Building a Laboratory Workforce to Meet the Future

ASCP Task Force on the Laboratory Professionals Workforce

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Key Words: Workforce; Laboratory professionals; Vacancy rate

ABSTRACT

Objectives: To analyze the demand for services from the nation’s medical laboratories, which is predicted to dramatically increase as our citizens age and millions receive insurance coverage through the Affordable Care Act.

Methods: A systematic review of relevant publications and databases was conducted to assess the current state of the nation’s medical laboratory workforce and to examine the impact of population demographics and health reform on workforce development to address the future demand for laboratory services.

Results: Building a Laboratory Workforce to Meet the Future, a new report from the American Society for Clinical Pathology (ASCP), provides a comprehensive strategy to address the future workforce needs of the nation’s medical laboratories to meet this demand to provide timely, accurate, and safe patient care and to fully realize the benefits of personalized medicine.

Conclusions: The report, from the ASCP Task Force on the Laboratory Professionals Workforce, is a comprehensive review of the myriad of factors affecting recruitment and retention of qualified laboratory professionals and provides a set of thoughtful recommendations outlining a multifaceted approach to bolster the pipeline of potential candidates for the profession as well as leadership in health care.

As the largest professional organization in the laboratory community and the only organization whose membership represents all the clinical laboratory professions, the American Society for Clinical Pathology (ASCP) has made workforce issues a top priority.1 All of the ASCP’s workforce-related programs and activities are predicated on and driven by the latest data. The ASCP Wage and Vacancy Surveys, administered biennially for the past 24 years, serve to not only monitor supply and demand but also identify underlying factors. In addition to efforts to monitor and more clearly define the workforce needs, the ASCP asserts its influence and broad reach to affect change through other venues—advocacy, education, certification, communication, and collaboration.

Periodic evaluation of the workforce landscape and the organization’s activities is essential to fulfill the ASCP’s role as a leader in the promotion of patient-centered care and the profession. The coming convergence of a multitude of variables within both the laboratory workforce itself and the nation’s patient population, coupled with numerous and rapidly occurring advances in the practice of medicine, warrants an in-depth comprehensive review at this time. The ASCP is committed to ensuring that the nation’s clinical laboratories are adequately staffed with qualified laboratory professionals.

Mission and Scope of the Task Force

The mission of the ASCP Task Force on the Laboratory Professionals Workforce was to recommend a comprehensive organizational strategy to address the future workforce needs of the nation’s medical laboratories to provide timely,
accurate, and safe patient care, as well as fully realize the benefits of personalized medicine. The specific charges of the task force were as follows:

• Evaluate the current data on all laboratory professions, identify gaps, and make recommendations for future data collection initiatives.
• Review the ASCP’s role in workforce development and current initiatives.
• Examine how the ASCP might leverage its resources and standing among other pathology/laboratory medicine organizations/industry, government, and the broader health care system to develop long-term initiatives that will provide a meaningful, measurable impact.

While parallel concern exists over a possible shortage of pathologists in the coming years, the primary focus of this task force is the nonphysician laboratory professions. Workforce dynamics and projected needs in the pathologist workforce will be considered separately since the demographics of each group, the challenges to recruitment and retention, educational requirements, and the body of available workforce data for each group differ significantly.

Background

Health Care: Undergoing Dramatic Transformation

Increasingly, the US economy is being defined by its health care sector. Health care currently accounts for 17% of the US gross domestic product (GDP) compared with just 5% in 1960. By 2020, health care is anticipated to account for 20% of all the goods and services produced in the nation. Driving this growth are large-scale and transformational changes that promise to dramatically affect patient care delivery. Among the factors causing this change is an aging population. According to US Census Bureau projections, the population 65 years and older is expected to more than double between 2012 and 2060, from 43.1 to 92.0 million. The ramifications of this dramatic demographic age shift of the population will be profound for our health care system as the population 65 years and older is expected to more than double between 2012 and 2060, from 43.1 to 92.0 million. The Medical Laboratory Workforce

The Medical Laboratory Workforce includes multiple categories of laboratory science practitioners, who have various levels of education and training, ranging from on-the-job training to associate, bachelor, and graduate or professional degrees. Medical laboratory practitioners include pathologists, doctoral-level clinical scientists, technologists/scientists, and technicians, and each has a vital role in the health care system. While the health care industry continues to offer consistent job growth, it is essential to identify workforce policies and priorities that ensure an effective, properly trained workforce that leverages efficient operating models and the latest technologies. Moreover, as these policies and priorities are identified, they need to be coupled with sustainable advances in educational curricula, continuing education, ongoing competency assessments, and credentialing requirements.

The US health care system is characterized by a complex interdependent network of multiple stakeholders at the national, state, and local levels and within professional, educational, and other jurisdictions. Efficient and effective workforce planning and deployment are inextricably tied to changes in demand for services based on assumptions about the health needs of an aging population, the growing prevalence of chronic disease, the cost burden of chronic disease and comorbidities, population risk profiles, and anticipated increased utilization due to the PPACA provisions intended to expand access to care. Additional factors include clinical technologies to facilitate diagnosis and treatment, payment systems that influence provider behaviors, workforce policies that frame personnel standards and scopes of practice, and the overall structure of the system.

While the demand for services is poised to grow, the way medicine is practiced is also in transition. New diagnostic and prognostic tools will increase our ability to predict the likely outcomes of drug therapy, while the expanded use of biomarkers could result in more focused and targeted drug development. Personalized medicine also offers the possibility of improved health outcomes and has the potential to make health care more cost-effective.
The Current Landscape

Key Findings of the 2012-2013 ASCP Wage and Vacancy Surveys

The ASCP provides the principal source of data on the medical laboratory workforce for the nation through its Wage and Vacancy Surveys. These surveys, administered biennially since 1988, attempt to determine the extent and distribution of workforce shortages across the country. Laboratory medicine is a complex and rapidly evolving field. With each administration of the survey, the ASCP seeks to improve its method to collect the most current and meaningful data.

Compared with the results of ASCP’s 2010 Vacancy Survey, this year’s data reveal decreased overall vacancy rates for the blood bank, cytology, hematology/coagulation, histology, immunology, and microbiology departments [Figure 1]. Data also show a slight decrease in staff (nonsupervisor) and supervisor vacancy rates by department except for the cytology department, whose staff vacancy rate has doubled since 2010 [Figure 2] and [Figure 3]. This year, the survey asked about the total positions anticipated to open in the next 24 months due to the retirement of personnel. Results show that the projected retirement rate for supervisors is higher than that for staff. In comparing the anticipated rate of vacancies by December 2012 among all the departments surveyed, staff rates are generally higher than supervisory rates. The rate of staff positions that take longer to fill (ie, those that remain open for longer than six months) is highest for the molecular biology and diagnostics department, and the rate for the corresponding supervisor positions is highest for blood banks. The cytology department has the lowest rate of positions that remain open for longer than six months. While it appears that vacancies are low, factors such as the economy, aging workforce, innovations in science and technology, and laboratory education program closures must be taken into consideration. Laboratory professionals are taking extra shifts and/or second jobs within the laboratory. Facilities also indicate that due to funding issues, some positions left open are eliminated or creating new positions becomes difficult.

![Figure 1](image1.png) Overall vacancy rates by laboratory department. Sample sizes for Reproductive Medicine and Genetics and Tissue Typing/Histocompatibility did not allow for statistically significant comparisons.

![Figure 2](image2.png) Staff (nonsupervisory) vacancy rates by laboratory department. Sample sizes for Reproductive Medicine and Genetics and Tissue Typing/Histocompatibility did not allow for statistically significant comparisons.
Results from the 2013 ASCP Wage Survey show increased average hourly salary for laboratory professionals compared with the 2010 survey. Where data allowed for comparisons between certification, wages continued to be higher for certified laboratory personnel. Based on age data collected from the survey participants, the mean age of laboratory personnel is 44.3 years.

For the medical laboratory professions, establishing a threshold vacancy rate that could be used to define a workforce shortage is challenging due to the wide variance of efficiencies under which medical laboratories operate. Laboratory management has long struggled with the challenge of staffing. Other health care professions have focused on patient care indicators to define demand. Unlike nursing and other professions that use patient ratios, the development of a sound staffing formula for medical laboratories remains elusive because of the varied and complex nature of the tasks laboratory professionals perform.

The US Bureau of Labor Statistics (BLS) maintains data for only two categories of laboratory professionals: medical/clinical laboratory scientists and medical/clinical laboratory technicians. According to the most current BLS report, in 2010 there were 330,600 employed clinical laboratory technologists and technicians. Using estimates of future size and composition of the labor force, aggregate economic growth, detailed estimates of industry productivity, and industry and occupational employment, the BLS reports that employment of medical laboratory technologists and technicians is expected to grow by 13% between 2010 and 2020 to 373,500. It is important to note that these numbers represent new jobs and not positions created by attrition.
Key Issues Affecting the Laboratory Workforce

Workforce supply and demand in our nation’s medical laboratories continues to be determined by a myriad of influences. On the supply side, the profession faces challenges with the three Rs—recruitment, retention, and retirements. On the demand side, the convergence of profound shifts in population demographics, legislative and regulatory reforms, and major advances in medical diagnostics and treatments will be significant influences. There continues to be much debate among policy makers. Some think these factors will create an unprecedented demand for services, while others believe the demand will be tempered by more efficient utilization.

Supply Side Issues

Education and Training Programs

The different types of medical laboratory professionals are distinguished both by their areas of specialization and the degree of education and training required. This education and training is received in an array of settings, including colleges and universities, community colleges, adult schools, and on-the-job training programs.

Closures of Clinical Laboratory Programs

According to the National Accrediting Agency for Clinical Laboratory Sciences (NAACLS), school closings in the past 15 years have reduced the number of medical laboratory scientists/clinical laboratory scientists (MLS/CLS) and medical laboratory technicians/clinical laboratory technicians (MLT/CLT) being trained annually. The number of individuals graduating from these programs declined from approximately 7,000 graduates in 1994 to approximately 6,000 in 2009.14 In the 20 years since 1990, the number of laboratory training programs has decreased from 720 to 552, a decrease of almost 25%. Program closures have been the result of a multitude of factors, including declining enrollment and cost. For many hospital-based programs, the implementation of the Medicare Prospective Payment Systems changed the hospital payment structure so that medical laboratories (including outreach testing), once a source of revenue, became cost centers.15 Fewer training programs can have profound impacts on rural areas, where prospective laboratory practitioners often seek training close to home. Idaho, for example, has only one medical laboratory educational program. Coincidently, data provided by the BLS indicate that Idaho has one of the lowest concentrations of laboratory professionals per resident (60 per 100,000 residents) in the United States.16

However, since 2009, the number of programs accredited and approved by the NAACLS has grown slightly, with the most significant increase occurring in the number of MLT programs. The data suggest, and anecdotal information from program directors supports, that programs have increased enrollments through more effective student recruitment strategies, adapted education delivery models, and cultivated clinical experience opportunities that allow greater numbers of students to complete programs. Programs appear to be responding to the national deficit of medical laboratory professionals and the greater demand for services by expanding enrollments. Their efforts are paying off. The numbers of graduates have been slowly increasing since 2009. In 2010, there were 6,125 graduates from MLS/CLS and MLT/CLT programs.17

Lack of Federal Funding

Moreover, there is little understanding and thereby a lack of resources allocated to the field of laboratory medicine by Congress and federal agencies. Throughout the years, millions of dollars have been allocated for the training of various health professions. However, training and/or funding for laboratory personnel is virtually nonexistent. For example, under the American Recovery and Reinvestment Act of 2009, of the $200 million designated for the Health Professions Training Programs Implementation Plan, little or no money was allocated to recruit, train, or retain laboratory professionals.18

In 2006, Congress slashed the Title VII Allied Health Professions program by 68%. Funding for the establishment and expansion of allied health training programs was reduced from $300 million in fiscal year 2005 to $94 million for the 2006 fiscal year. The allied health and other disciplines account, which included grants for a small number of laboratory training programs, was specifically reduced from $11.8 million to $4 million for the 2006 fiscal year. And Congress altogether eliminated funding for the allied health special training programs.19

Table 1
Average Hourly Wage for Laboratory Staff by Certification12

<table>
<thead>
<tr>
<th>Occupational Title</th>
<th>Certified</th>
<th>Not Certified</th>
</tr>
</thead>
<tbody>
<tr>
<td>CG</td>
<td>28.93</td>
<td>—</td>
</tr>
<tr>
<td>CT</td>
<td>31.40</td>
<td>—</td>
</tr>
<tr>
<td>HT</td>
<td>23.94</td>
<td>24.13</td>
</tr>
<tr>
<td>HTL</td>
<td>26.86</td>
<td>—</td>
</tr>
<tr>
<td>LA</td>
<td>16.09</td>
<td>15.88</td>
</tr>
<tr>
<td>MLT/CLT</td>
<td>20.55</td>
<td>19.44</td>
</tr>
<tr>
<td>MT/CLS/MLS</td>
<td>27.13</td>
<td>27.00</td>
</tr>
<tr>
<td>PBT</td>
<td>15.93</td>
<td>13.87</td>
</tr>
<tr>
<td>SBB</td>
<td>28.07</td>
<td>NA</td>
</tr>
</tbody>
</table>

CG, cytogeneticist; CLS, clinical laboratory scientist; CLT, clinical laboratory technician; CT, cytotechnologist; HT, histotechnician; HTL, histotechnologist; LA, laboratory assistant; MLS, medical laboratory scientist; MLT, medical laboratory technician; MT, medical technician; NA, not applicable (all SBB respondents were certified); PBT, phlebotomy technician; SBB, specialist in blood banking. aSample size was less than 30 and did not allow for statistically significant comparisons.
project grants that supported a very small number of medical technology education programs under Title VII of the Public Health Service Act. Over the years, the allied health special project grants, as part of Title VII, provided a few hundred thousand dollars for medical technology and medical laboratory science programs in academic settings; however, this line item has now been eliminated, and each allied health discipline is looked at as its own entity.

On a more positive note, federal grants provided through the Department of Labor (DOL) to train laboratory personnel have helped alleviate the laboratory personnel shortage in Minnesota. These grants (more than $5 million), provided through the Workforce Investment Act, have produced a model that should be replicated nationwide. The DOL also recently awarded two $5 million grants to two state universities in California—San Jose State University and San Diego State University—to train laboratory professionals.

Therefore, efforts must be undertaken to widen the scope of knowledge that lawmakers have about pathology and laboratory medicine. There needs to be a concerted attempt to address the laboratory workforce shortage across the nation by securing support from Congress, federal agencies, state government, hospitals, the laboratory community, academic institutions, and other stakeholders interested in workforce development.

Recruitment Challenges

Finding and Supporting the Next Generation of Laboratory Professionals

The medical laboratory professions have long suffered from a lack of recognition, from both the public and within health care. Despite the critical role that laboratory professionals play in health care delivery through the collection and analysis of patient specimens, many potential candidates remain unaware of the profession. Student recruitment has become more difficult as competing opportunities draw from the pool of qualified students. Perceptions that a career in laboratory science programs in academic settings; however, this line item has now been eliminated, and each allied health discipline is looked at as its own entity.

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Targeting the STEM Pipeline

For the most part, the medical laboratory professions require highly technical skills and a solid foundation in the sciences. For this reason, students with backgrounds in science, technology, engineering, and mathematics, or the STEM fields, are aptly prepared for the specialized education and training necessary for a career in laboratory medicine. Professional health care occupations jobs, such as the medical laboratory professions, and STEM occupations have been shown to share significant skill set similarities. While the numbers indicate that there are enough STEM graduates for STEM occupations, a scarcity remains in some occupations because STEM-capable workers divert into non-STEM occupations, particularly the health care professional occupations. Meeting our nation’s labor needs for both the traditional STEM occupations and the health care professional occupations, including medical laboratory professionals, will require a concerted effort to improve the pipeline into the STEM fields for sub-baccalaureate students, as well as bachelor degree and advanced degree holders; for youth moving toward employment and adults already in the workforce; for those already employed in STEM fields; and for those who would like to change careers to secure better employment and earnings.

Opening the Door to Nontraditional Students and Career Changers

While the BLS does not collect data on how often individuals change careers, it does report that the “younger baby boomers,” those born between 1957 and 1964, will change jobs, on average, 11 times in their lifetime. Given these statistics, strategies to address a clinical laboratory workforce shortage may need to focus on developing additional venues by which qualified candidates considering a laboratory career can enter the field. On-the-job training and career paths are among the avenues the ASCP has identified as priority areas to attract both nontraditional students and career changers to the field.

Funding Opportunities for Students/Scholarships

Like all post–secondary degree programs, the cost of completing a clinical laboratory education program continues to escalate. Increasing access to pursue opportunities in the field will be essential to reach, recruit, and retain qualified students. As the racial and ethnic diversity of the nation’s population is changing, so too is the diversity of the health care workforce. This trend toward increased diversity will help the health care industry meet the needs of an increasingly multicultural population. While the medical laboratory professions have traditionally been and continue to be female dominated, current BLS data indicate race and ethnicity distribution among laboratory workers to be fairly representative of the nation’s population 

Table 2 

Table 3 

However, given the tendency for minorities to be underrepresented in higher income health professions, it is likely that ethnic or racial minorities are underrepresented among the higher skilled, higher paid medical laboratory science professions, such as medical laboratory scientists or cytotechnologists. Increasing funding opportunities through scholarships and grants to qualified students serves to widen
access to the field and promote all the laboratory professions to underrepresented groups.

Pathways to the Profession

Medical laboratory professionals receive their training through a combination of academic education and clinical training. Academic programs for the laboratory professions are available at community colleges, colleges, and universities, and clinical training is available through accredited training programs or on-the-job (practical) training programs.

Access to Training Opportunities

The availability of training programs, particularly those that can offer online and distance education, can be critical to the development of an adequate, stable, and/or competent laboratory workforce. The University of Nebraska, for example, maintains a clinical laboratory education program that includes an effective distance training program that has served other nearby states as well. The BLS data analyzed by the ASCP reveals that Nebraska, which is served by five accredited training programs, including one that has a robust distance education program, has more than 149 laboratory professionals per 100,000 residents, one of the highest concentrations in the nation, and almost twice the number of Idaho, which has only one training program in the entire state.16

Clinical Experience

Training programs typically include didactic instruction accompanied by practicum experience delivered through bench-level instruction in a clinical laboratory. Students in the practicum phase of their training are typically placed in a clinical laboratory where they receive one-on-one instruction from the clinical staff. Interviews with program directors indicate increasing difficulty securing sufficient clinical rotation spots for students. In recent years, the laboratories, many of them in hospitals, have reduced the number of students they accept for clinical experience or eliminated the program altogether, citing increased workload and short staffing. Clinical sites incur tremendous labor costs yet do not receive reimbursement or grant funding from the associated training program to cover the added expense. For some programs, student enrollment capacity has become limited by the availability of these clinical slots.

Faculty

Clinical laboratory training programs typically have low student-to-faculty ratios because clinical training requires intensive instruction and oversight. Faculty shortages have been reported in many allied health professions, thought to be due to the disparity in salary, with academic salaries being lower than those in medical practice. Concern exists that faculty shortages in the medical laboratory professions might also become an issue as older current faculty retire. More pointed data will be needed to determine if this is indeed the case. While the ASCP’s Wage and Vacancy Surveys collect data on 12 different staff and supervisory-level laboratory occupations, they do not survey faculty. Faculty members of laboratory science education programs often have other clinical responsibilities besides teaching, such as administrative or supervisory roles. Administration of a separate survey would be necessary to decipher a shortfall of faculty.

Personnel Standards

There are a number of standards used as benchmarks for assessing the qualifications of medical laboratory personnel. These standards stem from federal and state law, as well as private-sector efforts such as personnel certification and the accreditation of clinical training programs. This section provides an overview of these differing forms of occupational regulation.

Federal Requirements: Clinical Laboratory Improvement Amendments of 1988

Under a federal statute, known as the Clinical Laboratory Improvement Amendments of 1988 (CLIA), the federal government has created a set of regulations imposing differing personnel requirements, depending on the complexity of the laboratory tests involved. CLIA breaks test complexity down into four areas: high complexity, moderate complexity, provider-performed microscopy, and waived testing. To perform any laboratory test, testing personnel must meet the CLIA high-complexity standards. For most laboratory personnel, the applicable standards are outlined in 42 Code of Federal Regulations (CFR) 493.1489. Cyto technologists, however, must meet the personnel regulations outlined in 42 CFR 493.1483. There are no federal personnel requirements specified for

|Table 2|

<p>| Race and Ethnicity of Laboratory Science Workers vs the US Population, 2012 |</p>
<table>
<thead>
<tr>
<th>Race/Ethnicity</th>
<th>Laboratory Workers, %</th>
<th>US Population, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>White, non-Hispanic</td>
<td>60.8</td>
<td>67.0</td>
</tr>
<tr>
<td>Hispanic/Latino</td>
<td>10.7</td>
<td>14.9</td>
</tr>
<tr>
<td>Black, non-Hispanic</td>
<td>13.5</td>
<td>11.1</td>
</tr>
<tr>
<td>Asian/Pacific Islander</td>
<td>14.0</td>
<td>5.4</td>
</tr>
<tr>
<td>Other</td>
<td>1.0</td>
<td>1.1</td>
</tr>
</tbody>
</table>

|Table 3|

<p>| Sex of Laboratory Science Workers vs the US Population, 2012 |</p>
<table>
<thead>
<tr>
<th>Sex</th>
<th>Laboratory Workers, %</th>
<th>US Population, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>27.2</td>
<td>53.0</td>
</tr>
<tr>
<td>Female</td>
<td>72.8</td>
<td>47.0</td>
</tr>
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</table>
persons involved in histotechnology. That said, individuals performing the gross examination of an anatomic specimen must meet the CLIA’s high-complexity requirements.

A precise enumeration of the full CLIA high-complexity requirements is beyond the scope of this report. (The ASCP does not intend this report to constitute legal advice toward satisfying the CLIA requirements.) To ensure compliance with the CLIA regulations, the ASCP urges interested parties to examine the exact language of the CLIA regulations. These can be accessed via the following link: http://www.cdc.gov/clia/default.aspx. That said, in essence, for testing personnel to perform high-complexity standards, they generally need to possess, at a minimum, (1) an associate’s degree in laboratory science or medical technology or (2) at least 60 semester hours, or equivalent, from an accredited institution and either (a) 24 semester hours of clinical laboratory technology courses or (b) 24 semester hours of science, including six semester hours of chemistry, six semester hours of biology, and 12 semester hours of biology, chemistry, or medical laboratory technology. In addition, individuals who have less than a bachelor’s degree must (1) graduate from a clinical laboratory training program accredited by a program recognized by the US Department of Health and Human Services or (2) complete three months of documented laboratory training in each specialty of the laboratory (eg, chemistry) in which they perform testing. Oddly, CLIA does not require testing personnel with appropriate bachelor’s degree (or higher degree) to satisfy a clinical training requirement.

Licensure

Usually conferred by state governments, licensure is a government-provided authorization to work in a designated profession, provided the individual in question can satisfy the necessary requirements. Currently, 12 states or territories license clinical laboratory personnel: California, Florida, Hawaii, Louisiana, Montana, Nevada, New York, North Dakota, Puerto Rico, Rhode Island, Tennessee, and West Virginia. Georgia imposes state personnel standards, rather than licensure, on its laboratory workforce. All states requiring laboratory personnel impose personnel standards that are more stringent than CLIA’s minimum requirements. While state requirements differ, state licensure generally requires medical laboratory scientist–level laboratory professionals to possess a bachelor’s degree in a natural science, to graduate from an accredited training program or complete appropriate work experience, and to pass an acceptable certification examination, such as that offered by the ASCP Board of Certification (BOC). Technician-level personnel generally must possess an acceptable associate’s degree or equivalent, graduation from an accredited training program or completion of work experience, and passage of an appropriate certification examination, such as that offered by the ASCP BOC.

Certification

Like CLIA and state licensure, personnel certification requires laboratory personnel to meet certain personnel standards (ie, academic and clinical training). However, in contrast to CLIA and state licensure, certification provides no right to work; it is a voluntary form of occupational regulation. Certification can have many forms, but within the medical laboratory setting, certification requires the passage of an examination pertinent to laboratory testing. The ASCP BOC provides a number of examinations, including generalist examinations for medical laboratory scientists and medical laboratory technicians and categorical technologist examinations in chemistry, microbiology, and so on. While it may not be true of all certification examinations, the ASCP’s examinations assess competency. That is one of many reasons why ASCP certification is recognized as the gold standard for the medical laboratory workforce.

Accreditation

Not every laboratory professional secures clinical training via a clinical training program. Some receive their training through on-the-job or practical experience. If an individual plans to receive his or her clinical training through a clinical training program, it should be one accredited by an accrediting agency approved by the US Department of Health and Human Services. According to 42 CFR 493.1489(b)(2)(ii)(B) (1) (Standard; testing personnel qualifications), testing personnel must complete “a clinical laboratory training program approved or accredited by ABHES, CAHEA, or other organization approved by HHS.” The largest group accrediting clinical laboratory training programs is the NAACLS. In addition, the Commission on Accreditation of Allied Health Education Programs (CAAHEP) accredits cytotechnology programs as well as Specialist in Blood Bank Technology/Transfusion Medicine programs. Both the NAACLS and CAAHEP, like other accrediting agencies, have developed a set of requirements designed to ensure that individuals completing training through an accredited program receive a well-structured, quality experience and are optimally prepared to work in a medical laboratory once they graduate from the program. It should be noted that the ASCP’s experience has been that graduates of accredited clinical laboratory programs tend to have higher pass rates than individuals who complete their clinical training through on-the-job training or practice experience.24

Demand Side Issues

Delivery Systems and the Impact of Health Reforms

On March 23, 2010, President Obama signed into law the PPACA, also known as the Affordable Care Act (ACA). The
law has three overriding goals: (1) to increase access to health care, (2) to decrease the cost of health care and insurance, and (3) to improve the quality of health care services. This section of this report focuses on two of these three goals: access and cost. Quality is dealt with elsewhere in this report.

The ACA and the Demand for Health Care

In 2014, several of the most important provisions of the ACA will begin taking effect. These provisions include the insurance mandate requiring individuals to buy insurance, tax credits to help individuals purchase insurance, and health insurance exchanges designed to help lower the cost of insurance by pooling insurance purchasers together. The Congressional Budget Office estimated in 2012 that these changes will significantly lower the uninsured population, 4 reducing “the number of nonelderly people without health insurance coverage by 14 million in 2014 and by 29 million or 30 million in the latter part of the coming decade.” This increase in demand for health care services could overwhelm the health care system, including medical laboratory operations, if it is not adequately prepared to handle the massive influx of newly insured patients.

Cost Concerns

The cost of health care and the appropriate utilization of health care services have been a major concern for years, and the ACA is one of many federal efforts or initiatives aimed at reducing the cost of care. The ACA attempts to rein in health care costs and utilization with a variety of initiatives. Some of these initiatives are intended to lower the rate of growth in cost of care, particularly Medicare, while others are intended to alter the way health care is provided to improve quality and efficiency. Certain initiatives, such as Medicare provider payment cuts, bundling initiatives, accountable care organizations (ACOs), and quality reporting initiatives (Electronic Health Records Incentive Program, Physician Quality Reporting System, etc.), will directly affect anatomic pathology and laboratory medicine. But others, such as managed competition in health insurance exchanges and the excise tax on high-cost health insurance plans, will affect laboratory operations in a less direct manner.

In addition to the ACA initiatives, several other initiatives have surfaced to address the cost of care. In 2013, President Obama’s budget blueprint for 2014 proposed cutting the clinical laboratory fee schedule by 1.75% each year for the years 2016 to 2023 in an effort to cut the Clinical Laboratory Fee Schedule (CLFS) by almost $10 billion. The Centers for Medicare & Medicaid Services (CMS) has undertaken a number of reviews of high-cost medical services, such as the surgical pathology codes—including Current Procedural Terminology code 88305—resulting in significant cuts in the technical component of many of these services. Also, one recent report by the Office of the Inspector General of the US Department of Health and Human Services has suggested that the CLFS may be overvalued and that the CMS should consider cutting or imposing a copay on the fee schedule and/or instituting competitive bidding of Medicare-reimbursed laboratory procedures.

Although some of these efforts, like ACOs, could have positive implications for some laboratories on net, additional cost-savings measures could have direct implications for the laboratory industry. Laboratory Economics’ 2013 Anatomic Pathology Market Trends Survey identified declining reimbursements as the greatest challenge over the next five years. 25 Whatever shape cost-cutting measures take, they are likely to have implications for the laboratory workforce. Laboratory Economics noted in relation to the CMS-imposed cuts to the surgical pathology codes that laboratories are considering a number of measures, such as reducing or holding steady staff salaries or decreasing staff size, to cope with these cuts. 26

New Technologies, New Opportunities, and New Skills

For the past few decades, the medical laboratory has been characterized by ongoing rapid and dramatic innovation. Laboratory technology is often at the forefront of medical advances. Innovation in laboratory technology, which includes both new tests and advances in equipment and testing techniques, has made testing more efficient and automated. Information technology has revolutionized the transfer of data by decreasing the time it takes to order and receive test results and by creating opportunities for research on large data sets. Medical laboratory technology plays a more important role than ever in the delivery of health care. Likewise, these numerous new technologies are having a profound impact, in both challenges and opportunities, on the medical laboratory workforce.

Molecular Diagnostics

Many new diagnostic techniques and laboratory tests have been introduced as a result of both research on the fundamental pathogenesis of diseases and the development of new methods in themselves. Explosive advances in the areas of molecular-level and genetic testing are dramatically changing clinical practice. The National Institutes of Health (NIH) Genetic Test Registry currently has more than 7,000 orderable tests for approximately 3,000 conditions and 6,300 genes. 27 The number of conditions for which genetic tests are available has nearly doubled in the past 2 years!

New testing techniques are more sensitive and specific, allowing clinicians to detect, diagnose, and manage disease more effectively than ever before. Technologies that analyze DNA, RNA, and protein composition evaluate disease at the molecular level, permitting earlier detection and a more personalized approach to patient care. In addition, new methods in diagnostic imaging will cross over the
traditional boundaries that separate the diagnostic specialties of anatomic pathology, radiology, and molecular diagnostics. The resulting convergence of high-density data streams will offer patients the potential for a truly personalized form of diagnostic medicine. However, patients will only fully realize the benefits of this rapidly developing technology if we have an adequate laboratory workforce equipped with the skills required to perform the complex assays of the future.

Information Technology

The American Recovery and Reinvestment Act of 2009 (ARRA) has made promoting a national interoperable health information system a priority, authorizing significant resources to achieve this goal. While the nation’s laboratories have nearly three decades of experience generating patient test results electronically, emerging technologies have continued to revolutionize laboratory operations. There continues to be new and more efficient ways to communicate and provide services, educate staff and their clients, market products, and manage data and information.

Advances in laboratory information management systems have led to new career opportunities throughout the laboratory, for which experienced laboratory professionals with a proclivity for informatics are ideally suited. A thorough understanding of laboratory diagnostics, workflow, and the specific needs of other clinicians providing patient care are essential for developing systems that will streamline data housing and transfer, reduce error, monitor and improve work processes, and serve as a tool to better inform both clinicians and patients.

Automation

New testing methods and processing coupled with sophisticated laboratory information systems have segued into the development of laboratory automation systems. While total laboratory automation of testing processes may not be possible for all medical laboratories, namely due to the prohibitively large upfront investment for equipment and laboratory redesign, many have automated some portion of their operations. The extent to which automation affects the need for certain types of laboratory professionals is thus far lacking consensus. While some sources report significant increases in laboratory productivity without having to incur higher labor costs,28,29 others report that although new laboratory technologies potentially have decreased the need for as large a staff, workloads have increased. Approximately 73% of laboratory hiring managers have indicated that new technologies have not precipitated changes to their staffing needs.30

Practice Issues

Advances in science continue to dramatically affect the practice of medicine and patient care. Likewise, innovative technologies are changing the practice of laboratory medicine and, in turn, the educational requirements and qualifications needed to provide quality testing services. Technological advancement of laboratory testing, emerging pharmacogenomic and proteomic testing, digital imaging, and greater laboratory automation could significantly change the qualifications required of the next generation of laboratory professionals.

The increased volume of clinical testing and the growing menu of available clinical tests, often using new testing platforms, have the potential to influence not only the numbers and types of laboratory professionals needed but also their knowledge and skill set. Increasingly sophisticated diagnostics will require interpretation management. The coming milieu could necessitate the need for both generalists as well as specialists. The evolution could mean the opening of new and different career paths and scopes of practice.

The key participants of the laboratory sector—leaders in the laboratory community, state and federal policy makers, and educators—will need to continually monitor and review the roles of the various laboratory professionals to ensure that staffing qualifications and workforce-level requirements are clearly and logically defined to meet these forthcoming advancements. While the field applauds innovation and progress, continual self-scrutiny will be the key to effective deployment of the laboratories most valuable resource—its laboratory professionals.

Test Utilization

Another issue that can have a profound impact on the demand for laboratory professionals is test utilization. It is well recognized that many medical services provided each year are unnecessary or of limited clinical value. In fact, it is estimated that approximately $250 to $300 billion are spent each year on unnecessary or outdated health care services.

As discussed earlier, the ACA includes several initiatives to address the cost of care, in large part to address the issue of utilization of health care services. The ACA’s interest in ACOs and, to a somewhat lesser extent, patient-centered medical homes (PCMHs) is hoped to reduce unnecessary utilization of such services as laboratory tests. It is anticipated that ACOs and possibly PCMHs may provide key roles for pathologists and other experts in laboratory medicine by informing clinicians and other health care providers of appropriate use of laboratory testing. The Electronic Health Records Incentive Program, quality reporting programs (Physician Quality Reporting Program), and comparative effective research are other examples of ACA initiatives to address utilization.

Another federal initiative to address utilization (and cost) is the Obama administration’s recent proposal to reform the physician self-referral law’s in-office ancillary services (IOAS) exception. Self-referral arrangements are well documented to increase utilization and the cost of health care.
services. Reforming the IOAS exception could save more than $6 billion over the next 10 years.

Indeed, initiatives to address utilization are springing up within the public sector as well, such as the Choosing Wisely Campaign (www.choosingwisely.org). The initiative, spearheaded by the American Board of Internal Medicine Foundation, with the ASCP representing pathology and laboratory medicine, aims to “help physicians and patients engage in conversations about the overuse of medical test and procedures, and support physician efforts to help patients make smart and effective care choices.”

Perspectives From the ASCP Pathologist Workforce Round Table

Just as the laboratory and pathology communities are grappling with the challenges of defining and determining how best to meet the future workforce needs of its laboratory professionals, it is also faced with similar challenges with regard to pathologists.

The ASCP recently convened a Pathologist Workforce Round Table, bringing together a distinguished cadre of leaders in pathology from across the country with expertise in education, new care delivery models, hospitals, and industry, for a multidimensional examination of the current trends affecting the field as well as projections for the future.

The numbers help to paint the picture. There are currently 14,971 active pathologists, of whom 57.3% are 55 years or older. From 2005 to 2020, 23% more pathologists (5,400) will be needed compared with the baseline number practicing in 2000. By these projections, there could be a shortfall of pathologists of 4,400, although other workforce models project an even greater deficit.

What is an adequate supply of pathologists? It could be defined as having the right number with the right skills in the right place at the right time. Baseline projections assume that patterns of health care use and delivery of care remain static over the projection horizon and that changing demographics are the primary driver of changes in physician workforce needs. But many other factors are now at play from both a clinical and an economic framework. Projections must take into account both health care use and workforce implications of the following:

- Paradigm shifts in care delivery—ACOs, PCMHs, changes in technology, and team-based care
- New policies—health care reform and expanded scopes of practice
- Interventions for specific subsets of the population
- Changing economic conditions
- Changing demographics

Because patient care is accomplished by teams of different professionals, workforce projections must take into account all members of the team. Pathologists’ assistants (PAs) are a crucial extension of the pathologist in the health care setting, working as a liaison to other departments and laboratories to ensure quality health care. PAs contribute to the overall efficiency of the laboratory or pathology practice in a cost-effective manner. With increased pressure on health care systems to control costs, the demand for qualified PAs continues to grow each year. Likewise, doctorate-level clinical scientists, whose pipeline has been acutely constrained by cuts in NIH funding, play an integral role in laboratory operations, directing and overseeing medical laboratories, rendering the interpretative services of patient tests, and even developing next-generation diagnostic services to improve the quality of laboratory diagnostics.

Key Findings

The following findings are a result of a comprehensive examination of the current data for the laboratory professional workforce, as well as the multitude of factors influencing their supply and demand.

The latest results from the primary data sources for the medical laboratory professional workforce, including the ASCP’s Wage and Vacancy Surveys, the NAACLS/ASCP BOC Program Survey, and the BLS, provide some positive indicators—lower vacancy rates, lower current workforce average age, and program growth and increasing enrollment. However, using these indicators solely to conclude that the workforce shortage is waning is dangerously premature.

The impact of a number of factors must be considered. The recession has delayed retirement for many, and budget constraints have resulted in hiring freezes and elimination of positions through attrition. With the nation’s health care system on the brink of tremendous change, even if these positive trends hold, will they be sufficient to meet the demand? It is doubtful that these relatively minor gains are sufficient to handle the inevitable onslaught of new patients and new diagnostics.

The ASCP strongly believes in building policy and programming on quality data. While the ASCP’s Wage and Vacancy Surveys have produced widely cited trended data on the medical laboratory workforce for the past 25 years, the laboratory field and the services it provides have grown increasingly complex. Measures of workforce sufficiency have focused on laboratory operations—having enough adequately qualified laboratory professionals to perform patient testing in a timely fashion. However, there is a paucity of data on the impact of staffing on patient care and patient outcomes. While identifying and measuring such metrics is challenging, these kinds of data may have more impact with policy makers and the public in the current patient-centric environment. The development of staffing guidelines based on patient care has proved helpful to other professions in health care in securing resources for workforce development.
Educational preparation in laboratory science requires a solid background in the basic sciences. The laboratory competes with other health care professions, as well as other professions in the sciences, to recruit students with both the appropriate background and the aptitude to succeed in the laboratory science profession. Lack of awareness about laboratory science careers in precollege students continues to be a major obstacle.

Our ever-increasing knowledge of disease prevention and management, coupled with new diagnostics, automation, and information technology, is continually changing the services laboratory professionals provide. Scope of work is changing. While these developments present workforce challenges, they are also opportunities. The cytotechnologists provide an excellent example of adapting to a changing clinical landscape with modernization of their curriculum to meet the growing demand for molecular testing.

Federal funding for laboratory science education programs continues to be sparse. As with student recruitment, there continues to be a dearth of knowledge among policy makers regarding the laboratory professions and their critical contribution to the delivery of quality patient care.

Conclusion

How can the laboratory/pathology communities ensure that its workforce will be prepared to meet the future demands of our health care system? Given the predicted demographic and systematic scenarios, how many and what types of laboratory professionals will be needed? What role can today’s laboratory professionals and pathologists play in providing more patient-centric quality care? What skills and knowledge base will tomorrow’s laboratory professionals need to have?

While the ASCP’s Task Force on the Laboratory Professionals Workforce considered these questions and offered specific recommendations, it is clear that collaborative effort of multiple stakeholders will be critical to ensuring that our nation’s medical laboratories are adequately staffed with appropriately qualified laboratory professionals. Our nation’s medical laboratories employ an array of laboratory professionals, with differing educational backgrounds and credentials, performing a variety of clinical and administrative functions. The complexities of this workforce and the laboratory environment within the health care system are not easily understood. Increasing awareness about this profession is critical to recruitment and program funding, realizing the full benefit of these professionals as an essential member of the care delivery team.

Initiatives must be data driven. Continual review of the rapidly evolving laboratory environment and its role within the health care system, workforce, and patient demographics, as well as clinical and economic impacts, is essential to identify and gather relevant, high-quality data that can be use to inform and engage policy makers. One example of a current gap in workforce data involves educators for the field, many of whom often have clinical responsibilities beyond teaching. Administration of a separate survey on faculty would be

\[\text{Figure 5}\]\ Laboratory professionals workforce model. Adapted from the American Organization of Nurse Executives.\(^{34}\)

EHR, electronic health record; LIS, laboratory information system.
helpful to understanding the challenges education programs face, particularly with regard to clinical rotations.

The pipeline of future laboratory professionals must be nourished and promoted. Increased efforts must be made to reach high school or younger students prior to the critical period of their education when they begin to consider career options.

**Recommendations**

1. Promote the role of laboratory professionals to patients, other providers, health care administrators, educators, policy makers, and the public at large, as an integral part of the clinical care team in a transitioning health care system. Challenge current paradigms of laboratory service delivery to develop and implement novel approaches capable of guiding quality patient care in a more effective and efficient manner.

2. Conduct and disseminate original health services research that supports laboratory workforce policy and compels the nation toward an adequate supply of qualified laboratory professionals, with the appropriate skills and education, to ensure access to quality care for all citizens. Use high-quality, objective, care-driven data to assess workforce supply and demand to provide projections for future needs to inform programs and policies that will meet the needs of an evolving health care system.

3. Engage in outreach opportunities that promote STEM education to support and promote the development of high-level skills critical to the performance of quality laboratory testing and management, as well as bolster the pipeline of potential candidates for the profession and leadership in health care.

4. Develop and incorporate future-based products and information into educational programming via multiple platforms (web, conferences, publications, etc) that will enable laboratory professionals and pathologists to be at the forefront of health care.

5. Seek and support initiatives that promote the development of a qualified workforce through quality education programs that reflect advancing technologies, maintaining high standards for certification of laboratory professionals and laboratory accreditation programs that incorporate personnel standards.

6. Promote a legislative and regulatory agenda that strives to increase interest and access to training leading to careers in pathology and laboratory medicine. Harmonize state and federal personnel and testing standards to remove unnecessary barriers to intrastate employment of well-qualified laboratory professionals.

**References**


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