

COMMENTARY ARTICLE

Laboratory Medicine Workforce Shortage: Informed Public and Skilled High School Students can Fill the Gap

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Abstract

We have known for years that laboratory medicine would not have enough employees at all levels to effectively support the growing needs of medical doctors. According to the US Bureau of Labor Statistics prediction “MLS/MLT will increase by 11% by 2030” and we will need “almost 26,000 openings each year through 2030.” Our colleges and universities only produce “5,000 graduates per year.”

This commentary article will provide specific context for the current workforce situation in laboratory medicine in the United States and then discuss solutions at progressive levels of commitment. Level one can be quickly implemented by laboratories in their local area by reaching out to their local high school or middle schools. Level two will create advocates in the community with highly effective career

exploration tools. Level three will require a change in paradigm about entry level staff in a medical laboratory along with significant infrastructure building through development of high school medical laboratory assisting and/or phlebotomy training programs. These programs will have the greatest effect on the employment outlook as they will produce highly skilled and engaged graduates who are ready for medical laboratory entry level employment and medical laboratory college programs.

To fill the employment gap in laboratory medicine we must stop accepting that they are the “hidden profession” and move to actively engaging with every young person in the country before they go off to college. The industry from the phlebotomists and laboratorians to the C-suites of medical laboratories must be part of the solution.

Key Words: *Laboratory medicine; Hidden profession; Career and technical education; Workforce shortage; High school students*

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Introduction

Diagnosing disease is a lot like putting a puzzle together. The physician can find many of the external symptoms/pieces related to determining the disease, medical imaging adds another layer/piece. Yet it is laboratory medicine that provides the critical puzzle pieces that allow doctors to see a more complete picture and diagnose a patient's disease. Modern medicine could not be performed effectively if the laboratory and its highly skilled staff were not there to provide the key data that can lead to better diagnosis and treatments.

The medical laboratory is essential in medicine, but as an industry we often speak about laboratory medicine as the "hidden profession." The massive shortage of medical laboratory workers has been a problem for many years, and it has not significantly improved. Kaplan and Burgess stated in their 2010 article that "our clinical laboratories will not be able to fill open positions in the very near future unless the number of students enrolling in clinical laboratory science programs increases. One of the major reasons for declining enrolment may be that we in the profession are 'faceless.'" [1]

As an industry, we need more young people while they are in high school to be exposed to and to get excited about a medical laboratory

along with a multi-pronged approach to ensure that every high school student knows about medical laboratory careers from the laboratory assistant and phlebotomist all the way up to the pathologist and DCLS. We don't want to lose students who are interested in STEM and/or medicine to other career pathways. This article will describe the necessary paradigm changes in the medical lab community to develop a new proactive strategy along with three key tactical elements to improve the medical laboratory employment situation over the next decade.

United States Medical Laboratory Makeup

To provide a perspective on the type and number of medical laboratories in the United States, there are, as of April 2023, 318,937 laboratories registered with the Centers for Medicare and Medicaid Services (CMS)'s Division of Clinical Laboratory Improvements and Quality [2]. As can be seen in Figure 1, most medical laboratories are Certificate of Waiver (COW) labs. The next level up in testing, in the United States, is a Provider Performed Microscopy Procedures (PPMP) laboratory. This level has increased capability of a limited list of microscopy procedures along with waived testing is due to testing being done by a physician, mid-level practitioner or dentist performing the procedures in their lab [3].

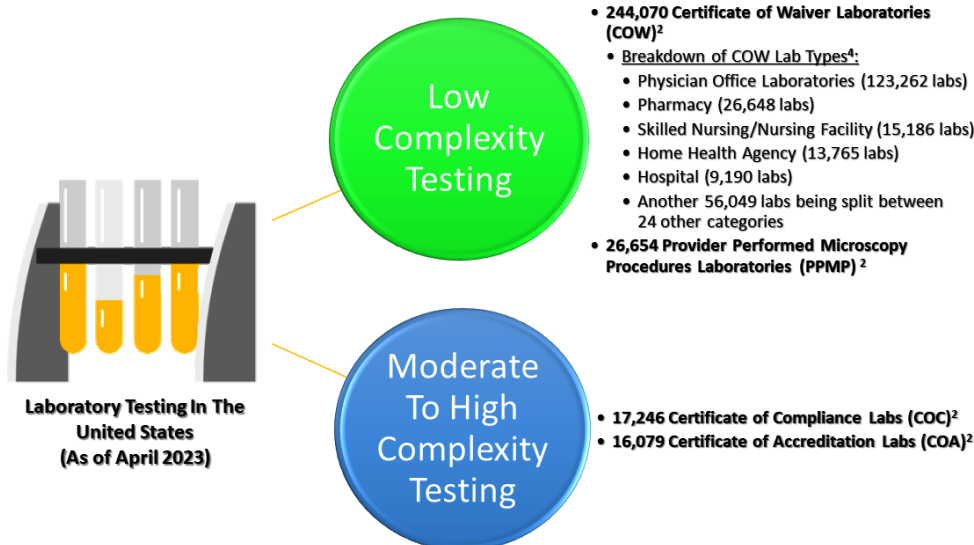


Figure 1) *Laboratory Testing in the United States as of April 2023. This graphic shows the types and number of medical laboratories in the US. Low complexity testing does not require staff to have graduated from a medical laboratory college program. Moderate and high complexity testing do require a college degree (usually from a medical laboratory program) and usually require a certification/licensure.*

The final level is the moderate to high complexity testing. Due to the nature of these tests being more difficult to perform and analyse it is necessary to ensure higher quality in these laboratories via an inspection every two years by either CMS surveyors (these labs are called Certificate of Compliance (COC) laboratories) or by an accreditation organization (these labs are called Certificate of Accreditation (COA) laboratories). These inspections are important to ensure that any laboratory doing moderate to high complexity testing is compliant with the applicable CLIA requirements. As can be seen in Figure 2 that there are five organizations that provide accreditation for the COA in all or nearly all areas. Two additional accreditation organizations have highly specialized areas of expertise and therefore only can be used for accreditation if your laboratory is also highly specialized.

What Are We Up Against?

Before developing solutions to address the medical laboratory workforce shortage, we need to understand the problem by looking at some of the fundamental data. For example, medical laboratories in the USA alone perform an “approximately 13 billion laboratory medicine tests annually” [7]. To put that number in perspective, if a laboratorian could perform one test per second it would take them about 412 years to complete all 13 billion tests. Laboratory medicine is running on fumes when it comes to recruiting adequate numbers of qualified laboratory staff. In the U.S, there are “shortages of greater than 25% in 16 states” [7]. The problem is made worse by the retirement wave that was occurring even before the pandemic. In 2020 “45% of med labs had greater than 20 years’ experience, 31% of these have greater than 25 years’ experience” [8].

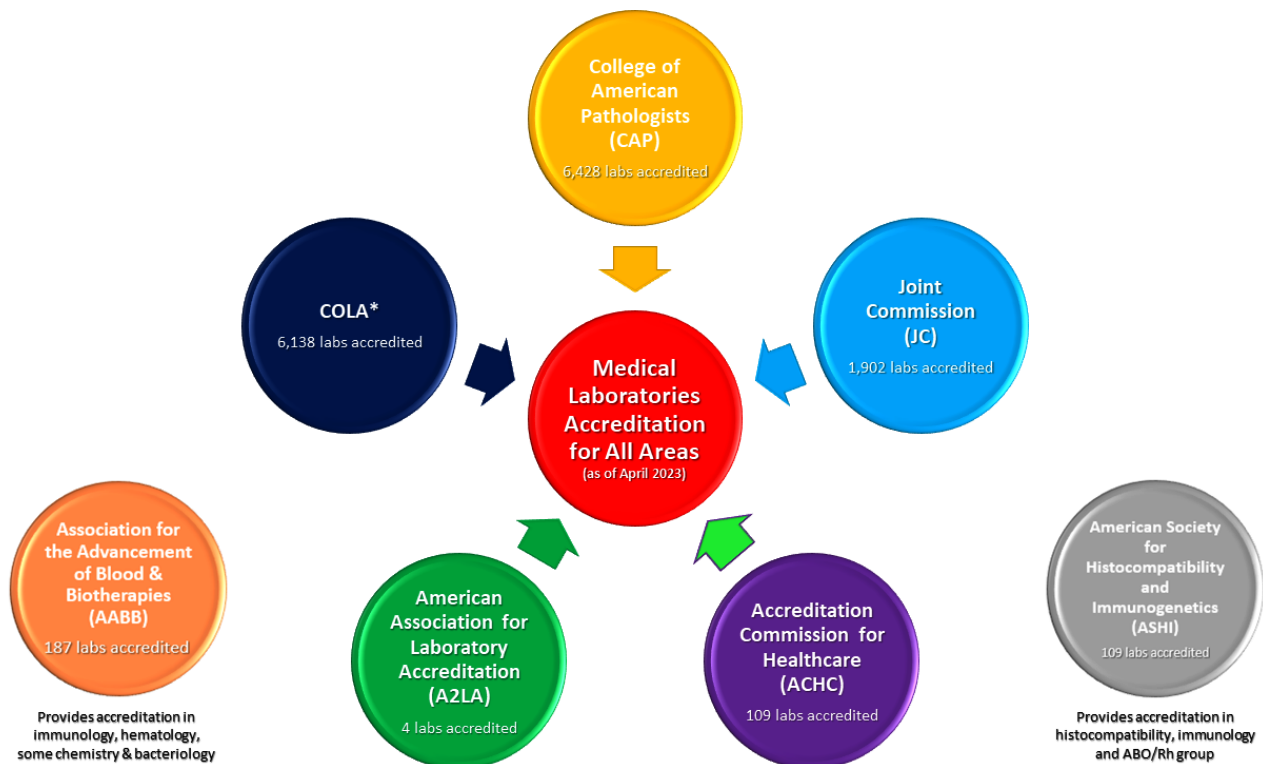


Figure 2) Medical Laboratory Accreditation in the United States as of April 2023. This graphic shows the different medical laboratory accrediting organizations in the US including what areas the laboratories accredit [5], how many labs each of them are responsible for accrediting [6]. *Note: COLA does not assess radiobioassay and cytogenetics [5]. ABB and ASHI have a limited list of areas that they accredit as can be seen below their circles [5].

Very likely we will see data presented in the coming years that will show that the pandemic removed not only a significant portion of our experienced laboratorians, but also removed a great amount of experienced institutional knowledge. To make matters worse, we are not effectively helping ourselves in recruiting new people to fill the projected needs with the US Bureau of Labor Statistics (BLS) predicting that “MLS/MLT will increase by 11% by 2030” and we will need “almost 26,000 openings each year through 2030.” Our colleges and universities only produce “5,000 graduates per year” [9]. The math is strongly against laboratory medicine, and we need to change our paradigm and resulting proactive approach as soon as possible.

Creating A Comprehensive CTE Phlebotomy & Medical Laboratory Career Program

In 2011, I was recruited out of medical/biological research at the University of Rochester to develop a health-related laboratory science program for high school students using a Career and Technical Education (CTE) model for BOCES2 in Spencerport, New York. After creating a laboratory and the curriculum for the program, I soon realized that if you build it, they don't always come. My lack of awareness and understanding of what students and parents knew of phlebotomy and medical laboratory science posed significant challenges to getting enough students to commit to the program to justify its existence. Realizing that medical laboratory careers were fundamentally invisible, I decided that I must develop a strategy of my own to get the word out to the regional community. I relied on proactive networking to professional and influential people in the region to create advocates that would passionately pass the message along to the broader community. If we are going to change the tide on raising awareness and ultimately excitement about medical laboratory careers, the industry as whole needs

to become proactive and intentional in how we promote interest in medical laboratory careers.

Level 1: Reaching out to start career exploration

The most basic level of outreach is guest speakers, field trips and student shadowing. These are the lowest hanging fruit because they can employ off the shelf materials and just require contacting schools to get started.

Level 1a: Guest speakers

To start with the low hanging fruit that could be implemented quickly, laboratories need to be actively reaching out to local high schools to set up guest speaking opportunities. Every laboratory in the country should be helping to ensure that laboratory medicine is on the mind of every high school and/or middle school student before they graduate. An active effort needs to be made by laboratories, possibly during Medical Laboratory Professionals Week, as part of their effort to improve the visibility of laboratory medicine in the public. Presenters don't have to develop their own presentations if they use existing resources provided by organizations such as the American Society for Clinical Pathology's Career Ambassadors program.

Level 1b: Field trips

Presentations are great for communicating high level information to students quickly/efficiently, but it is hard to really have students understand what a medical laboratory looks, sounds, and even smells like. Speakers should offer to set up field trips with the schools as part of “the package” when they offer to do guest speaker presentations. I have found in my own medical laboratory assisting and phlebotomy high school program that my students become much more interested in the medical laboratory when they have done a field trip to our local labs. Even students who haven't expressed interest in

the medical laboratory field could benefit from these visits as well as increase the number of advocates for lab medicine in the community. For those who are interested in a STEM/medicine, seeing all the high-tech analysers and the human samples being tested is eye opening and is a great way to see how important medical laboratories are in medicine.

Level 1c: Student shadowing opportunities

The last step in this level is offering a one-to-eight-hour shadowing experience. Shadowing experiences allow students the chance to envision themselves working as a laboratorian and picture it as a viable career choice. This is because they will spend a significantly longer amount of time watching medical tests being performed than they would get in a field trip. Often when I have taken my students to local medical laboratories, their classmates might have been able to see something cool and they didn't while on a tour. Large group field trips don't always allow students to see the multitude of tests that can be accomplished in the laboratory, whereas shadowing opportunities are more comprehensive. Being part of a shadow of one to eight hours will increase the chances of seeing that cool medical test result and thereby be interested in a medical laboratory career.

Level 2: Helping school counselors become laboratory medicine advocates

High school counselors are an important resource that can influence a student's choices of career paths whether a CTE or college path is desired. With the diversity of possible career paths to understand, counselors could benefit from easy-to-use tools to gain understanding and clearly present options to students. By providing medical laboratory career overview/career exploratory tools to counselors, it will add the field to their portfolio of options for students.

As an example, in my own promotion for my medical laboratory assisting and phlebotomy program, I have created a basic PDF tool (see Figure 3) that shows the potential laboratory careers along with educational requirements. Additionally, a brief description of the career is provided, pay based on the BLS, links to career research websites and career videos. I have shared the tool with counselors, and they have found it very useful when talking to students about attending my program. With the right creative resources, a tool (Figure 3) such as this could become more immersive and ultimately much more advantageous for the counselors, students/parents and the medical laboratory industry as a whole.

Level 3: Building minor and major league

For the medical laboratory industry to turn the tide on their employment crisis, it will require changing the mindset of the industry's C-suites and laboratorians alike. Understanding the rationalization that our entry level laboratory employees, specifically the phlebotomist and medical laboratory assistants are not only vital to ensure that college requiring laboratorians are able to work as effectively as possible but could also be a large source of potential future higher-level employees.

To simplify, I like to use professional baseball as an analogy. In baseball, you have the minor league and the major league. The minor league provides new talent for a Major League Baseball team inside their organization. One key element to ensure that the talent in the majors is maintained, is to have a larger minor league system of teams supporting the major league team. Some of the players on the minor league team will move up to the majors. Some players will spend their entire career, of potentially decades, without ever moving up to the majors but they still provide important plays every game and are doing what they love for a career.

Medical Laboratory Careers Exploration Tool

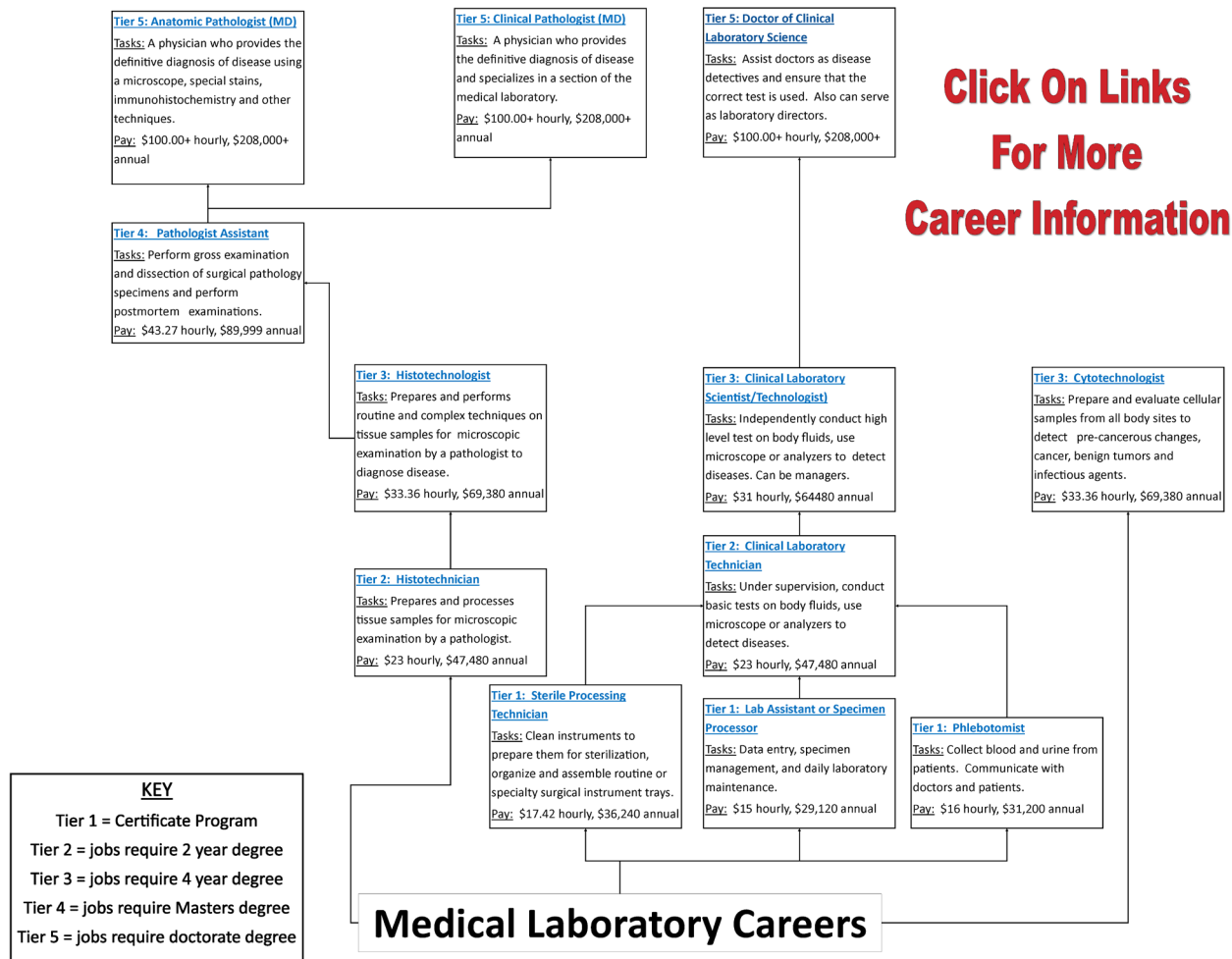


Figure 3) *Medical Laboratory Careers Exploration Tool.* This pdf tool provides its user with the ability at a glance to learn about multiple medical laboratory careers at once, know the amount of schooling required and the approximate pay. If the user wants to learn more, they can click on the links connected to the name of the career and research using career exploration websites/videos.

Now to continue the analogy, let's imagine that our entry level workforce is the minor league of the medical laboratory, and we say that any position in the medical laboratory that requires a degree is the major league. With this mindset, we can start to see our minor league employees as the resource that they could be. We need to ensure that our minor league staff is full so that some of these minor league "players" can move up to the majors. We may have a MLA that decides that they want to go up to a MLS degree or we may have a phlebotomist stay in this position for their entire career and be the critical phlebotomist that you rely on when you need

that STAT blood draw. Our goal at this level is to effectively produce minor league employees who are ready for the entry level careers but also ready for a college medical laboratory program.

Where Do We Go From Here?

I believe that one way to implement the minor league approach in the medical laboratory industry is to have more programs like my high school medical laboratory assisting and phlebotomy CTE program. The program is a two-year, 2.5 hour per day laboratory science training program for juniors and seniors in high

school. My students learn college level content knowledge along with employable laboratory and phlebotomy skills. It is incredibly valuable for our students to have this variety of content and skills as it makes our students deeply knowledgeable about the possible career paths. The program also provides them with real experience working in external laboratories where they can test their new lab skills as part of 120 hours' worth of co-ops. The phlebotomy component of their co-ops is 40 hours drawing blood on real patients for real samples over the course of one week at the end of their junior year. The students can also increase their professional network through contact with guest speakers and industry mentors. They are then able to earn industry certifications in phlebotomy, MLA and CPR/AED. Upon completion of my 2-year program, the students are well prepared and motivated for both direct employment and medical laboratory college programs.

If we were to implement programs like mine across the country, combining the resources of medical laboratories and Career and Technical Education centers and schools, I think we could be producing thousands of entry level employees and sending far more students to medical laboratory colleges. In my own program, I have found that most of my students go on to college with the majority of them going to college programs for medical laboratory careers. Almost all of those who do not go to college after graduation end up working as either medical laboratory assistants or phlebotomists. When I hear back from my industry partners on how my graduates are doing in their labs, their supervisors talk about how my graduates are some of the best employees that they have. Over time, I have noticed that most of my graduates who went directly to work in a laboratory end up going to college for medical laboratory degrees. My students who have

entered a medical laboratory program (either directly from high school or after working for a few years) have stayed in their programs and been highly successful. I believe this is because they are not choosing medical laboratory as a fallback career or as something that they found in a college brochure. My students have spent years learning about and falling in love with a potential medical laboratory career while also getting a chance to experience it through their co-ops and shadowing experiences. This ensures that when they run into a hard class or difficulty in college that they will find a way to be successful as they have already experienced what is on the other side of their degree while they were in high school.

Laboratory medicine's workforce shortage is a real problem that is not new but has been happening for decades with the COVID-19 pandemic exacerbating the problem. We cannot be complacent and keep doing the same things we have been in the past as they obviously haven't changed the trajectory of the problem. This requires everyone connected to the medical laboratory to think about the problem in a different way. Simply addressing retention of our staff without a drastic improvement in recruitment will still result in significant shortages.

Recruitment starts with making sure that there is general awareness that the medical laboratory is providing the key central puzzle pieces to medical diagnosis by actively reaching out to every high school student in the country. To achieve this, it requires that medical laboratories actively open their doors for interested students to see the laboratory in action through field trips and shadows. Additionally, providing tools to high school counselors to expose students who are interested in STEM/medicine is paramount to allowing students to investigate medical

laboratory careers. Finally, it requires that we build the infrastructure to train the next generation of minor league and major league medical laboratory workers while they are in high school. Some of these changes could be implemented quickly and some will require significant work but the combination of all these recommendations being implemented

will significantly change the trajectory of the laboratory medicine employment outlook.

Acknowledgments

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