI. February 27, 2004.

[21] *Ibid*.

[22] Ward-Cook, K., Chapman, S. and Tanner, S. 2002 Wage and Vacancy Survey of Medical Laboratories. Part 1: Salaries Continue to Show Moderate Gains. *Laboratory Medicine*. September 2003, Vol. 34, No. 9.

[23]Best, M. Strategic Laboratory Workforce Planning -- You Cannot Afford Not to Do It. *Laboratory Medicine*. July 23, 2004.

[24] American Society for Clinical Laboratory Science. *Role of Clinical Laboratories in Bioterrorism Preparedness Position Paper*. June 2002.

[25] *NCHA Workforce Study*. North Carolina Hospital Association, September 2002. No definition of laboratory tech was provided in the survey or if the position referred to medical laboratory technicians or medical technologists. Therefore it may have been interpreted differently by employers.

[26] Ward-Cook, K. *Preliminary Results of the ASCP 2003 Wage and Vacancy Survey.* American Society for Clinical Pathology. http://www.ascp.org/bor/center/wage_vac2003prel.asp

[27] *The North Carolina Allied Health Vacancy Tracking Pilot Project*. Cecil G. Sheps Center for Health Services Research, University of North Carolina at Chapel Hill, 2004.

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