

AUTOMATION AND THE RE-IMAGINED FUTURE

There are not enough medical laboratory technologists (MLTs) in Canada to meet the growing demands of the health care system, and the problem is only getting worse.¹ >>



CSMLS released a Call to Action (CTA) to address the national, regional, immediate and long-term efforts required to amend the shortage of MLTs within Canada.² According to the CTA, without a national effort to alter this trend, laboratory professionals will only continue to experience more considerable hardship in the workplace. The document itself cites a variety of contributing factors, including a high retirement rate for professionals, increased demand for laboratory services, a change in practice due to technological advances and vacancy rates that exceed the number of MLT graduates.³ This trend is not isolated to the Canadian health care system. The trend is echoed by other societies, including the American Society for Clinical Laboratory Sciences (ASCLS). In mid-2018, ASCLS published a position paper that reflected the CTA made by CSMLS. In that paper, ASCLS stated that, "Several factors impact the clinical laboratory workforce shortage" and, by extension, the quality of patient care the system can provide.⁴

Before 2014, total laboratory automation systems were thought to be one of the primary solutions to technologist labour shortages. Many laboratories across Canada began looking into investing in this technology to automate up to 99 percent of lab processes. The hope was that total laboratory automation systems would allow health care facilities to reduce costs, improve patient care, increase efficiency and greatly reduce the number of trained in-house technologists needed to run labs.⁵

While total laboratory automation would work well for large, high-volume labs, the costs and complexities kept total lab automation systems out of reach for smaller labs. Many smaller laboratories found that they were unable to invest the millions of dollars required to purchase the specialized equipment. As well, many health-science hubs that could afford to invest in this technology found the cost of maintenance and updates unsustainable over time. Total laboratory automation was not an end-all solution.⁶

CREATING A SYMBIOTIC RELATIONSHIP

In the last few years, the interest in total laboratory automation has shifted. Now, laboratories are increasingly investing in islands of automation as a response to labour shortages. Under this model, technologists and automation exist in a symbiotic relationship rather than as two separate entities that work against each other.

What is unique about this model is that it does not seek to eliminate human involvement in the lab, but uses automation to make the limited number of trained technologists as efficient as possible. As a result, laboratories are investing in bench-top machines that are more efficient and affordable than the total laboratory automation systems of the past.

Last year, Alex Bushell, CEO of Laboratory Improvements,

worked with the laboratory at the Peterborough Regional Health Centre (PRHC) to create their bench-top, robotic histology slide archiving system called SlideTrack. The vision for this initiative, developed by Bernard Schaan, laboratory manager at PRHC, was inspired by a time-consuming and monotonous task. Bushell says that, at the time, "The hospital's lab staff were spending up to six hours each day manually sorting and filing pathology slides." With a growing workload demand on the technologists at PRHC of at least eight percent per year, something needed to change, and quick. PRHC and Lab Improvements received a \$25,000 development grant and a \$15,000 procurement grant from Ontario's MaRS innovation hub to develop a solution that would also help other hospitals in the province experiencing the same problem. When implemented, the SlideTrack device was able to sort and file all the slides that passed through PRHC in 2019, more than 150,000 slides; a task that once took up valuable hours of MLTs' time.⁷ The success of SlideTrack has led Lab Improvements to begin exporting the technology into international markets.

ADAPTING THE ROLE OF TECHNOLOGISTS

During the peer review process of SlideTrack, Bushell noted that many labs wanted to automate additional repetitive tasks, not replace technologists: "With the constantly increasing volumes and fixed/shrinking budgets, management seems keen to explore new ways of helping the lab achieve maximum efficiency of the staff's time so they focus on higher-yield activities. Previously, automation was about replacing people all together, but that mindset has changed."

Along with this new model comes the conversation about the adapting role of technologists. More than ever before, technologists are required to be able to work effectively with automation, while having niche training to interpret findings and perform tasks not covered by machine operation. The Core Laboratory at Sunnybrook Health Sciences Centre in Toronto is one centre that gives a sneak peek into how the role of technologists will become more specialized in the future as MLTs work co-dependently with automation.

In 2018, the Core Laboratory featured Ontario's first end-to-end automated biochemistry lab. This new equipment allows blood samples to go from receipt to result without interruption, making testing more efficient than ever before. Instead of manually running tests, technologists are fulfilling a different role: "A highly specialized team of technologists, technicians and biochemists work around the clock. [They utilize the] state-of-the-art laboratory automation system for both testing and specimen archiving."⁸ Together, this team of experts works with automation to process around 4.5 million tests per year for Sunnybrook patients, government research agencies and other private laboratories and hospitals across the province.⁸



Automation, as described by Sunnybrook, does not do away with the technical skills that MLTs require to perform their job. Instead, it refines their abilities while making technologists more attentive to the results they can produce.

Having begun his career in 1987, Richard Bak, manager of Laboratory Medicine at London Health Sciences Centre, has worked with both manual and automated laboratories and has seen enormous advances in automation. In his opinion, improving automation and manual processes in smaller or specialty laboratories is a move towards improving staff safety, improving result quality and reducing transcription, all with an added increase in capacity and throughput. Efficiencies can be gained in both scenarios, but advances to all aspects of lab collection, specimen reception, processing and reporting need to be optimized before reducing staffing complements becomes viable.


RE-IMAGINING THE FUTURE

Laboratory professionals have always been exposed to automation cycles in the workplace. As technology ages, more advanced products are purchased for laboratories that require a new level of adaptation for MLTs. However, Bushell suggests that despite advances in automation, technologists will never be entirely replaced; the future will be about developing pockets of automation that aim to alleviate staffing problems and benefit patient care. He says, “Delays in diagnosis and treatment lead to patient anxiety, and if we use automation in smart, effective ways, then it’s the patient that wins in the end.”

Bak agrees on the future of automation in the lab. “Automation does not replace the need for highly competent staff. Continual training and supervision are staples within each area to continue to improve and provide the highest level of diagnostic care.” Instead, it is essential to remember that the future of laboratories, regardless of size, is dependent on more than just automation. Current laboratory roles need to be evaluated, and new role-related elements like procurement, informatics, pre-analytics, post-analytics, technical quality specialists and other factors need to be implemented.

Both Bushell and Bak agree that there needs to be a real focus on these developed-in-the-field, grassroots solutions as the lab combats labour shortages. As Bushell says, “there is such a high return on solutions designed in the lab for the lab,” and automation may be one part of this.

HELPFUL RESOURCES

- Hendriks, K. Innovation Revolutionizes Slide Management. *CJMLS* 2019;81(4):14–15
- The 2019 LABCON Webinar featuring Richard Bak, manager of Laboratory Medicine at London Health Sciences Centre.
- CSMLS The Objective Lens, The New Frontier, available at <https://podcast.csmls.org/podcast/episode-22-the-new-frontier/>. 



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