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United States General Accounting Office
Washington, DC 20548

October 10, 2001

The Honorable W.J. "Billy" Tauzin
Chairman
Committee on Energy and Commerce
House of Representatives

Subject: Health Care: Adequacy of Pharmacy, Laboratory, and Radiology Workforce
Supply Difficult to Determine

Dear Mr. Chairman:

Concern is growing about the supply of health care workers for meeting current demand as well as the future needs of an aging population. Emerging shortages of both nurses and nurse aides, the two largest categories of health care workers, have recently been the subject of several congressional hearings and numerous media reports.¹ Now some health care providers and professional organizations also are beginning to report difficulty recruiting sufficient numbers of pharmacists and laboratory and radiologic technologists and technicians. In response to these concerns, you asked us to describe the current and projected supply and demand for pharmacists and laboratory and radiology workers and trends in their employment and earnings. In this correspondence, we provide information on (1) current workforce trends for pharmacists, (2) current workforce trends among laboratory and radiologic technologists and technicians, and (3) factors that may affect the supply and demand for these workers in the future.

To provide this information, we relied primarily on published reports and data from the Department of Labor's Bureau of Labor Statistics (BLS) and the Department of Health and Human Services' Health Resources and Services Administration (HRSA). While BLS data on earnings for these occupations were available through 2000, reliable data on total employment were available only through 1998. We also obtained data from professional associations representing the various disciplines and from provider and employer organizations. We reviewed the relevant professional and research literature and interviewed industry and professional association representatives, researchers, and other experts. We performed our work during September 2001 in accordance with generally accepted government auditing standards.

¹A list of related GAO products is in the enclosure.

In summary, while the number of pharmacists has grown over the past decade, there is evidence of increasing demand for pharmacy services, which, according to HRSA and others, is outpacing the growth in supply. Earnings for pharmacists have risen significantly in recent years, and employers and professional associations are reporting increased vacancy rates and difficulties in hiring. Key factors that may be contributing to greater demand include an increase in the number of prescriptions filled, growth in the number and hours of retail pharmacy outlets, and an expansion of pharmacists' roles. While demand has continued to increase in recent years, the number of pharmacy school graduates has declined.

Higher vacancy rates and declining numbers of new entrants to the laboratory and radiologic fields have been reported by provider and professional associations. However, employment and earnings data for laboratory and radiologic technologists and technicians do not produce a clear picture about the current balance of supply and demand for these workers. While total employment for these workers grew from 1988 to 1998, reliable data to describe more recent trends are not available. Although significant growth in wages has been reported for segments of the laboratory workforce, overall earnings growth for both laboratory and radiologic technologists and technicians has lagged behind the rate of earnings growth for all workers from 1998 to 2000.

Demographic changes, technological advances, and management decisions on how both staff and technology are utilized will affect the demand for workers in the future. Population changes associated with the aging of the baby boom generation can be expected to increase the demand for pharmacy, laboratory, and radiology services and to limit the supply of workers available to provide them. However, the impact of scientific and technological advances is difficult to predict. Improvements in some technologies may raise the productivity of the existing workforce, but other advances in science may increase the volume and complexity of health care services and create a need for additional workers with more sophisticated skills. The demand for workers also may be affected by management decisions on how to employ technology and how to use workers with differing skills and qualifications.

BACKGROUND

After nurses, nurse aides, and physicians, three of the largest groups of health care workers are pharmacists, laboratory technologists and technicians, and radiologic technologists and technicians. Pharmacists are licensed by state pharmacy boards to prepare and dispense drugs. They also may educate patients about medications, monitor patients' responses to medications, and track adverse drug reactions and interactions. Currently, most pharmacy students are enrolled in a 6-year program of postsecondary education leading to a doctor of pharmacy degree.² In 1998, BLS

²Currently, there are two degree programs eligible for accreditation by the American Council of Pharmaceutical Education: Bachelor of Science in Pharmacy, a 5-year program, and Doctor of Pharmacy. After 2003, only the 6-year Doctor of Pharmacy program will be eligible for accreditation.

reported that there were approximately 185,000 pharmacists employed in the United States, with median annual earnings of \$66,227.³ Of these pharmacists, 25 percent worked in hospitals; 59 percent worked in retail settings, such as chain drug stores and grocery stores; and the remaining 16 percent worked in other settings, such as nursing homes and pharmacy schools.

Laboratory technologists and technicians, often referred to as clinical or medical technologists and technicians, perform a variety of diagnostic tests on blood and tissue samples.⁴ They may specialize in specific branches of laboratory science, such as cytology (the study of cells and cell abnormalities), histology (the study of tissue structure and organization), microbiology, or immunology. Also included are phlebotomists, who collect blood samples for testing or blood donations for blood banks. Training for technologists typically consists of a 4-year baccalaureate degree program. Educational preparation for technicians may consist of an associate's degree from a community college; a certificate from a hospital, vocational school, or the armed forces; or on-the-job training. Eleven states require licensing of laboratory technologists, and most technologists are certified by a professional association.⁵ BLS reported that there were approximately 313,000 employed laboratory technologists and technicians in 1998, with median annual earnings of \$37,274 for technologists and \$26,291 for technicians. Forty-nine percent of laboratory technologists and technicians were employed in hospitals in 1998, 20 percent in physicians' offices, 14 percent in medical or dental laboratories, and the remaining 17 percent primarily in government, research, and educational settings.

Radiologic technologists and technicians perform a variety of diagnostic imaging procedures such as X-rays, magnetic resonance imaging (MRI), computer assisted tomography (CT) scans, sonograms, and mammograms. As with training for laboratory workers, training for radiologic technologists and technicians varies. Although 2-year training programs are most common for technologists, educational preparation for technologists and technicians can range from 1 to 4 years and lead to a certificate or an associate's or bachelor's degree. Most radiologic technologists are certified, and 34 states require licensure for these workers.⁶ According to BLS, there were approximately 162,000 radiologic technologists and technicians employed in 1998, with median annual earnings of \$32,885. Sixty percent were employed in

³1998 is the last year for which we have BLS data on both employment and earnings for pharmacists, laboratory workers, and radiology workers. Data on total employment for 2000 will be available from BLS' Office of Employment Projections in November 2001.

⁴Technologists, both laboratory and radiologic, typically have a higher level of training and expertise than technicians.

⁵The American Society of Clinical Pathologists' Board of Registry is the primary organization for the voluntary certification of professionals in laboratory medicine.

⁶The American Registry of Radiologic Technologists is the primary organization for the voluntary certification of radiologic technologists.

hospitals, 30 percent in physicians' offices, 6 percent in medical and dental laboratories, and the remaining 4 percent in various other settings.

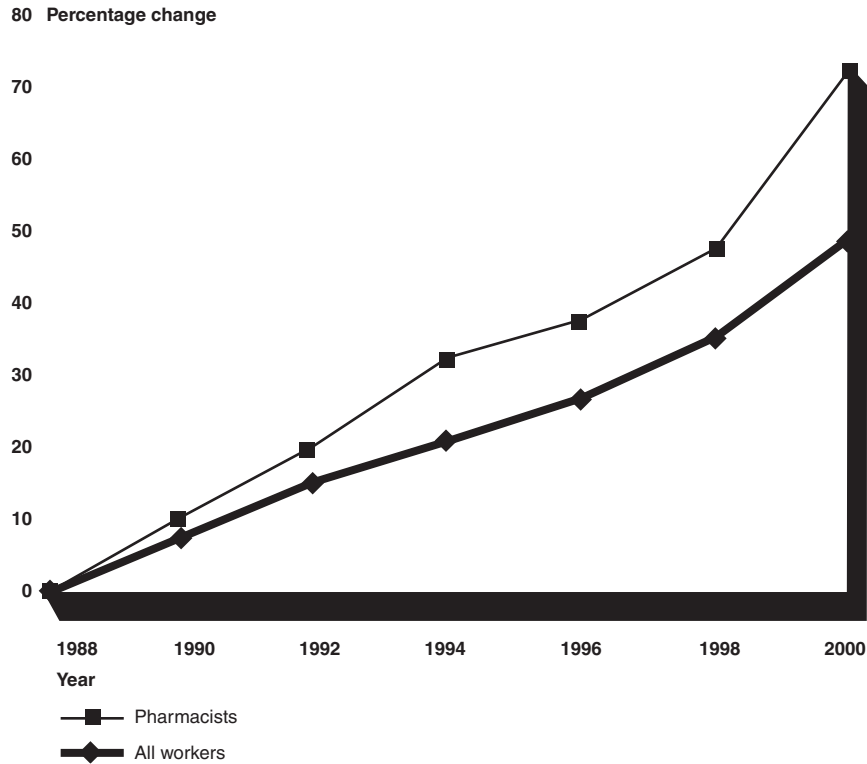
PHARMACY WORKFORCE PRESSURES
REFLECT GROWING DEMAND

While the number of active pharmacists has grown steadily since 1991, demand for pharmacist services is increasing and, according to HRSA and others, may be outpacing the growth of supply. Several provider and professional associations are reporting higher vacancy rates for pharmacists and increasing difficulties in hiring. At the same time, earnings for pharmacists have grown significantly, rising 17 percent from 1998 to 2000. The current pressures affecting the pharmacist workforce appear to be the product of an increased demand for pharmacy services and a declining number of graduates from schools of pharmacy.

Increased Earnings and
Higher Vacancy Rates Reported

Total employment of pharmacists grew from 162,000 in 1988 to 185,000 in 1998, an increase of 14 percent, just slightly less than the 19-percent employment growth rate for the workforce overall. From 1988 to 1998, pharmacists' earnings grew by 48 percent, compared with earnings growth of 36 percent for all workers. More recently, from 1998 to 2000, pharmacists' earnings increased much faster than those of all workers. (See fig. 1.) Median weekly earnings for pharmacists grew from \$1,063 in 1998 to \$1,243 in 2000, an increase of 17 percent, compared with a 10-percent growth in earnings for all workers.

Figure 1: Cumulative Percentage Increases in Earnings for Pharmacists and All Workers, 1988-2000



Note: Growth for any specific 2-year period cannot be directly determined from the figure because data represent cumulative earnings growth from 1988.

Source: GAO analysis of median weekly earnings for pharmacists and all workers as reported by BLS using data from the Current Population Survey.

At the same time that salaries have increased, employers have reported greater difficulty filling pharmacy positions. According to HRSA’s recent pharmacy workforce study, several provider and professional associations have reported increased vacancy rates and greater difficulty in hiring.^{7,8} A recent American Hospital Association (AHA) survey of hospitals reported an average pharmacist vacancy rate of 21 percent in 2001, and half of all hospitals reported more difficulty in hiring pharmacists than in the previous year.⁹ An American Society of Health-System

⁷*The Pharmacist Workforce: A Study of the Supply and Demand for Pharmacists* (Washington, D.C.: HRSA, Dec. 2000).

⁸Caution should be used when comparing vacancy rates from different studies. Vacancy rates reported by provider and professional organizations vary, and not all studies identify the methods used to calculate these rates.

⁹AHA and The Lewin Group, “The Hospital Workforce Shortage: Immediate and Future,” *TrendWatch*, Vol. 3, No. 2 (June 2000).

Pharmacists survey of its pharmacy-director members reported that the average pharmacist vacancy rate was 11 percent in 2000. In February 2001, the National Association of Chain Drug Stores (NACDS) reported a 6-percent vacancy rate for chain community pharmacies. The Department of Veterans Affairs (VA) recently reported that many of its facilities have filled fewer than half of their authorized pharmacist positions. According to HRSA, as a result of staffing shortages, some federal facilities have cut back on pharmacy services, and in others, pharmacists are being required to work longer hours.

Demand for Pharmacists May Be Outpacing Growth in Supply

HRSA's recent pharmacy workforce report suggested that several factors could be contributing to a rising demand for pharmacy services. One factor is an increased use of prescription medications, owing to the growth in the elderly population, improved insurance coverage of prescription drugs, and the continuing development of new medications. According to HRSA, from 1992 to 1999, the number of prescriptions filled by community pharmacies grew by 44 percent to nearly 2.8 billion, and the percentage of retail prescriptions covered by insurance increased from 44 to 78 percent. Another factor that may contribute to increased demand for pharmacists is competition among retail pharmacies, resulting in new stores and expanded hours of operation. Finally, although difficult to quantify, rising demand may also result from the expansion of the pharmacist's practice to include participation in multidisciplinary patient care teams, increased responsibility for ensuring patient safety, and patient education. According to HRSA, there is a lack of reliable current data on the increased roles and responsibilities of pharmacists. The last census survey of the pharmacy profession was conducted in 1991.

While the number of employed pharmacists continued to grow through 1998, both pharmacy school applications and graduations have declined in recent years. The number of pharmacy school applications fell by 29 percent from 1996 to 2000, and the number of graduates fell by 9.3 percent from 1996 to 2000. While the reasons for these declines are not clear, HRSA's pharmacy workforce report indicated that the decline in applications may be temporary and the number should begin to increase again in response to rising salaries.

CONCERNS EMERGING ABOUT LABORATORY AND RADIOLOGY WORKFORCE SUPPLY

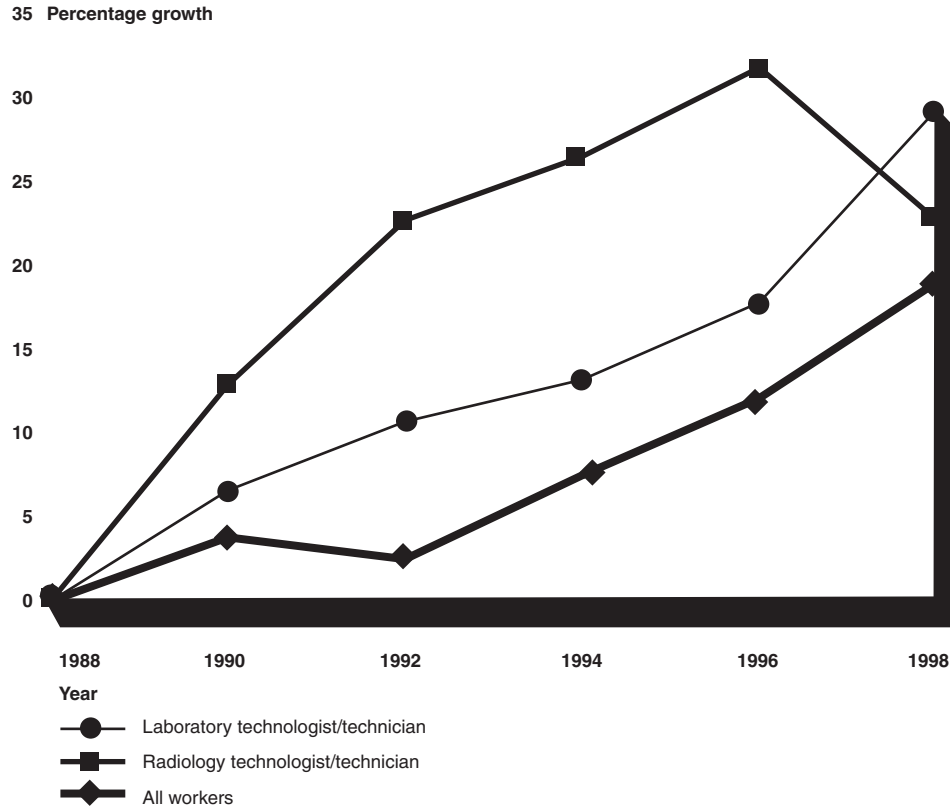
Employment and earnings data for laboratory and radiologic technologists and technicians do not produce a clear picture about the current balance of supply and demand for these workers. Although total employment for these workers grew from 1988 to 1998, the rate of growth fluctuated, and data to describe the most recent trends are not available. During that decade, earnings for laboratory workers grew about as fast as earnings for all workers, and earnings for radiology workers grew faster. Despite reports of significant wage increases among certain segments of the

laboratory workforce from 1998 to 2000, overall earnings growth among laboratory and radiology workers lagged during this period compared with that of the overall workforce. Some professional and industry groups have reported rising vacancy rates for certain categories of laboratory and radiologic technologists and technicians. There is also concern that the numbers of new entrants to these fields may be declining.

Recent Trends in Employment and Earnings Are Unclear

Data on recent trends in employment and earnings are not sufficient to draw conclusions about the current balance of supply and demand for laboratory and radiologic technologists and technicians. Overall employment for these workers grew from 1988 to 1998, yet the rate of growth fluctuated, and reliable data are not available to describe trends in employment beyond 1998. From 1988 to 1998, total employment of laboratory technologists and technicians grew by 29.3 percent, exceeding the 19.0-percent rate of overall employment growth. (See fig. 2.) The strongest period of growth for laboratory workers during this period occurred from 1996 to 1998 (9.8 percent). Among radiologic technologists and technicians, total employment grew by an estimated 22.7 percent from 1988 to 1998, just slightly more than the rate of overall employment growth. From 1996 to 1998, however, total employment among these workers declined by 6.9 percent.

Figure 2: Cumulative Percentage Increases in Employment for Laboratory Technologists and Technicians, Radiologic Technologists and Technicians, and All Workers, 1988-98

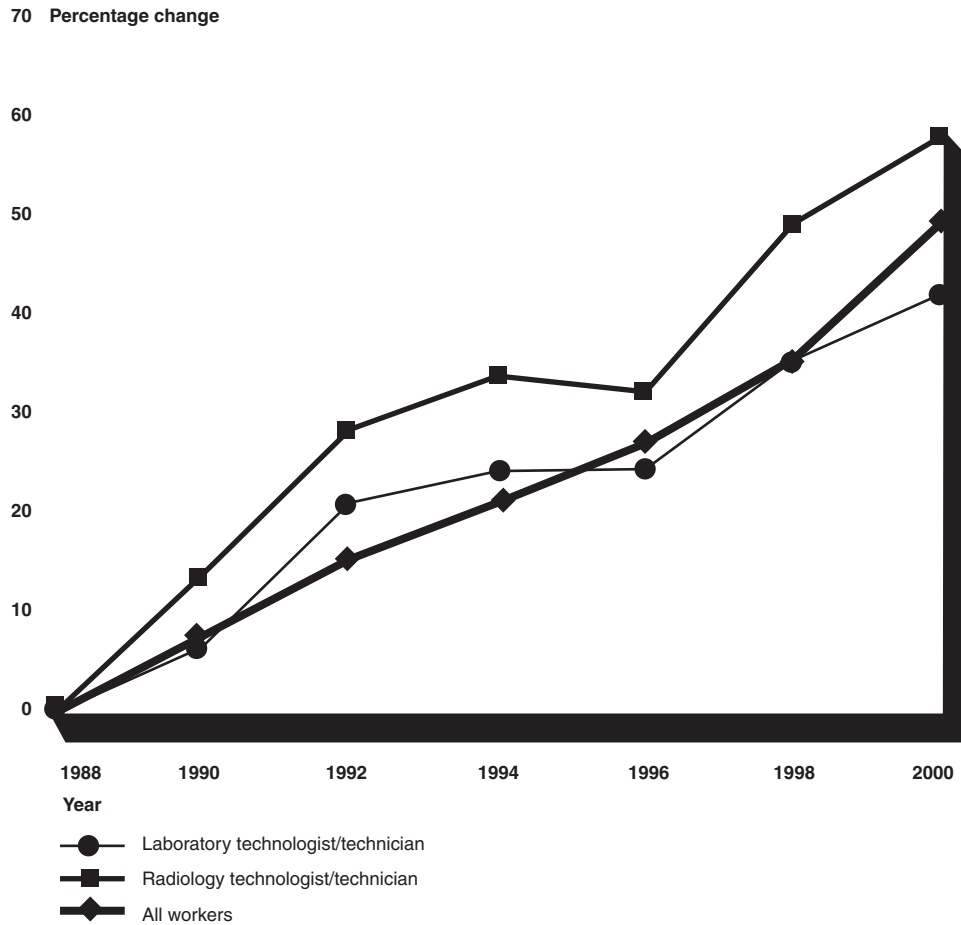


Note: Growth for any specific 2-year period cannot be directly determined from the figure because data represent cumulative employment growth from 1988.

Source: BLS, Office of Employment Projections.

From 1988 to 1998, median weekly earnings for laboratory technologists and technicians combined grew by 35.7 percent, about as fast as earnings for all workers, and earnings for radiology workers grew by 49.5 percent, faster than the rate of growth for the overall workforce. Most recently, from 1998 to 2000, the rate of earnings growth for laboratory and radiology workers lagged behind that of the workforce overall. (See fig. 3.) While earnings for all workers grew by 10.1 percent from 1998 to 2000, median weekly earnings for laboratory workers increased by 4.9 percent, from \$566 to \$594. Among radiology workers, median weekly earnings grew by 5.9 percent, from \$631 in 1998 to \$668 in 2000. However, for certain segments of the laboratory workforce, professional and industry groups are reported higher increases in wages from 1998 to 2000.

Figure 3: Cumulative Percentage Increases in Earnings for Laboratory Technologists and Technicians, Radiologic Technologists and Technicians, and All Workers, 1988-2000



Note: Growth for any specific 2-year period cannot be directly determined from the figure because data represent cumulative earnings growth from 1988.

Source: GAO analysis of median weekly earnings for laboratory and radiologic technologists and technicians and all workers as reported by BLS using data from the Current Population Survey.

While the laboratory workforce overall has experienced only modest recent earnings growth, the American Society of Clinical Pathologists (ASCP) reported significant increases in wages for certain categories of laboratory technologists and technicians.¹⁰ (See table 1.) From 1998 to 2000, wages increased faster for these workers than during any 2-year period since this information was first collected in 1992. Wage increases ranged from 8.5 percent for medical laboratory technicians to

¹⁰ASCP, 2000 Wage and Vacancy Survey of Medical Laboratories. This biennial survey of laboratory managers who are listed with the ASCP’s Board of Registry documents average wage levels and vacancy rates for several laboratory positions. Wage increases were calculated by comparing the medians of the average wage levels reported for each position.

15.4 percent for histotechnologists. While little trend information has been collected on radiologic technologists by professional organizations, available data suggest there have been recent increases in wages for some of these workers. For example, according to a recent industry survey, median salaries for radiographers, a radiologic subspecialty, increased an average of 5.0 percent per year from 1997 to 2001, more than the average increase of 3.4 percent per year from 1992 to 1997.¹¹

Table 1: Percentage Increase in Wages for Selected Medical Laboratory Specialties, 1992-2000

Laboratory specialty	1992-94	1994-96	1996-98	1998-2000
Cytotechnologist	5.1	2.5	5.6	12.1
Histotechnologist	9.8	0.5	4.0	15.4
Medical technologist	5.4	4.3	3.9	11.9
Phlebotomist	3.9	6.3	5.9	10.0
Histologic technician	4.7	7.5	0.0	13.3
Medical laboratory technician	6.3	1.7	7.5	8.5

Note: Data exclude individuals at the supervisory or managerial level.

Source: ASCP, 2000 Wage and Vacancy Survey of Medical Laboratories.

Staffing Challenges
Reported for Some Workers

Difficulties in hiring and rising vacancy rates for laboratory and radiologic technologists and technicians are being reported by some professional and industry groups. According to a recent AHA survey, 43 percent of hospitals reported experiencing more difficulty recruiting laboratory technologists compared with the previous year, and 63 percent reported more difficulty recruiting radiologic technologists. According to a 2000 American Healthcare Radiology Administrators' (AHRA) survey, 42 percent of hospitals and 66 percent of nonhospital facilities reported sufficient staffing for diagnostic radiography. This represents a decrease since AHRA's last survey in 1995, when 74 percent of both hospital and nonhospital facilities reported sufficient staffing. AHA reported that vacancy rates for hospital laboratory and radiologic technologists in 2001 were 12 percent and 18 percent, respectively.¹² According to representatives from both AHA and ASRT, rising vacancy rates for laboratory and radiology workers appear to be a new phenomenon, occurring only within the last 2 years.

According to the ASCP, vacancy rates for laboratory workers have fluctuated since it conducted its first wage and vacancy survey in 1988, and no specialty has experienced a persistent trend in one direction or the other. However, across all of the surveys, the range of vacancy rates reported for the various specialties rose from 5.0 to 13.6 percent in 1988 to 10.0 to 22.2 percent in 2000. The most significant recent

¹¹American Society of Radiologic Technologists (ASRT), 2001 Wage and Salary Survey.

¹²"The Hospital Workforce Shortage: Immediate and Future," 2001.

increases in job vacancy rates were for cytotechnologists and histotechnologists, with vacancy rates for these specialties doubling from 1998 to 2000. In addition, in 2000, laboratory managers reported higher turnover and increased difficulty in filling all positions compared with the previous year.

Supply of New Laboratory
and Radiology Workers
Appears to Have Declined

Comprehensive data on new laboratory and radiology workers are not available. However, data that are available from a range of organizations and educational programs, while not representative of all new entrants to these occupations, suggest that the numbers of new entrants to the laboratory and radiologic fields have declined in recent years.¹³ While laboratory and radiologic technology education programs appear to have sufficient capacity, the numbers of enrollees and graduates declined from the 1995-96 school year to the 1999-2000 school year, the last year for which data are available. These declines may affect the overall supply of workers in coming years, and, while little is known about recent trends in the utilization of radiology and laboratory services, demand is expected to rise as the U.S. population ages.

The numbers of enrollees in both laboratory and radiologic technologist and technician programs have declined in most occupational specialties in recent years, although some specialties have experienced an increase. Declines in laboratory enrollments from 1995 to 1999 ranged from about 16 percent for specialists in blood banking technology to 33 percent for histotechnologists. Declines in radiologic program enrollments ranged from about 15 percent for radiographers to about 38 percent for radiation therapists. In addition, the number of graduates of laboratory and radiologic programs and the number of graduates taking certification exams have declined. Although education programs for several laboratory and radiologic specialties experienced increased graduations in the 1999-2000 school year, since 1995, the majority of education programs in these fields experienced declines in graduates, from about 14 percent to about 38 percent. Since 1994, the number of newly certified medical technologists declined by 33 percent, and the number of radiographers taking certification exams for the first time also declined by 33 percent.

Representatives of industry and professional organizations believe the decrease in enrollments is more the result of a loss of interest in these professions than a lack of capacity in the current education system. Although the number of education programs for laboratory and radiologic specialties has declined in recent years, the decline in student enrollment cannot be attributed solely to a loss of capacity in the education system. For example, officials from the Joint Review Committee on

¹³These data generally do not include information on technologists who are employed in the field but do not seek certification, nor do they include any data on technicians and professionals who receive on-the-job training or training from sources other than formal education programs.

Education in Radiologic Technology told us that most radiologic technology programs are currently operating at only about 50 to 60 percent of their capacity. One factor that may explain declining interest in these occupations is that other business fields can offer higher salaries to technology-minded workers. For example, representatives from professional and industry organizations cite competition from the information technology and medical equipment manufacturing fields.

FUTURE SUPPLY AND DEMAND FOR WORKERS DIFFICULT TO PREDICT

Demographic changes can be expected to exert pressure on both the demand for pharmacy, laboratory, and radiology services and the supply of workers available to provide them. However, the impact of current and future scientific and technologic advances and management decisions about staff utilization are difficult to predict. Improvements in some technologies may raise the productivity of the existing workforce, but other advances in science may increase the volume and complexity of health care services and create a need for workers with specialized or advanced skills.

Demographic Changes Will Exert Pressure on Supply and Demand

The future demand for health care services is expected to increase dramatically once the baby boom generation reaches age 60 and beyond. The population aged 65 and older will double from 2000 to 2030. Moreover, the population aged 85 and older is the fastest growing age group in the United States. The growing number of elderly persons will have a significant effect on the demand for health care in the future. Older age groups tend to use a greater volume of health care services. For example, in 1996, the average annual number of prescriptions for women aged 40 through 44 was about 9, compared with about 18 for those aged 60 through 64 and about 24 for those aged 80 through 84.¹⁴

With the aging of the population comes the potential for a mismatch between the future supply and demand for health care workers. From 2000 to 2030, the total working-aged population—people aged 18 to 64—is expected to grow by only 16 percent. The ratio of the working-aged population to the population over age 85—those likely to require the most services—will decline from 39.5 workers for each person 85 and older in 2000 to 22.1 in 2030 and 14.8 in 2040. In addition, the current workforce in the laboratory and radiology fields is aging, similar to the trends in the nursing field. In 2000, over half of the certified laboratory technologist and technician workforce was over age 45, similar to the registered nurse workforce, and almost a third were over age 50. The median age for laboratory technologists and technicians and radiologic technicians increased from about 34 in 1989 to about 38 in 1999.

¹⁴1996 Medical Expenditure Panel Survey (MEPS). Data on the number of prescriptions are for persons with health insurance.

Impact of Technology
and Staffing Patterns Unclear

Projecting future employment trends for these occupations requires an understanding of the forces that will likely influence supply, demand, and utilization as well as sufficient data to estimate their potential impact. Technological advances that facilitate increased automation may enhance productivity by substituting for some workers even as the demand for the particular service, test, or procedure continues to rise. But other advances, such as new, more sophisticated tests and procedures, may increase demand for workers with more advanced or specialized qualifications.

For radiology services, one analysis predicts that the demand for medical imaging will increase by 140 percent over the next 20 years, while other studies suggest that advances in the use of digital filming equipment and procedures may significantly increase the productivity of the existing workforce. With regard to pharmaceutical care, some health care systems—VA's in particular—have made extensive use of robotics and bar code reader systems to fill mail-order, outpatient, and inpatient prescriptions. These systems have not only increased the productivity of VA pharmacists by relieving them of many routine, time-consuming tasks but also reduced medication errors in the inpatient setting.

Management decisions about how to use productivity-enhancing technology as well as staff with differing skill mixes and qualifications may affect demand for workers. For example, substitution of lower-skilled pharmacy technicians for some pharmacist tasks may increase a pharmacist's productivity. The number of pharmacy technicians has risen in recent years: according to BLS, the number of employed pharmacy technicians increased from approximately 83,000 in 1996 to 109,000 in 1998. VA, for example, uses pharmacy technicians widely. Although VA still has a pharmacist shortage, the expanded use of pharmacy technicians and new technologies has limited the degree to which VA pharmacies have needed to restrict operations. While the duties of laboratory technologists and technicians may overlap, there is little evidence of systematic substitution of one type of worker for the other. However, the simplification of some routine tests may enable people other than laboratory personnel to complete tests that are now performed in laboratories.

As agreed with your office, unless you publicly announce its contents earlier, we plan no further distribution of this letter until 30 days from its date. At that time, we will send copies to interested parties. This letter will also be available on GAO's home page at <http://www.gao.gov>.

If you or your staff have any questions, please call me on (202) 512-7119 or Helene Toiv on (202) 512-7162. Other contributors were Eric Anderson, Beth Cameron Feldpush, and Patricia Jones.

Sincerely yours,

A handwritten signature in black ink that reads "Janet Heinrich". The signature is written in a cursive, flowing style.

Janet Heinrich
Director, Health Care—Public Health Issues

Enclosure

RELATED GAO PRODUCTS

Health Workforce: Ensuring Adequate Supply and Distribution Remains Challenging (GAO-01-1042T, Aug. 1, 2001).

Nursing Workforce: Emerging Nurse Shortages Due to Multiple Factors (GAO-01-944, July 10, 2001).

Nursing Workforce: Multiple Factors Create Nurse Recruitment and Retention Problems (GAO-01-912T, June 27, 2001).

Nursing Workforce: Recruitment and Retention of Nurses and Nurse Aides Is a Growing Concern (GAO-01-750T, May 17, 2001).

VA Patient Safety: Initiatives Promising But Continued Progress Requires Culture Change (GAO/T-HEHS-00-167, July 27, 2000).

DOD and VA Health Care: Jointly Buying and Mailing Out Pharmaceuticals Could Save Millions of Dollars (GAO/T-HEHS-00-121, May 25, 2000).

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