



Feature



MLT Education Reform: The future is now!

The educational preparation for Medical Laboratory Technologists is currently undergoing a major transition. While no one's crystal ball can be absolutely accurate, let me share with you some perspectives and insights. A given is that medical laboratory sciences and related professionals will continue to play a significant role in the delivery of health services to the Canadian population (Monahan, 2001). In an increasingly complex healthcare environment characterized by a shift from hospital to community care, variable and fluctuating work hours, changing patient demographics, a growing awareness of patient rights, and the growing public demand for professional preparedness and accountability, there is a corresponding need to ensure the academic preparation of health professionals meets the expected deliverables and expectations.

contribution and role of the laboratorian will become even more central to the delivery of efficient and effective healthcare in the future. Dixon, et al (2005), foresee professional MLT advancement where it will contribute most directly – at the patient's bedside. Lehmann (1996) points out that future students not only have to have the technical know-how and competencies to assure point-of-care testing is properly performed and recorded, but they will also need the skills to implement quality assurance programs and quality control. McQueen (2001) notes that clinical and laboratory professionals must become familiar with many of the accessible electronic tools designed to search for evidence. Detailed statistical and epidemiologic knowledge may not be essential, but critical appraisal skills and a competent understanding of the strengths and weaknesses of systemic review and meta-analysis will certainly become requirements.

of the future MLTs world best by stating: "Opportunities for genuine job enrichment exist in the laboratory. The personality traits of many laboratorians cluster into that cherished segment of a Myers-Briggs type analysis reserved for scientists. ... The emergence of new technology and evidence of the contribution of the laboratory to the care of sick people is at an all time high. ... We need to develop opportunities for our colleagues to increase their levels of responsibility, most importantly by providing information to physicians who order the testing. Given the proper information management tools and backup support, the training and experience of laboratory staff can be of immeasurable benefit to patient care problem solving".

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Educational and Training Implications

The traditional model of education for medical laboratory professionals in Canada involves a model of didactic preparation followed by clinical placement. Most often the didactic component lasts four semesters followed by a clinical rotation that varies anywhere from 15 to 46 weeks. In recent years there have been increasing problems with this model. In particular the clinical partners involved in the education of allied health students, including MLT students, have increasingly said they no longer have the resources (human and financial) to teach basic skills to students nor do they have the time to remediate students to contemporary technology and operating procedures – in other words there are increasing demands for students to be better prepared before they go to clinical. In addition, the clinical partners are requiring that all students be prepared to function in a team based interprofessional collaborative environment. Couple that with the reality, as identified by Issenberg, et al (1999), of the decreasing societal acceptance of students "learning" on patients, the result of which is a rather strong argument for the re-invention of an innovative curricular model and safe environment for the education and assessment of MLT students.

With that in mind, the purpose of the following article is to highlight some of the challenges and opportunities medical laboratorians are expected to face in the next decade, and to then present and discuss the resultant curricular reforms and innovations which are unfolding at The Michener Institute for Applied Health Sciences.

Changing Face of Medical Laboratory Science

So just what does the future hold for MLTs?

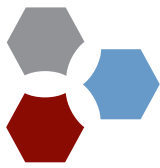
According to Tatum and Hendrix (2006), the future healthcare system will continue to be in need of well prepared and educated clinical laboratory technologists who are positioned to bridge the current state of practice and the ongoing development of highly complex and innovative testing. Richardson (2000) contends that with an increasing focus on emerging and resistant pathogens, the

In terms of day-to-day practice, Lehmann (1996) argues that medical laboratory technologists must increasingly be prepared to work as part of an integrated healthcare team. To accomplish this goal, educational preparation will have to include a problem-oriented approach that deals with the patient in a clinical context.

Caskey, et al (2002), also points out that laboratorians of the future will also have to become increasingly culturally competent to deal effectively with the changing demographics of patients. Cultural diversity will impact the laboratory workforce as well as the patients the workforce serves. Medical laboratory professionals will have to become skilled in communication with the diverse patient populations served. MLTs will need to become far more aware of their personal biases, and must accordingly be willing to do whatever is necessary to achieve cultural competency.

Perhaps Forsman summarizes the challenges

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If the above forecasters are correct in their contentions with respect to the future practice world for MLTs, what then will be the specific implications for medical laboratory educators and their respective academic institutions? In 1996, Lehmann predicted that with the ever evolving healthcare environment, and the increasing intrusion of technology in day to day medical laboratory practice, academic institutions would need to reinvent their educational objectives. Contemporary curricula would be needed to ensure students were better suited to compete in the new environment. He further felt communication and management skills would be required as an essential component of an MLT's education in order to produce a clinical laboratorian that could not only work with, but also lead other healthcare professionals. Caskey, et al (2002), further challenged that academic institutions would have to ensure the curriculum also resulted in competencies that would result in laboratory professionals who could work effectively in and with different cultures.

A Responsive Case Study: The Michener Institute:

The Michener Institute for Applied Health Sciences is Canada's largest educational institution dedicated solely to the education of applied health practitioners who function as members of interprofessional

healthcare teams. Michener currently operates one of the largest medical laboratory training programs in the Province of Ontario with an annual intake of 64 students. Responding to the professional laboratorian realities noted above, and in response to a plea for new and innovative models of educating allied health science professionals (Canada Health Council, 2005), Michener has responded by developing and implementing a new curriculum model based on the tenets of Interprofessional Collaboration, Simulation-enhanced Education and Healthcare Competency Assessment. (See Figure 1)

gram students will also participate in a set of four interprofessional collaboration courses designed to foster insight and understanding with respect to the other potential members of a healthcare team. In order to accommodate the introduction of a new fifth semester (e.g. 15 weeks), a decision was made to reduce the MLT clinical rotation from approximately 46 weeks to 32 weeks. The new clinical preparation semester will allow the students to encounter an integrated, hands on, co-operative problem based learning environment which will be designed not only to assess their basic clinical skills but also to address the required interprofessional competencies.

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The new model uses simulation and inter-professional education to facilitate students' integration of both technical skill and "humanistic" core skills. During the first four semesters, in addition to the acquisition of core skills and technical skills (with high emphasis on simulation based learning), the students will also be introduced to research methodology and reflective practice. Pro-

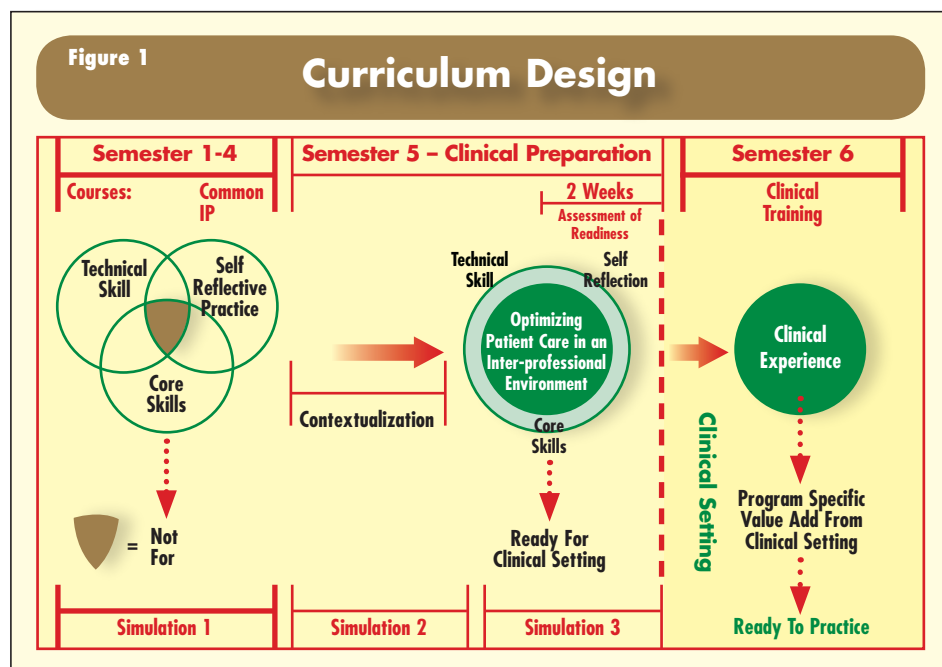
This so-called capstone semester also incorporates assessment of student readiness for clinical education and readiness for professional practice in a collaborative, team-based, patient-centred environment. Following successful completion of the readiness-for-practice assessment, students will proceed to clinical placement at a clinical partner site.

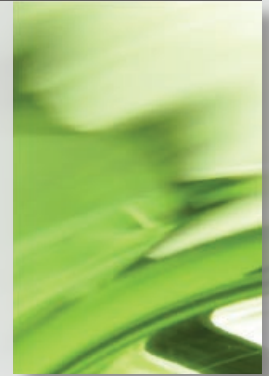
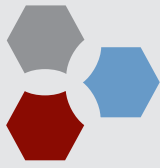
Constructive validation of clinical readiness is Michener's current primary research objective. As the new educational model is implemented, its impact will be assessed and documented using specific outcome measurements. Appropriate modifications to the model will be made to ensure improvement and further applicability to the MLT curriculum.

Conclusion

Medical laboratory professionals are clearly at the doorstep of great opportunity, and at the same time, faced by a number of challenges. The key to resolving both is a better understanding of the true contribution that the practice of laboratory medicine makes to the care of the sick and then designing a curricular response and education plan that appropriately prepares participants for that reality. Laboratorians need to become comfortable with this future vision ... they must realize the role they play has a major impact on healthcare delivery.

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White blood cell counts in malaria patients

White blood cell counts during malaria are generally low to normal, a phenomenon that is widely thought to reflect localization of leukocytes in the spleen and other marginal pools rather than depletion or stasis. Leukocytosis is typically reported in a fraction of cases and may be associated with concurrent infections or poor prognosis, or both. However, few published studies have compared white blood cell (WBC) counts in malarial parasite-infected and –uninfected residents of regions in which malaria is endemic. Human malaria can be caused by any of several species of *Plasmodium* parasites that occur in various combinations in regions of endemicity. *Plasmodium falciparum* is responsible for almost all mortality attributed directly to malaria and is the focus of almost all research and intervention efforts. Compared with *P. falciparum*, however *Plasmodium vivax* is the source of as much or more morbidity worldwide, despite its extremely low prevalence in sub-Saharan Africa. The tacit assumption that WBC counts

are identical during infections with different *Plasmodium* species has been examined only minimally and tangentially. Although several methods for estimating the densities of blood-stage parasites by microscopy are in use, the most common is to count the number of asexual parasites seen relative to a given count of WBCs (usually 200 or 500 cells) and then to multiply the parasite:WBC ratio by 8,000, the assumed number of WBCs per microlitre of blood. These estimates are used in clinical and epidemiological studies and to evaluate the effects of interventions on individuals and communities. The consequences of errors are strongly dependent on context but could be profound, as would be the case in studies that relate malarial symptoms or transmission to parasite densities. The authors conducted a study in which they counted WBCs in 4,697 people who presented to outpatient malaria clinics in Maesod, Tak Province, Thailand, and Iquitos, Peru, between May 28 and Aug. 28, 1998 and between May 17 and July 9, 1999. At each site and in each year, WBC counts in the *P. falciparum*-in-

fecting patients were lower than those in the *P. vivax*-infected patients, which, in turn, were lower than those in the uninfected patients. In Thailand, one-sixth of the *P. falciparum*-infected patients had WBC counts lower than 4,000 cells / μ L. The authors concluded that leucopenia may confound population studies that estimate parasite densities on the basis of an assumed WBC count of 8,000 cells / μ L. For instance, in this study, use of the conventional approach would have overestimated average asexual parasite densities in the *P. falciparum*-infected patients in Thailand by nearly one-third.

McKenzie FE, Prudhomme WA, Magill AJ, et al. White blood cell counts and malaria. *J Infect Dis.* 2005; 192:323-330. ♦

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Educational institutions, such as The Michener Institute, must become proactive academic partners in the development of medical laboratory science professionals rather than remaining simply reactive training centres.

Together we can truly ensure the Future is Now! ♦

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