![CSMLS SCSLM — Canadian Society for Medical Laboratory Science / Société canadienne de science de laboratoire médical]

Simulation and Competency Obtainment

CSMLS Recommendations for Simulation in Assessment of MLT Competencies

Final Report
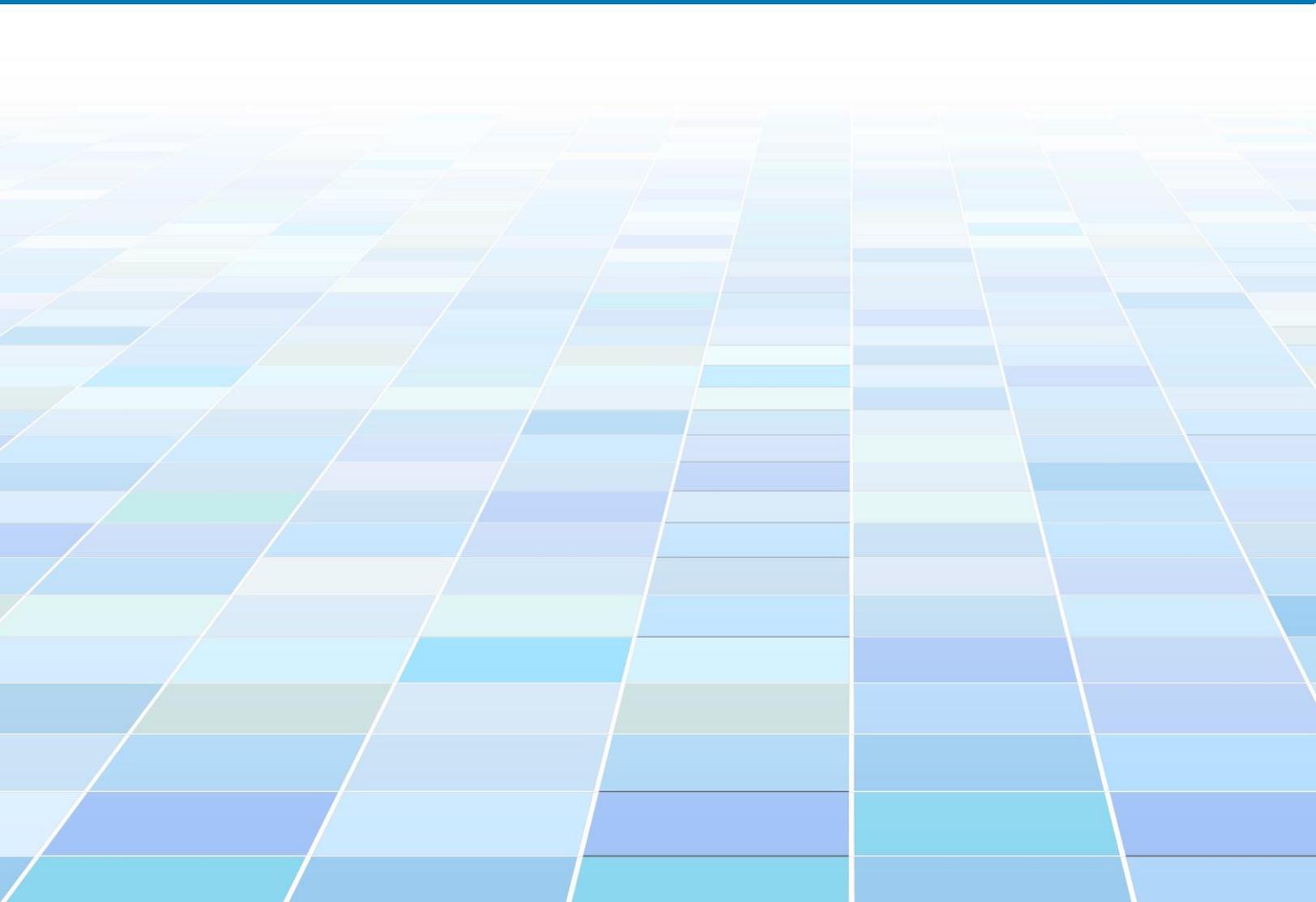
Contents

Definition of Simulation

For the medical laboratory profession, as derived by participants at the National Simulation and Clinical Placement Educator Forum (2016), simulation is defined as:

"Simulation is an educational technique used to imitate real life scenarios (in part or whole), which enables participants to demonstrate and receive feedback on knowledge, skills, abilities and/or judgment. This can include but is not limited to communication, problem-solving, critical thinking and the ability to collaborate and work effectively within a health care team. Simulation can reflect simple to complex situations or processes and can be accomplished in any of the following examples:

- through interactive written case-based scenarios;

- computerized laboratory information system gaming;

- inter- or intra-professional role playing;

- standardized patients;

- task trainers such as rubber arms for phlebotomy;

- virtual simulation for specimen identification;

- haptic simulation;

- high fidelity simulation, or

- hybrids of any of these examples.

Similar to healthcare simulation, academic student simulation encompasses a range of activities with a broad common purpose of improving the effectiveness and efficiency of services and ultimately, enhancing competency acquisition by students in a safe and secure environment that reduces potential harm to patients, students, and the laboratory and general healthcare systems."

Purpose

The report describes the use of simulation for assessment and evaluation purposes of CSMLS MLT competencies as defined by key stakeholders through consensus-building sessions. The information has been used to draft CSMLS recommendations for the maximum use of simulation in evaluation, replacing sign-off in the clinical practicum, of MLT competencies and their practice domains.

This document was shared with EQual™ Canada for the purpose of academic program evaluation.

Background

Originating from the HHR shortage conversations and CSMLS Simulation and Clinical Placement Initiative, key stakeholders reached out to CSMLS indicating a need to better understand how simulation can be used in the assessment and evaluation of MLA and MLT general competency profiles. CSMLS was able to facilitate this conversation within three groups and create a set of guidelines for MLAs. To continue this movement, in 2021 a 27-member taskforce was assembled to create a similar document for MLTs. The taskforce was made up of persons from a variety of professions relevant to MLTs including regulators, accreditors, educators, employers, among others. For each competency, a consensus regarding the use of simulation was formed through a series of discussions with the taskforce members. The resulting recommendations for the use of simulation are contained herein.

Timeline of key dates for the CSMLS simulation initiative to date are:

1. Nov 15, 2018   Uniting Simulation Education Event (open to all members).

2. Nov. 17, 2018   Educator Committee Meeting

3. Jan. 25 – 27, 2019   MLA Exam Panel Meeting

4. Aug. 19, 2019   Educator Committee - finalize MLA recommendations

5. May 8, 2021   MLT Boundaries of Simulation Meeting 1 - competencies suitable for simulation pt. 1

6. Jun. 5, 2021   MLT Boundaries of Simulation Meeting 2 - competencies suitable for simulation pt. 2

7. Jun. 26, 2021   MLT Boundaries of Simulation Meeting 3 - competency section thresholds

8. Aug. 24, 2021   MLT Boundaries of Simulation Meeting 4 - finalize recommendations

9. Dec. 16 2021   Final report shared with EQual™ Canada

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Results

Consensus building activities proved the integrity of the process to create a national perspective. After the initial set of preliminary recommendations were derived by the taskforce and the upper limits of simulation were determined for each category of the competency profile, CSMLS drafted the final results. Appendix A contains a list of competencies determined suitable for simulation; and Appendix B contains a list of competencies not suitable for simulation. These determinations are based on a few key points:

1. The task force determined a maximum limit for simulation of 70% per competency section, excluding section 7, was reasonable. The following recommendations were also provided:

   - CSMLS should create an implementation guidance document for educators
   - Grandparenting is acceptable for current successful programs (6-year Accreditation Canada status) who exceed the maximum limits set, meaning they do not have to revert to terminus sign off in clinical placement only.
   - Review of the limits on a regular basis, and that this occurs in line with the competency profile review process was suggested.

2. CSMLS will not set minimum limits for evaluation using simulation to accommodate needs for programs to create flexible models.

3. CSMLS recognizes that the category threshold percentage and the percentage derived from number of competencies within a given category suitable for simulation are not equal (e.g. more than 70% of competencies suitable for simulation within a category may be suitable to simulate.) CSMLS recommends selecting key competencies within the category to remain aligned with the threshold of 70%.

Conclusion

Through consensus-building sessions, key stakeholders including MLT regulators have concluded the use of simulation for the assessment and evaluation of CSMLS MLT competencies is an acceptable method to replace competency sign-off in the clinical practicum setting. The method is acceptable, provided the maximum use of simulation in evaluation, as defined by the CSMLS recommendations herein, is respected.

CSMLS has ensured that Accreditation Canada (EQual™), the accrediting body for MLT General programs in Canada, and accreditation teams understand the document and can use it during program review.

CSMLS Recommendations for the Upper Limits of Simulated Curricula for Assessment

MLT Competency Categories	% of Curricula
1. Safe Work Practices	≤ 70%
2. Data and Specimen Collection and Handling	≤ 70%
3. Analytical Processes	≤ 70%
4. Interpretation and Reporting of Results	≤ 70%
5. Quality Management	≤ 70%
6. Critical Thinking	≤ 70%
7. Communication and Interaction	**≤ 0%**
8. Professional Practice	≤ 70%

Note: The Taskforce recommends that it be clear in the documents that maintenance of competence is expected, even when signed off. As well as a statement that some competencies have been deemed NOT eligible for simulation assessment, due to the need to mimic actual workflow and volume of specimens in a day to day workplace environment. This can be accommodated using a PREAMBLE for the Recommendations for Simulation document (MLT).

Appendix A: CSMLS Recommendations for Simulation in Assessment of MLT Competencies

The following are 'able to simulate' for assessment of the corresponding MLT Competency.

Category: 1. Safe Work Practices	
1.01	Applies the principles of routine practices
1.02	Uses personal protective equipment, e.g. gloves, gowns, mask, face shields, aprons
1.03	Applies laboratory hygiene and infection control practices
1.04	Minimizes possible dangers from biological specimens, laboratory supplies and equipment
1.05	Uses laboratory safety devices, e.g. biological safety cabinet, fume hood, laminar flow cabinet, safety pipetting device, safety container and carrier, safety shower, eye wash station
1.06	Labels, dates, handles, stores and disposes chemicals, dyes, reagents and solutions according to legislation, e.g. WHMIS
1.07	Handles and disposes sharps
1.08	Stores, handles, transports and disposes biological and other hazardous materials according to legislation
1.09	Uses disinfection and sterilization methods
1.10	Minimizes potential hazards related to disinfection/sterilization methods
1.11	Applies measures in response to laboratory accidents/incidents
1.12	Applies spill containment and clean up procedures for biological and other hazardous material
1.13	Responds appropriately to workplace emergencies
1.14	Reports and documents all incidents related to safety and personal injury
1.15	Applies proper ergonomic principles to minimize risk of injury

Category 2. Data and Specimen Collection and Handling	
2.01	Verifies relevant information is provided for test request
2.02	Provides information to the client on specimen collection, transportation and storage
2.04	Performs sample collection and chain of custody procedures relating to specimens with legal implications
2.05	Adheres to established protocols for labeling and traceability of specimens
2.07	Assesses specimen suitability for testing
2.08	Verifies that the pertinent data on the specimen and requisition correspond
2.09	Accessions specimens into laboratory information systems
2.11	Prepares specimens for analysis
2.12	Identifies, documents and initiates corrective action for pre-examination (preanalytical) errors

Category 3. Analytical Processes	
3.01	Applies the principles of microscopy: bright field, fluorescence, polarizing, inverted
3.02	Applies the physical and chemical principles of staining
	3.02.01 Assesses the quality of staining and initiates corrective action
3.03	Applies principles of light measuring systems used in common instruments: absorption spectrophotometry, reflectometry turbidimetry.
	3.03.01Assesses results, identifies sources of interference and initiates corrective action
3.04	Applies principles of electrochemical systems used in common instruments: ion selective electrodes, conductance electrodes
	3.04.01 Assesses results, identifies sources of interference and initiates corrective action
3.05	Applies principles of electrophoresis and chromatography
	3.05.01 Assesses results, identifies sources of interference and initiates corrective action
3.06	Applies principles of osmometry
	3.06.01 Assesses results, identifies sources of interference and initiates corrective action
3.07	Applies principles of immunoassays
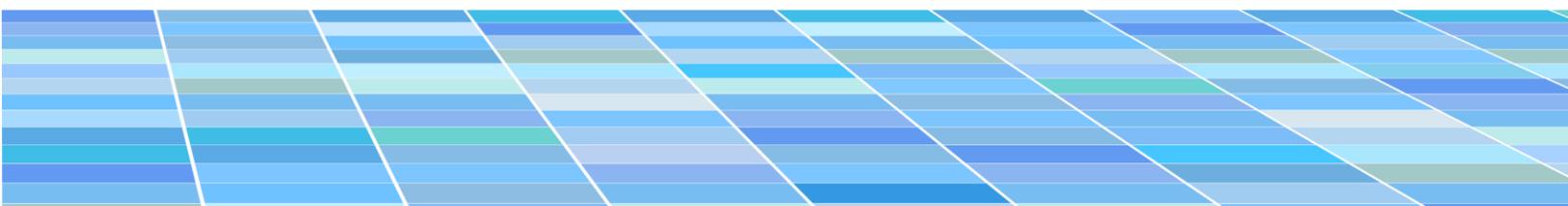
Category 3. Analytical Processes (continued)	
	3.07.01 Assesses results, identifies sources of interference and initiates corrective action
3.08	Demonstrates knowledge of principles of mass spectrometry
	3.08.01 Assesses results, identifies sources of interference and initiates corrective action
3.09	Applies principles of particle analysis used in common hematology instrumentation
	3.09.01 Assesses results, identifies sources of interference and initiates corrective action and/or follow up testing
	3.09.02 Performs manual counting procedures
3.10	Demonstrates the knowledge of principles of flow cytometry
	3.10.01 Assesses results, identifies sources of interference and initiates corrective action
3.11	Applies the principles of hemostasis to perform coagulation testing
	3.11.01 Assesses results, identifies sources of interference and initiates corrective action and/or follow up testing
3.12	Performs qualitative and quantitative biochemical analyses
	3.12.01 Assesses results, identifies sources of interference and initiates corrective action and/or follow up testing
3.13	Prepares blood, body fluids and other clinical specimens for microscopic examination
3.14	Identifies and evaluates the morphology of cellular and non-cellular elements in microscopic preparations
	3.14.01 Differentiates between clinically significant and insignificant findings
	3.14.02 Assesses results, identifies sources of interference and initiates corrective action and/or follow up testing
3.15	Applies principles of immunology to the detection of antigens and antibodies
3.16	Performs testing to identify common red blood cell antigens and antibodies
	3.16.01 Differentiates between clinically significant and insignificant findings
	3.16.02 Differentiates between clinically significant and insignificant antibodies
	3.16.03 Performs compatibility analyses
	3.16.04 Assesses results, identifies sources of interference and initiates corrective action and/or follow up
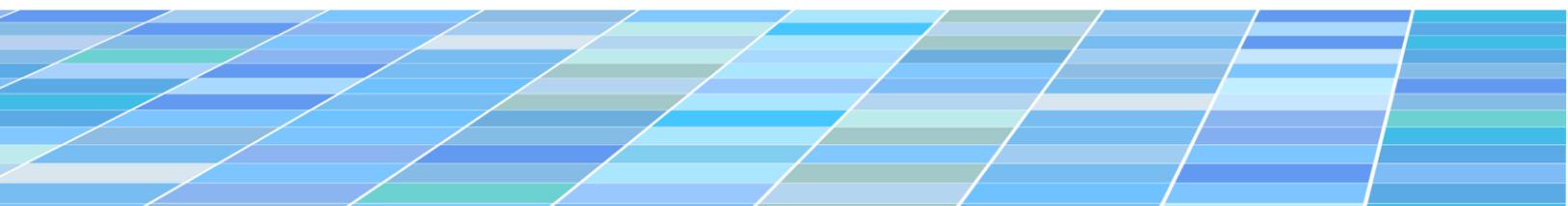
		testing

Category 3. Analytical Processes (continued)		
3.17	Prepares and issues blood products (parent competency)	
	Note that competency 3.17.01 was determined not suitable for simulation. However, 3.17.02-3.17.04 are classified 'able to simulate'	
	3.17.02 Ensures proper storage of blood products	
	3.17.03 Evaluates the quality of blood products	
	3.17.04 Evaluates the appropriateness of the blood product for the patient's clinical situation	
3.18	Describes and investigates the adverse effects of transfusion according to established protocol and initiates follow-up action	
3.19	Performs analyses to detect and identify common clinically significant micro-organisms	
	3.19.01 Selects appropriate culture media and environment for isolation	
	3.19.02 Describes common clinically significant micro-organisms according to body site	
	3.19.03 Confirms identification using staining techniques, biochemical, serological and automated testing methods	
	3.19.04 Applies the principles of instrumentation to the detection of micro-organisms	
3.20	Performs antimicrobial susceptibility analyses	
	3.20.01 Assesses results, identifies sources of error and initiates corrective action and/or follow up testing	
3.21	Applies molecular diagnostic principles to identify nucleic acid sequences	
	3.21.01 Assesses results, identifies sources of interference/errors, initiates corrective action and/or follow up testing	
3.22	Performs tissue preparation techniques: Grossing, Processing, Embedding, Sectioning (paraffin and frozen)	
	3.22.01 Assesses quality of the preparation and initiates corrective action and/or follow up	
3.23	Performs techniques to demonstrate cellular and non-cellular components in tissue and body fluids	
	3.23.01 Assesses quality of the technique and initiates corrective action and/or follow up	
3.24	Operates and maintains standard laboratory	
	3.24.01 Prepares reagents, calibrators, standards and quality control materials	
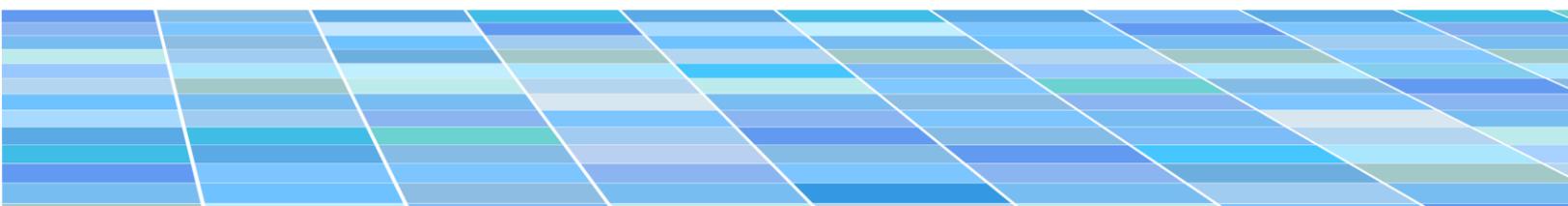
3.25	Describes the role of the laboratory in point-of-care testing
	3.25.01 Performs point-of-care techniques, assesses results, identifies sources of interference and initiates corrective action

Category 4. Interpretation and Reporting of Results	
4.02	Reports results that meet quality control criteria
4.03	Identifies unexpected or implausible results and takes appropriate action prior to reporting
4.04	Recognizes and acts on critical value
4.05	Documents results accurately
4.06	Accounts for all tests requested

Category 5: Quality Management	
5.01	Demonstrates knowledge of quality systems essentials (QSE)
5.02	Follows established protocols as defined in policy, process and procedure manuals
5.03	Assesses quality control data and calibration data
5.04	Uses statistics to monitor and track the acceptability of quality control results
5.05	Identifies, documents and reports deficiencies that may affect the quality of testing
5.06	Performs and documents preventative maintenance according to established protocols
5.09	Demonstrates knowledge of risk management
5.11	Demonstrates knowledge of inventory maintenance
5.12	Demonstrates information management skills, e.g. computer, laboratory information systems and related technology
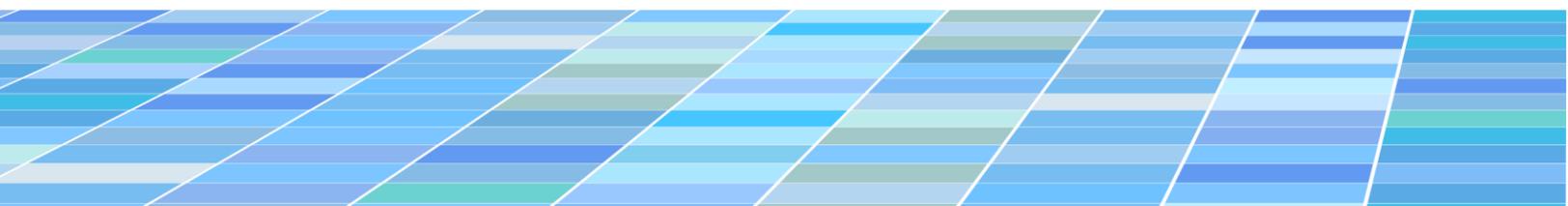
Category 6. Critical Thinking	
6.02	Recognizes that change initiated in one area may impact other areas of health care services
6.03	Engages in reflective practice; stops and thinks about practice, consciously analyzes decision making and draws conclusions to improve future practice
6.04	Organizes work to accommodate priorities
6.05	Maximizes efficient use of resources, e.g. time, equipment, personnel
6.06	Demonstrates effective problem solving/trouble-shooting strategies and initiates appropriate follow up
6.07	Contributes to implementation strategies that integrate timelines, resource management and communication related to projects or research/studies
6.08	Practices evidence-based decision-making skills such as literature review, data analysis and research methodologies/studies

* No competencies in **Category 7. Communication and Interaction** were determined suitable for simulation

Category 8. Professional Practice	
8.04	Obtains informed consent prior to procedure and respects a patient's right to refuse
8.07	Recognizes the need for and participates in continuing education and training
8.09	Recognizes how ethical issues in the health care environment affect the medical laboratory technologist and clients
8.10	Demonstrates knowledge of the health care system, professional laboratory organizations and their responsibilities
8.11	Demonstrates knowledge of the determinants of health and their implications for the laboratory system
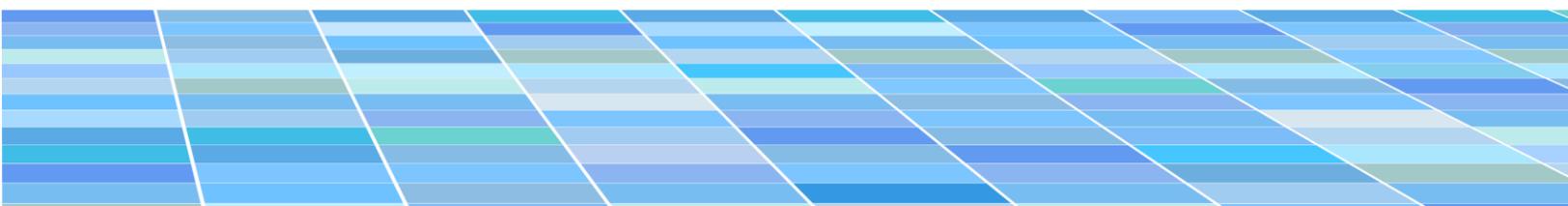
Appendix B: CSMLS Recommendations for Competencies not suitable for Simulation in Assessment of MLTs

*The following are **not 'able to simulate'** for assessment of the corresponding MLT Competency.*

Category 2. Data and Specimen Collection and Handling	
2.03	Confirms the identity of the patient and performs venipuncture and capillary blood collection to obtain appropriate samples for laboratory analysis
2.06	Delivers specimens taking into account priority and stability
2.10	Adheres to guidelines for specimen retention, storage, transportation and disposal

Category 3. Analytical Processes	
3.17	Prepares and issues blood products (parent competency)
	3.17.01 Assesses compatibility of donor/product

Category 4. Interpretation and Reporting of Results	
4.01	Recognizes the relationship between analyses, diagnoses, clinical information and treatment by assessing results on the basis of: specimen integrity, reference values, critical values, method limitations (e.g. dynamic ranges, interferences, specificity, sensitivity), patient delta checks, clinical conditions, other laboratory findings

Category 5. Quality Management	
5.07	Recognizes malfunctions in equipment/instruments, initiates and documents corrective action
5.08	Participates in continuous quality improvement activities
5.10	Participates in internal and external quality assurance activities, e.g. proficiency testing, audits, accreditation

Category 6. Critical Thinking	
6.01	Demonstrates knowledge of a dynamic environment; adapts and responds to change

Category 7. Communication and Interaction	
7.01	Practices effective communication with colleagues, patients/clients and other health care professionals: Active listening, Verbal communication, Non-verbal communication, Written communication, Conflict management, identifying barriers to effective communication, using technology appropriately to facilitate communication
7.02	Demonstrates effective teamwork skills
7.03	Demonstrates interdisciplinary/interprofessional team skills: Communication, Collaboration, Role clarification, Reflection
7.04	Demonstrates adaptive skills when interacting with patients/clients

Category 8. Professional Practice	
8.01	Maintains confidentiality of healthcare information
8.02	Complies with legislations that govern medical laboratory technology
8.03	Recognizes limitations of own competence and seeks action to resolve
8.05	Recognizes potentially dangerous situations and understands the right to refuse unsafe work
8.06	Takes responsibility and is accountable for professional actions
8.08	Promotes the image and status of the profession of medical laboratory science as members of the health care team
8.12	Respects the diversity, dignity, values, and beliefs of patients/clients and colleagues
8.13	Demonstrates knowledge of interpersonal skills: Recognizes signs of individual and group stress, recognizes signs of patient stress, exhibits empathy when assisting patients and colleagues