Definition of a Medical Laboratory Technician & Qualified Specimen Services Technician

The definition of a:

- QUALIFIED MEDICAL LABORATORY TECHNICIAN (QMLT)
- QUALIFIED SPECIMEN SERVICES TECHNICIAN (QSST)

A Qualified Medical Laboratory Technician (QMLT) is a person employed to perform routine tasks by following established protocols under the supervision or direction and control of a Registered Medical Laboratory Scientist. A QMLT may only practise within their area of competence, in a health service that forms part of the medical laboratory science profession. During training, supervision would be direct but after suitable assessment of competency, it may be replaced with direction* by a Registered Medical Laboratory Scientist or another registered health practitioner with an appropriate scope of practice, other than a Medical Laboratory Technician.

A Qualified Medical Laboratory Technician in Phlebotomy is a person employed to perform pathology laboratory specimen collection by following established protocols under the supervision of a Clinical Trainer. A QMLT in Phlebotomy may only practise within their area of competence, in a health service that forms part of the medical laboratory science profession. During training, supervision would be direct but after suitable assessment of competency, the tasks can be performed under direction* from a registered Phlebotomist or Medical Laboratory Scientist.

A Qualified Medical Laboratory Technician in Donor Services is a person employed to perform blood and blood component donation collection from Blood Donors within the New Zealand Blood Service. A QMLT in Donor will work under the direction of a suitably experienced Registered Nurse and will have passed the examination for QMLT in Phlebotomy and Donor Services.

A Qualified Specimen Services Technician (QSST) is a person who has successfully completed a minimum of two years work experience in the area of specimen services (or one year with a suitable degree) and passed the final examination in specimen services offered by the NZIMLS. The QSST is employed to perform tasks by following established laboratory protocols in the specimen services section of the laboratory.

*Direction: is the active process of management, control or guidance that influences the outcome of an individual’s practice. Direction may be provided directly or indirectly, dependent on the laboratory procedure being performed and the level of competence of the medical laboratory technician. For direction to be provided indirectly, provision must be made for reasonable access to whom ever is providing that direction.

QMLT & QSST candidates have two syllabi to study:

- The Common Syllabus - common to all NZIMLS technician qualifications.
- The Discipline Specific Syllabus - common only to the discipline in which the candidate is sitting the QMLT & QSST examination.

The Common Syllabus and Discipline Specific Syllabus are assessed by one examination only.
Objectives

1. Education of Laboratory Technicians, Phlebotomy and Donor Technicians
   a. To provide an employer recognisable qualification in a New Zealand Medical Laboratory/Blood Service.
   b. To provide sufficient theoretical training to enable a laboratory technician or phlebotomy/Donor technician to perform their practical work with accuracy, reliability and efficiency.
   c. To enable them to appreciate the reasons for, and the importance of the procedures and the tests that they perform.
   d. To enhance interest in their work and increase job satisfaction and self-esteem.

2. QMLT & QSST SYLLABUS
   a. To prescribe the course of study for the QMLT & QSST examination.
   b. To define the composition of the examination.
Definitions

1. **Quality assurance**
   
   All those planned and systematic actions necessary to provide adequate confidence that a product or service will satisfy a given requirement for quality.

2. **Quality Control**
   
   The monitoring and control of the process producing the product and service.

3. **Total Quality Management (TQM)**
   
   Management philosophy of continual incremental improvement through total involvement. Seeks, through the utilisation of fully trained, informed and involved employees, participating and working with management to satisfy customer requirements, to improve overall quality, productivity, efficiency and company viability.

   Reference ISO 15189

4. **Ethics**
   
   The rules or principles that govern right conduct.

5. **Confidential information**
   
   Information (written or spoken) given on the understanding that it will not be passed on to others.

6. **Patient/Donor confidentiality**
   
   Non-disclosure of patient's/donor's personal information, other than to his or her clinician, unless authorised by the patient them.

7. **Informed consent**
   
   Agreeing to something once provided with all the facts, understanding them fully and knowing one's rights as an individual.

8. **Cultural Competence**
   
   A set of congruent behaviours, attitudes and policies that enables effective interaction in cross-cultural situations. ‘Culture’ refers to integrated patterns of human behaviour that include language, thoughts, communications, actions, customs, beliefs, values and institutions of racial, ethnic, religious or social groups. ‘Competence’ implies having the capacity to function effectively as an individual and an organisation within the context of the cultural beliefs, behaviours and needs presented by patients and their communities.

   (Adapted from Cross 1989)

Notes:

- Informed consent pertains to the preparative procedures, collection, use, storage and disposal of specimens.
- Patients or donors may agree to the collection of samples for testing, but may impose certain requirements on what else can be done with their specimens (e.g. kept for research, teaching etc.; some may ask that the specimen be returned to them).
- Personal patient details entrusted to the laboratory organisation to assist in the interpretation of results must be kept confidential.
- Results should be released only to those persons whom the Clinical Director / Laboratory Manager have designated.
- Printed records or computer files belong to the clinician, medical practice or institution (hospital, or laboratory or blood service). Information held in them belongs to the patient/individual.
- Interacts in a culturally competent manner.
The following word definitions will be used to describe the level of knowledge a QMLT & QSST shall be required to achieve. Examination questions will also use these words.

**LIST**  Headings only

**DEFINE**  State meaning clearly and concisely

**OUTLINE**  Write brief notes incorporating the essential facts

**IDENTIFY**  Recognise according to established criteria

**DESCRIBE**  Give a complete account demonstrating a thorough practical knowledge

**RECOGNISE**  Be able to identify the main points

**INDICATE**  Briefly point out

**CLASSIFY**  Be able to designate to a group

**DIFFERENTIATE**  Briefly and concisely state the main differences

**DISTINGUISH**  To briefly point out the main differences

**DISCUSS**  Give details, explaining both the positives and negatives

**CALCULATE**  Perform a mathematical process to get the answer

**MATCH**  Find one that closely resembles another

**EXPAND**  To express at length or in greater detail

**COMPLETE**  Finish, have all the necessary parts

**NAME**  A word or group of words used to describe or evaluate

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**Dilution Factor Definitions (where applicable)**

Due to inconsistencies in nomenclature associated with dilution expression the following will be used for calculations in the examination:

- **½ and 1 in 2:**  implies 1 part added to 1 part making a total of 2 parts,
  ie. A dilution factor of x2.

- **1 to 2:**  implies 1 part added to 2 parts making a total of 3 parts,
  ie. A dilution factor of x3.

Because of the dual meaning of the expression 1:2, it will not be used in the examinations.
1. What is Medical Laboratory Science

1.1 Describe the role and understand the definition of medical laboratory science within the context of sample collection and analysis to aid the diagnosis and monitoring of disease, medical conditions and treatments thereof and in the testing and accreditation of donated blood and blood products to ensure the health of the donor and the safety of the blood supply.

1.2 Understand the concept of cultural competence, professional behaviour and attitude within a Medical Laboratory or Blood Service pertaining to:
   - Patients, clinicians and colleagues
   - Patient fluid, tissue and body parts
   - Blood donors
   - Donated blood, blood components, or tissue
   - Be familiar with the MSCNZ statement of Cultural Competence, December 2007, and the attitudes, knowledge and skills expected of a QMLT in their dealings with patients and colleagues.

1.3 Understand the role of the professional/legislative bodies representing, training and governing Medical Laboratory Science in New Zealand.
   - NZIMLS (New Zealand Institute of Medical Laboratory Science)
   - MSCNZ (Medical Sciences Council New Zealand)
   - Universities that train Medical Laboratory Scientists
   - Understand the five codes of competency (practise as a professional, practise as a technician, safe practice, communication and cultural competent practice) and associated standards as outlined in the Medical Sciences Council New Zealand’s Code of Competencies and Standards for the Practice of Medical Laboratory Science.

1.4 Describe the major functions of the following departments / sections and their interrelationships within a laboratory.
   - Haematology
   - Biochemistry
   - Microbiology
   - Immunology / Virology
   - Histology
   - Cytology
   - Cytogenetics
   - Forensic Science / Mortuary Practice
   - Molecular Diagnostics / Genetics
   - New Zealand Blood Service
   - Collection services (Phlebotomy)
     - Call Centre for helpline, results & enquiries
     - Specimen Services
1.5 Describe the major functions / roles of the following laboratory staff:
- Pathologist, general and specialist
- Laboratory Manager
- Technical Head / Head of Department
- Section Leader / Technical specialist / Supervisor
- Scientific Officer
- Registered Medical Laboratory Scientist
- Registered Medical Laboratory Technician (QMLT)
- Registered Nurse within the New Zealand Blood Service
- Clerical / Administration staff
- Qualified Specimen Services Technician

1.6 Outline the role of the Laboratory with referring health professionals such as General practitioners, specialists/consultants, nurses and patients.

1.7 Have a working understanding of basic medical terminology and abbreviations that relate to your specific discipline. To include common prefixes and suffixes (e.g. hyper, hypo, -itis, neuro, philia).
2. Ethics and Legislation

2.1 Define:
- Patient/Donor confidentiality.
- Informed consent.
- Duty of care (do no harm).
- Understand statutory requirements for release of body parts to patients / families.
- Understand the statutory obligations for the release of samples (to referral laboratories, chain of evidence parties, patients).
- Outline the laboratory policies for the release of information / results to patients/donors.
- Outline the Medical Laboratory/organisation’s obligations to the Treaty of Waitangi.
- Understand how the HPCA legislation relates to Medical Laboratory Science and the Health sector.
- Understand the code of ethics of NZIMLS.
3. Human Anatomy and Physiology

3.1 Outline the position of the major organs of the human body.

3.2 Outline their basic function.

3.3 Describe the body specimen types encountered in Medical Laboratories.
4. Specimens

4.1 Outline procedures for the packaging and transport of specimens for delivery to a laboratory (from the patient to a laboratory, between laboratories).

4.2 Outline the procedures for the selection, preparation and storage of specimens within your department / laboratory.

4.3 Outline appropriate specimen labelling requirements.
5. Equipment

5.1 Describe the use and routine maintenance of the following equipment (where applicable):
- Thermo-regulated apparatus (Incubators, water baths, refrigerators, freezers).
- Balances.
- Distilled/deionised water apparatus.
- Glassware.
- Pipetting devices - manual and automated/mechanical liquid handling devices.
- Biohazard cabinets.
- Transport systems (including pneumatic tubes, couriers).

(NOTE: "Maintenance" in the context of this syllabus refers to daily good house-keeping practices required to keep equipment clean and functioning at peak efficiency. Laboratory technicians are encouraged to recognise faults in equipment, but must refer them to their supervisor for corrective action.)

5.2 Centrifuges
- Describe the principle of centrifugation.
- Describe the use and maintenance required.
- List the safety precautions necessary including specimen breakage.

5.3 Computers
- Have basic computer skills and knowledge of software, hardware functionality.
- Understand the role of computers in the laboratory / workplace.

5.4 Barcodes and Scanners
- Understand the use of barcodes and barcode scanners
6. **Safety**

6.1 Describe safety precautions and emergency procedures for incidents involving the following:
- Fire.
- Electrical apparatus.
- Chemical (poisons, carcinogens, corrosive and volatile substances, gases, radioactive substances, liquid nitrogen).
- Spillages of blood and other biological fluids.
- **Earthquakes**

6.2 Outline an accident reporting procedure for the workplace.

6.3 Outline the role of a health and safety representative.

6.4 Describe the safe handling of biological material under the following headings:
- Identification of routes of infection.
- Types of infectious material.
- Safety equipment.
- Handling.
- Disposal.
- Decontamination.
- Transportation.

6.5 Identify international safety symbols that are used in the workplace.

6.6 Describe the concept of safe practice within the workplace.

6.7 Describe the prevention and emergency treatment of the following:
- Eye splashes
- Cuts and bleeding
- Needle injury
- Burns
- Poisoning
- Electric shock
- Loss of consciousness

6.8 Understand Hazard Identification and management and the use of Material Safety Data Sheets.

6.9 Understand the concept of occupational health and the role of self protection through staff vaccination programmes i.e. Hepatitis B vaccination.

6.10 Understand the principle of Occupational Overuse Syndrome/Gradual Process Injuries and its relevance in the laboratory, including some prevention strategies.
7. **Quality Assurance**

7.1 Define quality assurance and total quality management.

7.2 Describe quality control.

7.3 Define accuracy and precision.

7.4 Define a Biological Reference Interval.

7.5 Explain the role of ISO 15189 within the Medical Laboratory.

7.6 **Outline Harmonisation as it relates to Laboratory Medicine.**

7.7 Outline internal and external audit processes including the assessment bodies (eg IANZ, MAF).

7.8 Understand the concept of Documentation Control within the Medical Laboratory.

7.9 Outline quality feedback by customers (patients, donors and health professionals).
8. Calculations

The student shall be able to perform basic laboratory calculations including:

- Converting units – for example: umol to mmol, ml to L, g to kg, fractions to percentage
- Define SI units – pico, nano, mili, micro, kilo as they relate to the power of 10
- Common laboratory calculations for dose time and urine volume.
- **Use of nomograms.** For example, calculating surface area from height and weight.
- Define pH and use this understanding to differentiate between acidic and basic solutions.

8.1 Dilutions
- Making a working solution from a stock solution.
- Calculation of patient results post dilution.

8.2 Statistics
- Calculation of mean standard deviation and coefficient of variation using a calculator.
- Creation of and plotting results onto a Levy Jennings graph
- Basic interpretation of Levy Jennings graphs

8.3 Calculation of Molarity from molecular weight (note molecular weight to be supplied in examination)

Other calculations specific to your discipline as referred to in the discipline specific syllabi.
9. Reference Texts

9.1 Specimens

IATA guidelines 4th Ed 2003
Infectious substances and diagnostic specimens
Shipping guidelines

Land Transport Rule Dangerous Goods 1999

9.2 For Basic Chemistry and Equipment

Clinical Chemistry: Theory Analysis and Correlation
Kaplan L.A., Pesce A.J.
3rd Edition 1996
Mosby; Missouri, USA

TIETZ: Textbook of Clinical Chemistry
Carl A Burtis and Edward R Ashwood
Saunders; Philadelphia, USA

Code of Ethics of the New Zealand Institute of Medical Laboratory Science
www.nzimls.org.nz

9.3 For Safety

Clinical Microbiology Procedures Handbook
Isenberg H.D. Chief Editor
2nd Edition, 2004
American Society Microbiology Washington DC

Fleming D.O., Richardson 1.H., Tulis 1.1, Vesley D.
Laboratory Safety Principles and Practices
American Society Microbiology Washington DC.