QUALIFIED MEDICAL
LABORATORY TECHNICIAN

SPECIMEN SERVICES

2023 CURRICULUM

NZIMLS
THE NEW ZEALAND
INSTITUTE OF MEDICAL
LABORATORY SCIENCE (INC)

Part One: Common Curriculum

Part Two: Discipline Specific Curriculum in Specimen Services

Introduction

Definition of a Medical Laboratory Technician

A Medical Laboratory Technician (MLT) 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 MLT 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. However, 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.

The QMLT candidate has two curricula to study:

- **The Common Curriculum** which is common to all NZIMLS technician qualifications.
- **The Discipline Specific Curriculum** which is common only to the discipline in which the candidate is sitting the QMLT exam.
- This document combines both the **Common Curriculum (Part One)** and the **Discipline Specific Curriculum (Part Two)**.

Objectives

1. Education of Medical Laboratory Technicians and Medical Laboratory Pre-Analytical Technicians

a. To provide an employer recognisable qualification in a New Zealand Medical Laboratory/Blood Service.

b. To provide a qualification that is recognised by the Medical Sciences Council of New Zealand for the Registration of Qualified Medical Laboratory Technicians (QMLT) and Qualified Medical Laboratory Pre-Analytical Technicians (QMLPAT).

c. To provide sufficient theoretical training to enable a medical laboratory technician or medical laboratory pre-analytical technician to perform their practical work with accuracy, reliability and efficiency.

d. To enable them to understand and appreciate the reasons for, and the importance of the procedures and tests they perform in accordance with the requirements of the organisation and its Quality Management system.

e. To enhance interest in their work and increase job satisfaction and self-esteem.

2. QMLT and Common Curricula

a. To prescribe the course of study for the QMLT examination.

b. To define the composition of the examination.

The Pre-Analytical Special Interest Group (PASSIG) has prepared both a curriculum and practical assessment for use by Trainee Medical Laboratory Technicians preparing for the NZIMLS QMLT examinations.

The Practical Assessment **is compulsory** and has been included to aid candidates preparing for the QMLT examinations and to be a record of training or practical competency, accomplished by mastery assessment.

NOTE - The Practical Assessment is a requirement and must be presented as part of the examination and qualifying process.

The PreAnalytical SIG has taken significant steps to limit the theoretical knowledge required, to be sufficient to perform bench procedures and understand the importance of recognising abnormal or anomalous results for referral to a supervisor.

The request for specific numbers of points and the reduction in the number of tests to be performed in the practical assessment is an endeavour to limit the quantity of information to learn and examine.

This does not preclude employers training their laboratory assistants for their own needs.

Competence Standards

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Competence standards are a description of the ability of a medical laboratory science practitioner to practise safely and effectively in a variety of contexts and environments. Competence is influenced by many factors including, but not limited to, the practitioner's qualifications, clinical experience, professional development and his/her ability to integrate knowledge, skills, attitudes, values and judgements within a practice setting. A critical value of competence standards is the capacity to support and facilitate professional practice and growth.

The standards set out in this document are expressed as entry-level competencies and behaviours. However, it is expected that all practitioners will successively build on these competence standards to levels expected of experienced practitioners.

The competence standards identify the minimum knowledge, skills and professional attributes necessary for practice. During any one procedure it is expected practitioners will demonstrate elements of practice across a number of broadly defined domains of competence. This recognises that competent professional practice is more than a sum of each discrete part. It requires an ability to draw on and integrate the breadth of competencies to support overall performance.

Context of the Competence Standards

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The competence standards are directly linked to the three medical laboratory science scopes of practice defined by the Council under the Act.

Medical laboratory science practitioners in Aotearoa New Zealand practise within a legislated regulatory framework under the Health Practitioners Competence Assurance Act 2003. Defining scopes of practice serves to protect the health and safety of the public through the use of protected professional titles. Only individuals who hold current registration with the Medical Sciences Council are permitted to use the professional titles of:

- Medical Laboratory Scientist
- Medical Laboratory Technician
- Medical Laboratory Pre-Analytical Technician

Competence Standards for Medical Laboratory Science Practitioners in Aotearoa New Zealand
An Overview of the Competencies Domains

(*Reproduced with permission from the Medical Sciences Council of New Zealand*)

Key competencies are arranged within a number of integrated themes called *Domains.* There are five domains of competence that apply to each of the scopes of practice for medical laboratory science practitioners. In addition, competencies specific to each scope of practice are articulated in a number of subsets (5A to 5C) of the fifth domain.

Domain 1: Professional and Ethical Conduct
This domain covers practitioners' responsibility to be professional and ethical and to practise within the current medico-legal framework. Includes their responsibility for ensuring patient confidentiality/privacy is maintained at all times while recognising the potential role as a patient advocate.

Domain 2: Communication and Collaboration
This domain covers practitioners' responsibility in utilising appropriate, clear and effective communication and their responsibility for ensuring they function effectively as a member of a health team at all times.

Domain 3: Evidence-Based Practice and Professional Learning
This domain covers practitioners' responsibility to engage in evidence-based practice and to critically monitor their actions through a range of reflective processes. It includes their responsibility for identifying, planning and implementing their ongoing professional learning needs.

Domain 4: Safety of Practice and Risk Management
This domain covers practitioners' responsibility to protect patients, others and the environment from harm by managing and responding to the risks inherent in both healthcare and medical laboratory science practice. It includes their responsibility for ensuring high quality professional services are provided for the benefit of patients and other service users.

Domain 5: Medical Laboratory Science Practice
This domain covers the knowledge, skills and capabilities practitioners need to practise the profession of medical laboratory science. Elements in this domain are common to all medical laboratory science practitioners, taking into account the different requirements of each scope of practice.

Domain 5A: Medical Laboratory Scientist
This domain covers the additional knowledge, skills and capabilities specific to the Medical Laboratory Scientist scope of practice.

Domain 5B: Medical Laboratory Technician
This domain covers the additional knowledge, skills and capabilities specific to the Medical Laboratory Technician scope of practice.

Domain 5C: Medical Laboratory Pre-Analytical Technician
This domain covers the additional knowledge, skills and capabilities specific to the Medical Laboratory Pre- Analytical Technician scope of practice.

More detailed information on these Standards can be found on the Medical Sciences Council website under "Competence Standards for Medical Laboratory Science Practitioners in Aotearoa New Zealand (revised February 2018).

Part One
Common Curriculum

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 that patient/donor.

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).

Word Definition

The following word definitions will be used to describe the level of knowledge a QMLT shall be required to achieve. Examination questions will also use these words.

	WORD DEFINITIONS
CALCULATE	Perform a mathematical process to get the answer
CLASSIFY	Designate to a group
COMPARE	Detail both the differences and the similarities
COMPLETE	Finish, have all the necessary parts
CONVERT	Express in alternative units
DEFINE	State meaning clearly and concisely
DESCRIBE	Give a complete account demonstrating a thorough practical knowledge in a logical sequence
DISCUSS	Give details, explaining both the positives and negatives
DISTINGUISH	Briefly point out the main differences
EXPAND	To express at length or in greater details
INDICATE	Briefly point out
IDENTIFY	Recognise according to established criteria
INTERPRET	Express the results of a test or series of tests in a meaningful format
LABEL	Give a name to
LIST	Headings only
MATCH	Find one that closely resembles another
NAME	A word or group of words used to describe or evaluate
OUTLINE	Write brief notes incorporating the essential facts
STATE	Give the relevant points briefly

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,
i.e., A dilution factor of x2.

1 to 2: implies 1 part added to 2 parts making a total of 3 parts,
i.e., A dilution factor of x3.

Because of the dual meaning of the expression 1:2, it will not be used in the examinations.

1.0 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 Describe 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 or MLPAT in their dealings with patients and colleagues.

1.3 Outline 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 competencies (practise as a professional, practise as a technician, safe practice, communication and culturally 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 Outline 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 Outline the major functions / roles of the following laboratory staff:

- Laboratory Clinical Director.
- Pathologist, general and specialist.
- Laboratory Manager.
- Technical Head / Head of Department/Scientist In charge.
- Section Leader / Technical specialist / Supervisor.
- Scientific Officer.
- Registered Medical Laboratory Scientist.
- Registered Medical Laboratory Technician (QMLT).
- Registered Medical Laboratory Pre-Analytical Technician (QMLPAT).
- Registered Nurse within the New Zealand Blood Service.
- Clerical / Administration staff.

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

1.7 Identify and expand basic medical terminology and general abbreviations that relate to the laboratory. To include common prefixes and suffixes (e.g. hyper, hypo, -itis, neuro, -philia).

2.0 Ethics and Legislation

2.1 Outline:

- Patient/Donor confidentiality.
- Informed consent.
- Duty of care (do no harm).
- Statutory requirements for release of body parts to patients / families.
- Statutory obligations for the release of samples (to referral laboratories, chain of evidence parties, patients).
- Laboratory policies for the release of information/results to patients/donors.
- A Medical Laboratory's organisation's obligations to the Treaty of Waitangi.
- The Code of Health & Disability Services and Consumer Rights.
- The NZIMLS code of ethics.
- Knowledge of Health Practitioners Competence Assurance Act (2003).
- Dangerous goods act
- Vulnerable Children's Act 2014 (may be included)

2.2 Outline how the Health Practitioners Competence Assurance (HPCA) Act 2003 and following amendments relates to Medical Laboratory Science and the Health sector.

2.3 Describe the legal obligation for technicians to be registered and to hold an annual practicing certificate.

2.4 Define scope of practice.

2.5 Describe the scope definitions for a medical laboratory technician and medical laboratory pre-analytical technician, including the difference between provisional and full registration.

3.0 Human Anatomy and Physiology

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

3.2 Outline their basic function.

3.3 Identify the specimen types (and their origin) encountered in Medical Laboratories.

4.0 Specimens

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

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

4.3 Describe appropriate specimen labelling requirements including those for New Zealand Blood Service.

5.0 Safety

List your personal duties as a worker under the Health and Safety at Work Act 2015.

5.1 Define, with examples, a notifiable injury or illness, notifiable incident, and notifiable event, according to the Health and Safety at Work Act 2015.

5.2 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

5.3 Outline an accident reporting procedure for the workplace.

5.4 Outline the role of a health and safety representative.

5.5 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

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

5.7 Describe the concept of safe practice within the workplace.

5.8 Describe the prevention and emergency treatment of the following:

- Eye splashes
- Cuts and bleeding
- Needle or sharps injury
- Blood and Body Fluid exposure
- Burns
- Poisoning
- Electric shock
- Loss of consciousness

5.9 Outline Hazard Identification and Management including the use of Material Safety Data Sheets.

5.10 Outline the concept of occupational health and the role of self-protection through staff vaccination programmes, e.g., Hepatitis B vaccination.

5.11 Outline the principle of Occupational Overuse Syndrome/Gradual Process Injuries and its relevance in the laboratory, including some prevention strategies.

6.0 Equipment

6.1 Describe the use and routine maintenance (where applicable) of the following equipment:

- Thermo-regulated apparatus (Incubators, water baths, heating blocks, refrigerators, freezers)
- Balances
- Distilled/deionised water apparatus
- Glassware
- Pipetting devices - manual and automated/mechanical liquid handling devices
- Biohazard cabinets
- Fume hoods/fume cupboards
- Transport systems (including pneumatic tubes, couriers)

(NOTE**: "Maintenance"** in the context of this curriculum 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).

6.2 Centrifuges:

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

6.3 Computers:

- Outline basic computer components including hardware and software.
- Describe the role of computers in the laboratory / workplace.

6.4 Barcodes and Scanners:

- Describe the use of barcodes and barcode scanners

7.0 Quality Assurance

7.1 Define quality assurance and total quality management.

7.2 Describe quality control.

7.3 Define and distinguish accuracy and precision.

7.4 Define a Biological Reference Interval.

7.5 Describe 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 (e.g., International Accreditation New Zealand (IANZ), Ministry of Primary Industries (MPI)).

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

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

8.0 Calculations

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

- Converting units – for example: µmol 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.
- Define pH and use this understanding to differentiate between acidic and basic solutions.

8.1 Dilutions:

- Calculate volumes required to make a working solution from a stock solution.
- Calculation of patient results post dilution.

8.2 Statistics:

- Calculation of average, 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.

See Guide to Calculations on the NZIMLS website under Education.

9.0 Reference Texts

Below are listed suggested reference texts. The latest versions are recommended. This is not an exhaustive list.

9.1 Specimens

Diagnostic Samples: From the Patient to the Laboratory: The Impact of Preanalytical Variables on the Quality of Laboratory Results
Guder W.G, Narayansan S, Wisser H, Zawta B Wiley-Blackwell

Clinical Diagnostic Technology – The total Testing Process, Volume 1: The Preanalytical Phase Ward-Cook K.M, Lehmann C.A, Schoeff L.E, Williams R.H
AACC Press, Washington DC

IATA Infectious Substances Guidelines Manual 2015 edition IATA Dangerous Goods Regulations Manual 2016 edition

Land Transport Rule Dangerous Goods 2005
https://www.nzta.govt.nz/resources/rules/dangerous-goods-2005/

9.2 Human Anatomy and Physiology

Phlebotomy Handbook Garza d, Becan-McBride K
Pearson Educational, New Jersey USA

Phlebotomy Essentials McCall R.E, Tankersley C.M
Lippencott, Williams & Wilkins, Philadelphia, USA

9.3 Equipment

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

TIETZ: Textbook of Clinical Chemistry and Molecular Diagnostics Carl A Burtis, Edward R Ashwood and David E Bruns
Saunders; Philadelphia, USA

TIETZ: Fundamentals of Clinical Chemistry and Molecular Diagnostics Carl A Burtis and David E Bruns
Saunders; Philadelphia, USA

9.4 **Safety**

Clinical Microbiology Procedures Handbook Isenberg H.D. Chief Editor
American Society Microbiology Washington DC

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

9.5 **Legislation and Standards**

Health Practitioners Competence Assurance Act (2003)

ISO 15189:2012 Medical laboratories – Requirements for quality and competence AS/NZS

2243 Safety in laboratories

Clinical and Laboratory Standards Institute (CLSI) guidelines
www.legislation.govt.nz

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

Competence Standards for Medical Laboratory Science Practitioners in Aotearoa New Zealand (revised 2018). www.mscouncil.org.nz

Statement of Cultural Competence (2007)
www.mscouncil.org.nz

Part Two
Discipline Specific Curriculum
Specimen Services

1.0 Collection of Laboratory Specimens

Learning outcome: The candidate will be able to outline the principles of collection and handling of laboratory specimens under the following headings:

1.1 Laboratory Specimens

- Equipment – suitable containers and required test volumes.
- Procedure for collection.
- Integrity of the specimen.
- Labelling of specimens, including the collection site.
- Sterility requirements.
- Storage requirements.
- Transportation to the laboratory.

1.2 Specimen Types

- Blood
- Urine
- Faeces
- Sputum
- Swabs
- Aspirates, drains and fluids
- Cerebral Spinal Fluid (CSF)
- Bone Marrow
- Semen
- Tissue
- Bone
- Skin Scrapings
- Sweat
- Saliva
- Sterility testing
- Other fluids (e.g., Pool Water)
- Blood cultures

2.0 Handling of Bloods and Specialised Tests

Learning outcome: The candidate will be able to outline the handling of bloods and specialised tests under the following headings:

2.1

- Containers suitable for specimen collection.
- Additives used in specimen collection and storage.
- The rationale behind the use of additives.
- Identifying the correct specimen type for each test requested.
- Timed and fasting specimens.
- The differences between serum and plasma, and venous, arterial, capillary and cord blood specimens.

2.2 Handling of Biochemistry Specimens

- Specimens for routine biochemistry tests.
- Glucose Tolerance Test (GTT) and Polycose
- Timed, fasting, and tests with special handling requirements.
- Urines including 24hr urines.
- Blood Gas samples.

2.3 Handling of Haematology and Coagulation Specimens

- Routine tests
- Platelet Function Assay (PFA)
- Kleihauer

2.4 Handling of Transfusion Medicine Specimens (Blood Bank)

- Group and Hold, Crossmatching
- Antenatal testing
- Coombs/DAT
- Tissue Typing

2.5 Handling of Virology and Immunology Specimens

- Quantiferon TB Gold
- Viral serology panels
- Bacterial serology panels

2.6 Specialised Testing

- Specimens for PCR (polymerase chain reaction).

2.7 Handling of Blood Cultures

- Volume requirements.
- Frequency of collection.
- Use of aerobic and anaerobic bottles.

2.8 Handling of Urine Specimens

- Catheter, mid-stream, clean catch.
- Random, casual, timed, first catch.
- Tuberculosis.
- Chlamydia/*Neisseria gonorrhoea*(male).
- Cytology.
- Creatinine Clearance test (plus serum).
- Drug screen, including chain of custody.
- Microalbumin.
- Albumin/Creatinine Ratio.
- Protein.
- 24 hour –tests with and without preservative (acid and non-acid bottles).

2.9 Handling of Faeces Specimens

- Culture
- Parasites
- Virus including, Rotavirus and Norovirus
- Faecal elastase
- Reducing substances

2.10 Handling of Sputum Specimens

- To include culture for Tuberculosis (TB).

2.11 Handling of Swabs

- Bacterial
- Multi-resistant Organisms (MROs)
- Viral
- Chlamydia
- Bordetella pertussis
- Foetal Fibronectin (FFN)

2.12 Handling of Aspirates and Fluids

- Joint aspirates
- Other aspirates
- Cerebrospinal Fluid (CSF)
- Fluids, e.g., dialysates
- Aspirates and fluids for cytology

2.13 Handling of Bone Marrow Specimens

- Tests commonly requested, e.g., cell markers, chromosome studies, Fluorescent In-Situ Hybridisation (FISH).

2.14 Handling of Semen Specimens

- Fertility testing
- Post-vasectomy testing

2.15 Handling of Tissue Specimens

- Fresh tissue (not in preservative)
- Tissue in formalin

2.16 Handling of Bone Specimens
- Tests commonly requested

2.17 Handling of Mycology Specimens
- Common sample types
- Tests commonly requested

2.18 Handling of Sweat Specimens
- Tests commonly requested

2.19 Handling of Saliva Specimens
- Tests commonly requested

3.0 Pre-analytical Variables

Learning outcome: The candidate will be able to describe the effects that pre-analytical variables can have on laboratory specimens.

3.1 Patient Collection Procedures
- Patient Identification i.e., minimum requirements.
- Fasting status.
- Timed Collections.
- Drug Regimes.
- Dietary restrictions and the effect of diet.
- Diurnal variations.
- Posture.
- Special collection procedures.
- Collection from indwelling catheters & intravenous lines.
- Blood collection from sites adjacent to an Intravenous line.
- The correct use of tourniquets.
- Minimum volumes.
- Correct blood/additive ratio.
- The order of draw for blood specimens.
- Importance of inverting samples post collect

3.2 Specimen Handling Procedures
- Light sensitive tests.
- Temperature sensitive tests.
- Pneumatic tube system*.
- Transit time.
- Causes of haemolysis.
- Causes of clots in anti-coagulated tubes.

3.3 Laboratory Processes

- Centrifugation.
- Processing specimens at the correct temperature.
- Aliquoting technique & record keeping.
- Minimum volume of specimen for tests requested.
- The causes and effects of haemolysis & lipaemia on specimen testing.
- The causes and effects of icteric specimens.
- Pre analytical storage.
- The use of Gel tubes.
- Retention of laboratory records
- Dealing with unlabelled/mislabelled specimens

4.0 Transportation of Specimens

Learning outcome: *The candidate will be able to describe the correct protocols for the transportation of laboratory specimens.*

4.1 Regulations

- Land Transport Rule: dangerous goods, pertaining to infectious substances, 6.2. This includes packaging, labelling, marking, documentation, and carriers.
- Postal Regulations.
- International Air Transport Association (IATA) regulations.

4.2 Packaging

- Data loggers
- Biohazard bags
- Dry ice
- Double wall Ice containers (Pink / Blue ice)
- Controlled temperature transport

5.0 Test Ordering

Learning outcome: The candidate will be able to outline the requirements for test ordering and be able to outline the relevant test information.

5.1 Requests for laboratory testing

- Paper based and/or electronic test ordering.
- Profile requesting.
- Funding arrangements for laboratory requests.
- Medical Trials.

5.2 Information provided on request forms

- Patient identification and demographics.
- Relevance of clinical details and information.
- Common medical prefixes and suffixes.
- Common medical terminology.
- Common medical abbreviations.
- Personnel authorised to order tests.

5.3 Processing tests

- Prioritisation of urgent and critical specimens for each laboratory department
- Test abbreviations.
- Unlabeled /mislabeled samples

6.0 Labelling of Specimens

Learning outcome: The candidate will be able to describe the principles of correct labelling**.**

6.1 Labelling Requirements

- Patient identification and demographics.
- Minimum labelling requirements.
- Labelling requirements of Blood Bank specimens.
- The process for handling unlabeled and mis-labelled bloods.

6.2 Systems for identifying possible labelling errors

6.3 Checking previous results, delta checks.

- Process for handling mis-labelled specimens discovered after testing or resulting.

7.0 Patient and Laboratory Information Systems (LIS)

Learning outcome: *The candidate will be able to outline Patient and Laboratory Information Systems and their uses under the following headings.*

7.1 Coded and Confidential Information

- Coded Identity
- Aliases
- National Health Index (NHI) numbers
- Privacy and confidentiality
- NZ Medical Council (NZMC) number
- The use of reference numbers

7.2 Barcoding

- Laboratory requisition number
- Use of Bar codes including 1 Dimension and 2 Dimension (Quick Response (QR) code)
- Portable document format (PDF) Stacked linear barcode

7.3 Reporting Systems

- Computer ordering of laboratory tests
- Laboratory reporting systems
- Health Link 7 (HL7) and data transference

7.4 Reference ranges

- Gender
- During Pregnancy
- During childhood and adulthood
- Therapeutic range. e.g., Patients on anticoagulants
- Patients on therapeutic drugs
- Antipsychotic drugs
- Anticonvulsant drugs
- Antirejection drugs – Covered in the Therapeutic drugs above

8.0 Storage

Learning outcome: The candidate will be able to discuss the storage requirements of laboratory specimens from collection through testing and final storage

8.1 Storage Conditions

- Ambient / room temperature
- Frozen
- Refrigeration / 4ºC
- Storage time

8.2 Handling

- Separation of red cells and serum/plasma
- The effect of leaving plasma/serum on the red cells
- The effect of gel on testing

8.3 Preservatives

- Formalin/non formalin
- Acid
- Fluoride
- RPMI
- Cytorich Red

8.4 Viability of test specimens on storage

- Test adds

9. Aliquot Management and Centrifugation

Learning outcome: The candidate will be able to describe aliquot management and centrifugation.

9.1 The clotting process

- Process of in vitro clotting and the effect it has on the specimen.
- Holding time prior to centrifugation.

9.2 The effect of centrifugation on specimens

- Cell layers of blood post centrifugation.
- Use of Gel tubes and their limitations.
- Centrifuge speed and timing.
- Centrifuge temperature.

9.3 Aliquoting

- Labelling requirements of secondary tubes.
- Minimum volumes.
- Automated aliquoting systems.
- Aliquoting practices which can cause haemolysis.
- Suitable choice of secondary container.
- De-capping and recapping.
- Urines for biochemistry testing.
- Urines for Chlamydia testing.
- 24 Hour Urine collections.
- Polymerase Chain Reaction (PCR) samples.

10.0 Safety

Learning outcome: *The candidate will be able to describe laboratory safety procedures and management of waste.*

10.1 Precautions when handling specimens

- Standard Precautions.
- The National Laboratory Guidelines for Pandemic Influenza.

10.2 Management of Hazards

10.3 Management of Waste

10.4 Blood and Body Fluid Accidents / Exposure

- Procedures and test requirements.
- Reporting process.

11.0 Quality

Learning outcome: *The candidate will be able to identify the principles of Quality Assurance and be able to outline the procedures involved in maintaining quality systems*.

11.1 Standards

- ISO 15189

11.2 Statistical data

- Turnaround times (TATs)
- Key performance indicators (KPIs)

11.3 Audits

- Auditing
- Registration Audits
- Internal audits
- External audits
- Vertical audits

11.4 Record Keeping

- Retention and storage of laboratory records.

11.5 Incident Reporting

- Reporting of incidents and accidents.
- Complaints procedures.

12.0 Recommended texts and related documents (The latest version is recommended.) There is no single textbook that covers the entire Specimen Services syllabus. However, the following are all valuable resources.

- In-house laboratory training programmes must be based on the standards outlined in ISO 15189

- Clinical and Laboratory Standards Institute (CLSI) Guidelines – These include international consensus documents pertaining to phlebotomy and collection.

- Specimens: From the Patient to the Laboratory. The impact of preanalytical variables on the quality of laboratory results. W.G. Guder, S. Narayanan, H. Wisser, B. Zawta

- Clinical Diagnostic Technology. The Total Testing Process. Vol 1: The Preanalytical Phase. Editors Kory M. Ward-Cook, Craig A. Lehman, Larry E. Schoeff, Robert H. Williams

- Phlebotomy Handbook Blood Collection Essentials**,** Garza D., Becan-McBride K Appleton and Lange, Stamford Connecticut

- Phlebotomy Essentials**,** McCall R. E., Tankersley C.M..Lippincott, Williams and Wilkins, Philadelphia

- Handbook of Phlebotomy**,** Pendergrapg, G.E Lea and Febiger: Philadelphia

- Phlebotomy Exam Review, Ruth E.McCall, Cathee M. Tankersley

13.0 NZ Legislation and Standards

Latest editions of the NZ legislation can be found on the internet. Refer to the latest edition. The application of the legislation in the workplace may be examined.

Consumer Protection

- Fair Trading Act
- Health and Disability Commissioners Code of Health
- Disability Services Consumers Rights
- Obtaining Consent
- Duty of Care
- Vulnerable Children's Act 2014

Specific Procedures for Blood Transfusion

- ANZ Society of Blood Transfusion (ANZSBT) Guidelines for Pre-transfusion Testing:

Infection Control

- Standards New Zealand – Infection Control NZS 8142:
- WHO Five Moments of Hand Hygiene

Data Protection

- Privacy Act
- Health Code Privacy Principles

Hazard and Risk Management

- Health and Safety in Employment Act
- Health and Safety In Employment Relations
- Hazardous Substances and New Organisms (HSNO) Act
- Dangerous Goods Act
- Summary of Land Transport Rules for Dangerous Goods – Rule 45001
- Codes of Practice as issued by Occupational Safety and Health (which is part of the Department of Labour)
- Health and Safety in the Workplace
- Health and Disability Services – Safety Act
- NZS 4304: – Management of Healthcare Waste
- Ministry of Health *National Laboratory Guidelines for Pandemic Influenza: Collection and handling of human s for laboratory diagnosis of influenza with pandemic potential. (*www.moh.govt.nz)