# National Strategic Laboratory Roundtable

# Workforce Work stream

# Update

**May 2017**

# New Zealand Medical Laboratory

# Workforce Blueprint

# Version #8

**May 2017**

## Introduction

The "Workforce" is all too often reviewed from a static point of view: numbers in position, vacancies, turnover, compliment, demographic structure and "demand met". Waiting until demand is upon us and we are not coping forcing a business case to be approved is the more likely current mode of operation, leaving scant consideration to getting ahead of impending demand.

In highly technological industries, what the future looks like, what transitioning of workforces may be required, what current skill sets and knowledge we wish to retain and grow as well as planning for adaptability, rarely feature: succession planning in all but the smallest of specialties, and proactive workforce (re)training even less so.

The purpose of the blueprint is to change this as far as the laboratory workforce is concerned. We look at a simple overview of "what we have now" but mainly focus on the developing state of laboratory services, likely future shape of the industry and how it can / will deliver to health imperatives. Looking at how laboratory services are changing, will give us a chance to consider what adaptation we need to implement and ultimately to get on with it. Rather than reacting to change we wish to plan for change and assist the workforce to do likewise.

This document is intended to be a living document to guide us whilst remaining adaptive as our industry evolves.

## Current State

Appendix One contains current workforce data and demographic information. In summary:

- The number of scientists and technicians employed in the medical laboratory industry over the past 5 years has slowly grown from 3000 to 3300.
- The ratio of technicians to scientist increased (more technicians relative to scientists) from 37% in 2005 to around 48% (just under 50:50) by 2010 and has been maintained at that ratio since then.

- The workforce is primarily NZ trained with 72% of scientists and 62% of technicians NZ trained. The majority of new scientist and technician registrations continue to come from NZ trained individuals.
- Medical Laboratory Services employ a predominantly female population, more so amongst technicians than scientists.

## Changes in the Laboratory Industry

Our vision is that:

> *"Clinical practice (in its broadest sense) will be advanced by an integrated and proactive pathology and laboratory service that anticipates the needs of patients and clinicians, and intentionally manages anticipated change."*

And our mission is:

> *"The business of putting objective evidence (information and intelligence) into the hands of clinicians and patients, to enable timely decision making and to improve patient outcomes."*

This mission recognises that a significant focus of Pathology and Laboratory Services is to enable clinical treatment and care to be delivered in a safe, effective and timely manner centred on the patient. The focus is also broader than treatment and care however including such things as:

- using laboratory information to support the efficient planning and commissioning of health services for populations
- informing investment in new health technology and procedures
- the protection of society from harm associated with communicable diseases
- the early detection and screening of disease
- ensuring that systems, processes and practices are in place to provide assurance to the health service about the quality of laboratory and pathology information.

Appendix Two entitled "the Future Laboratory is Here" describes the changes we know are either imminent or already affecting laboratory services. In this environment, to achieve an integrated and sustainable system, clinical excellence, quality outcomes and value for money, we need future focused training to be a normal part of the laboratory business, ensuring the workforce is not just maintaining knowledge and skill but is prepared to drive value added change. We need to retain the knowledge and skills we have in this workforce but support them to adapt to changing needs: less cytologists, more histologists, more laboratory service communicators and point of care support staff. It is how we are to do that in a rapidly changing environment that is the focus of this paper.

# Cytology

Immunisation programme for HPV has produced a 60% penetration of the target audience, and 70% vaccine effectiveness. The impact of this public health initiative to prevent cervical cancer, plus further changes to the screening programme will have a dramatic impact on the number of cytologists required. It is estimated that when HPV screening will be introduced in late 2018, however this date is heavily dependant IT development and data migration to a new register, we will need 60-70% less cytologists almost overnight. But we will still need some, and those that remain will see a higher percentage of "abnormals" than currently. Issues that arise:

- With the clear lack of job security, maintaining a viable cytology workforce until 2018 is becoming difficult.
- Post 2018, whilst fewer gynae cytologists will be needed, we will still need some and they will need to be highly skilled in the abnormal. Note: non gynae cytology will still be required.
- Lower numbers of staff combined with higher pathological demand might impose geographical challenges as to where services are delivered (centralisation).
- Maintaining quality and safety taking into consideration minimum individual volumes and cytoscreeners as well as minimum/ maximum lab volumes per anum.
- Changes in technology and automation of screening.
- Current contracts are now being renemwed for one year as an RFP is being developed.

**ACTION REQUIRED:**

1. Urgent attention needs to be given to this workforce if we are to retain sufficient until 2018: providing comfort around future job security needs to be provided if these staff are to be persuaded from taking the next available (non lab) job opportunity that comes along. Retraining staff in alternative laboratory services, whilst they continue to deliver a cytology service is one option.
2. Ensuring that IT and data management are focussed on to allow time to test systems or source alternatives.
3. Urgent attention to what, if any technology will be required.
4. What the configuration of services will be after 2018 needs to be identified to give certainty and sufficient time to implement; specifically will there be a centralisation of services? If we are to have one of two more centralised services, where will they be located? If staff are to move to a new job location, they need advance warning. Likewise if moving isn't a feasible option, maintaining and/or growing a workforce in the location(s) may be required.

# Histology Bowel Screening

As a result of the Waitemata Bowel Screening Trial, some firmer projections of impact on the workforce as a result of this initiative have become available. With a population of 575000, key points included:

- 224 cancers detected

- 15000 people screened
- 3.5 pots per person
- FOC (Biochem) reduced need for colonoscopy

Additional Workforce required as a result were:

- Specimen Reception: 2.4FTE
- Clerical: 0.25 FTE
- Scientist/Technician: 0.7FTE
- Pathologist: 0.5 – 0.7 FTE

This result indicates less of an impact on staffing requirements than originally thought however the impact of rollout needs to be monitored. Whether centralisation of services is likely should also be decided without delay to give certainty and the time to adapt.

## Information and Intelligence

How we manage laboratory systems, make sense of data and work "outside the laboratory" will be at least equally important components of the value laboratories can provide. Improving connectivity with whole of health and end to end planning will be critical. Navigators and communicators with not just doctors, but patients, pharmacists, family…. will be important for both the success of the laboratory(s), but also the resources and knowledge held by them.

Our system is often described as data rich but information poor. Laboratory services are one section of health that contains a significant amount of data, both about and for individual patient care through to the population level. Turning this data into information and intelligence for patients, clinicians and the system, and communicating that information effectively and efficiently is a key requirement of laboratory services.

The sheer volume will mandate better demand management systems as will increasing expectation around TAT. But TAT is no longer the time between taking the sample and producing the result. It is increasingly being seen as from the time between first thinking about the test and clinicians / patients acting on the result, which gives opportunity to add value from what laboratories do. It will be critical in getting the right test "thought about" in the first instance through to 'what it means". And given that the customer will increasingly be the patient, mechanisms to communicate at this level will be mandated.

Information is a key strength and resource that will add value to the future of patient centric care: demand for scientists to increasingly work in the data/information, quality, clinical engagement space is already apparent. Patient portals are already in operation giving patients access to their test results directly: we must be ready to meet that increasing demand.

**ACTION REQUIRED**

- Universities need to ensure communication skills and IT interface knowledge is a core component of laboratory training.
- Training options need to be developed for existing Laboratory and IT professionals to ensure experienced professionals can contribute in the new arena

Future Focused Training needs to equip current staff with the effective communication skills as well as how to provide information rich resources to support clinical and population based decision making.

- Laboratory results may need a redesign if patients are to make best use of this information directly.
- Information portals and access points for patients (live chat, free phone, email, website information etc.) need to be established/improved.

# Further Work Required

### Initial Training

Phlebotomists and other sample collectors need to be identified as a specific group and be suitably trained. The possibility that where necessary they also provide cannulation services will assist in sample collection and assist others within the hospital setting to obtain the highest quality collects.

Specimen receipt and processing is becoming more complex and will continue to do so. Transport of samples requires staff to have a high degree of knowledge as to both national and international transport requirements. Clinical trials and personal health requests will require advice from staff with this expertise.

Technicians current level of training may need to be improved, focusing on automated laboratory functioning. This may require more formal training albeit to the level of a diploma rather than degree. To make the most of our workforce and facilitate adaptability as well as career progression, the strands of learning that are available must be able to be credited towards subsequent training allowing for career progression for those that are able to do so..

We may also have to look at this workforce in the context of the "science industry". Demand for laboratory technicians (and scientists) in other areas outside of health (private sector such as oil and gas, horticulture, and public sector such as research and education). The ability to cross credit across a wider range of skill sets may provide value.

Scientists need communication and IT skills just as much as they will need scientific knowledge and ability.

### Future Focused Training

As core business a system needs to be established to provide access to fit for purpose training that is future focused and preparatory for anticipated change.

## Adaptability

This is a small workforce of highly skilled people. We need to retain the workforce and give opportunities to advance in a career, capitalising on prior knowledge and experience. We may also need to expand the talent pool from which we can draw looking to whole of science, not just medical laboratory science.

## Team Work

All of health demands team work. In laboratory and pathology services the pathologist-scientist-technician team is underutilised. With demand for intelligence and communication as well as coordination of the single patient's care through to engagement at multidisciplinary team meetings (in community as in hospitals) better utilisation of the team will be required. Pathologists and scientists working to the same level of efficiency we see from (for example) GPs and nurse practitioners, distribution of tasks, support and collegial engagement will assist better delivery to increasing demand.

As scientists increasingly move into the interpretation of result and data space, pathologists must be with them to supervise and assist with the clinical implications. Clearly defined scopes of practice will need to be embedded in practice. There is also the emerging role of Clinical Scientists who will be interpreting results and consulting clinicians directly, and the role of Pathology assistants in Histology.

## Whole of industry

Given the changing face of laboratory ownership and control, and in recognition of size, this will require whole of system engagement. Retaining people in the industry, if not in that specific laboratory makes best use of resource. To maintain provincial capability will require large laboratory cooperation, regardless of ownership.

We will need all of the stakeholders to help to make the journey happen:

- Universities and other Educational Providers
- Professional Associations and Societies
- Unions and Employers
- And most importantly members of the medical and scientific professions themselves.

**APPENDIX ONE**

# Demographic Data

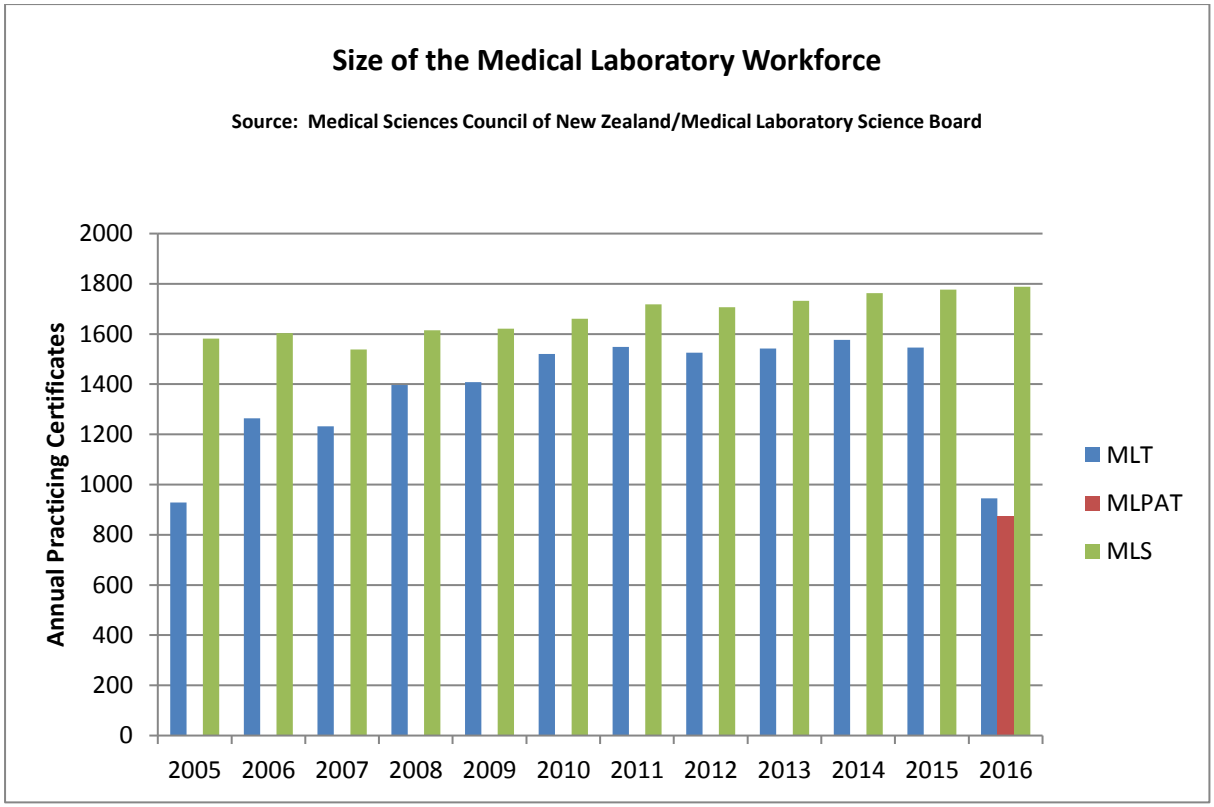
The number of scientists and technicians, plus the ratio, over the past 10 years are detailed below (APC data).

| | MLT | MLPAT | MLS | Total APCs | MLT/Total Workforce | Annual % |
|---|---|---|---|---|---|---|
| 2005 | 928 | | 1581 | 2509 | 37% | |
| 2006 | 1264 | | 1603 | 2867 | 44% | 14.2% |
| 2007 | 1232 | | 1538 | 2770 | 45% | -3.4% |
| 2008 | 1397 | | 1615 | 3012 | 46% | 8.7% |
| 2009 | 1408 | | 1621 | 3029 | 47% | 0.5% |
| 2010 | 1520 | | 1661 | 3181 | 48% | 5.0% |
| 2011 | 1549 | | 1718 | 3267 | 47% | 2.7% |
| 2012 | 1526 | | 1706 | 3232 | 47% | -1.1% |
| 2013 | 1542 | | 1732 | 3274 | 47% | 1.2% |
| 2014 | 1577 | | 1763 | 3340 | 47% | 2.0% |
| 2015 | 1546 | | 1777 | 3323 | 47% | -0.6% |
| 2016 | 945 | 874 | 1788 | 3607 | 51% | * |

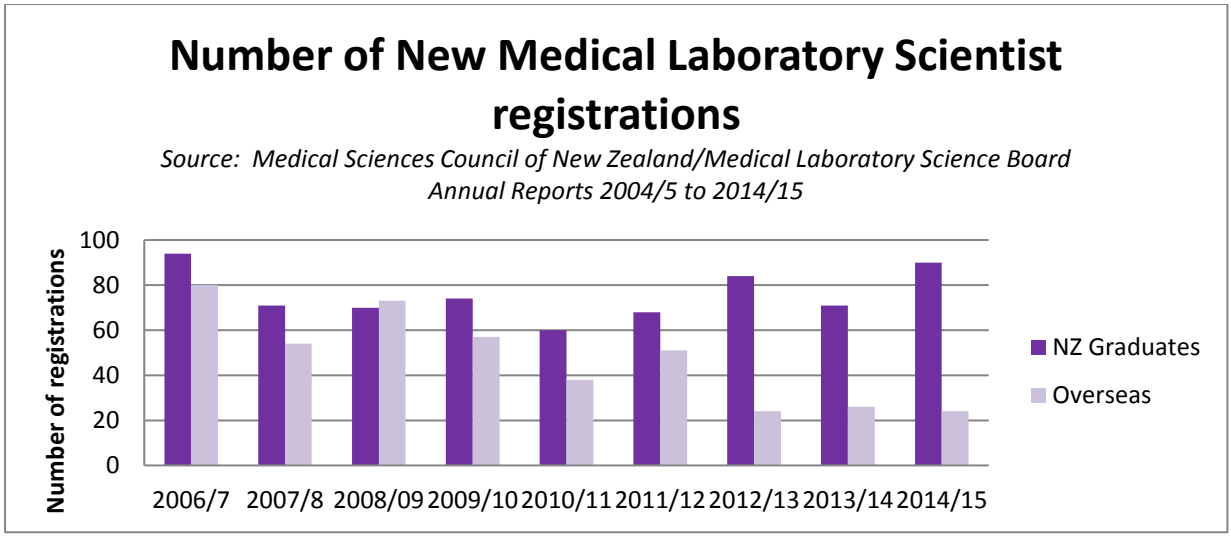
* Growth not calculated due to new workforce inclusion

The size of the workforce is remaing reasonably static. The introduction in 2016 of registration for an existing workforce in laboratories has distorted the data for 2016 and does not represent growth in real terms.

There are 273 additional APCs in the MLT and MLPAT group mostly representing the inclusion of Specimen Services staff in the registered workforce

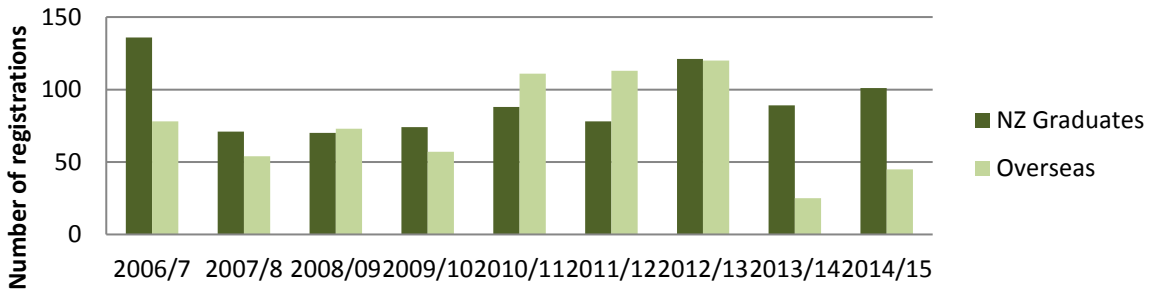



The number of NZ graduate scientist and technician versus overseas graduates are detailed below.



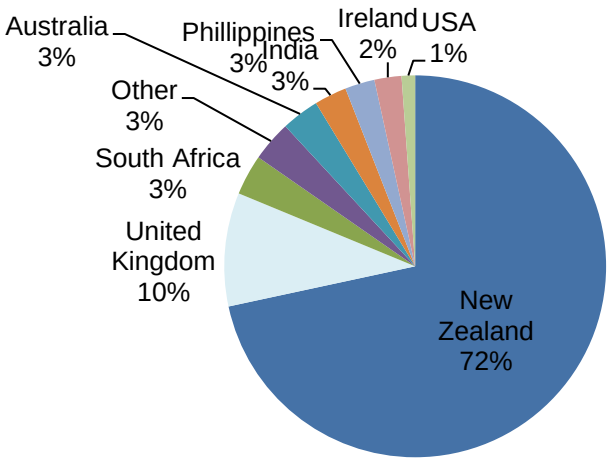
## Number of New Medical Laboratory Technician registrations

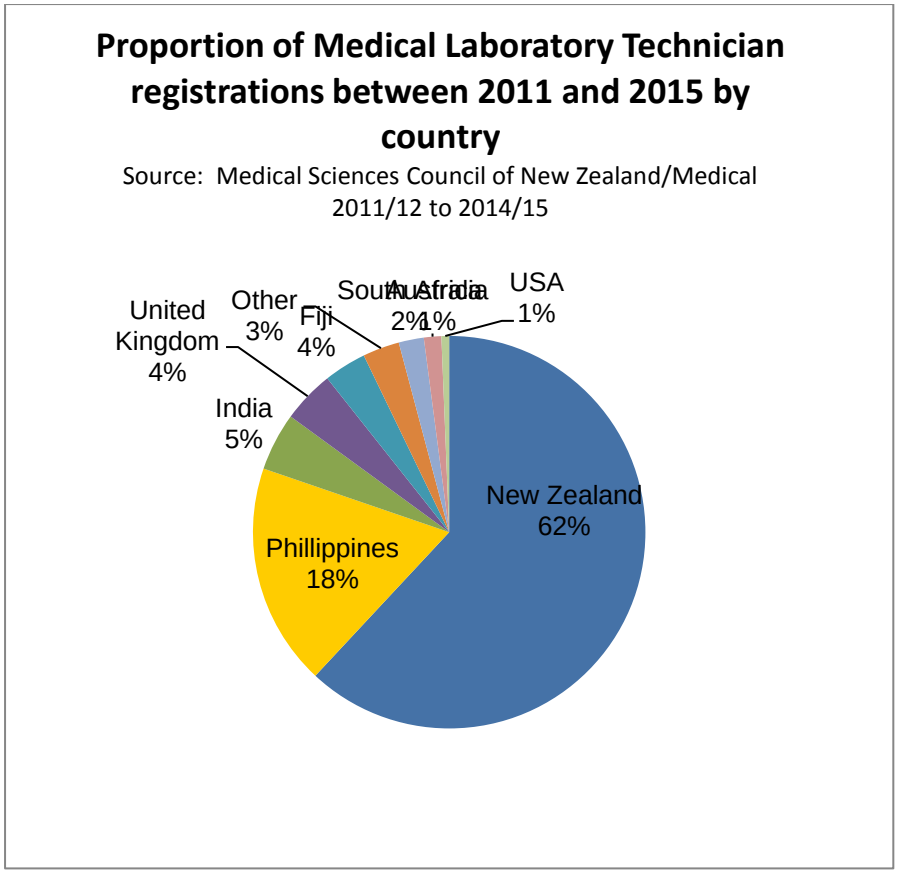
Source: Medical Sciences Council of New Zealand/Medical Laboratory Science Board Annual Reports 2004/5 to 2014/15

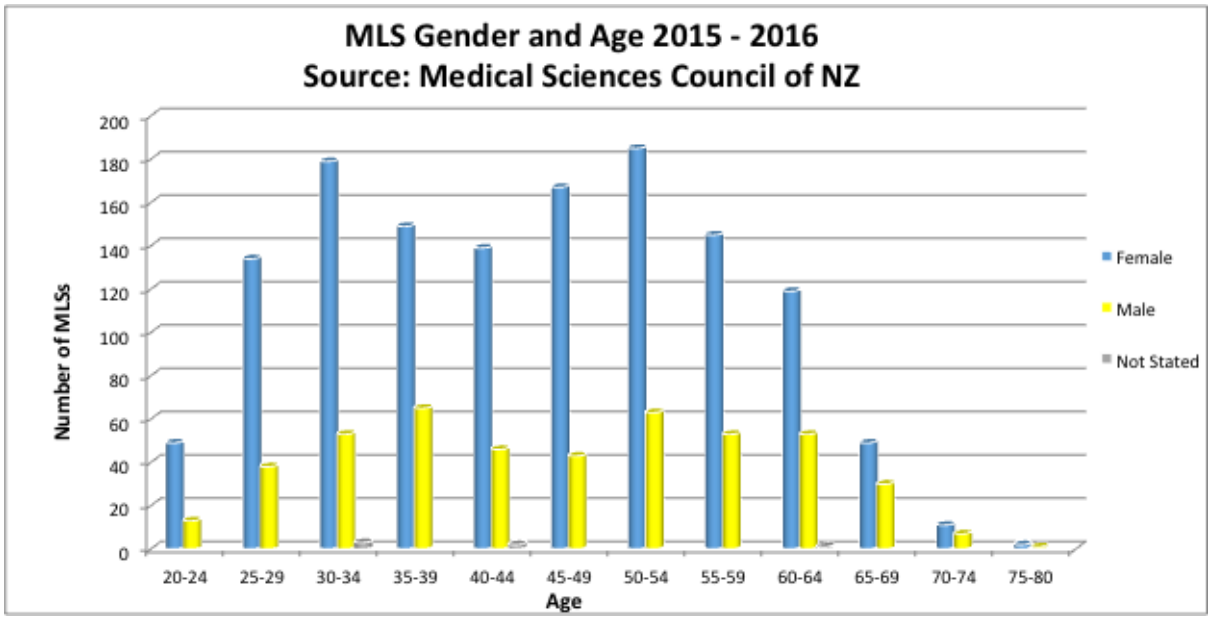


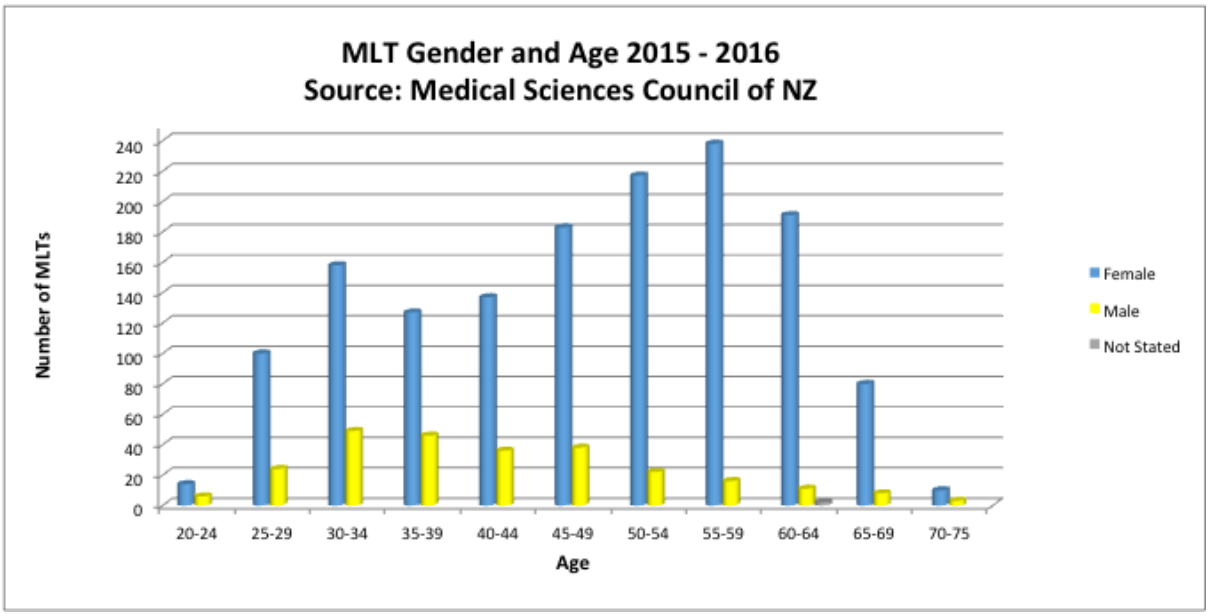

## Proportion of Medical Laboratory Scientist registrations between 2011 and 2015 by country

*Source: Medical Sciences Council of New Zealand/Medical 2011/12 to 2014/15*




Proportion of Medical Laboratory Technician registrations between 2011 and 2015 by country
Source: Medical Sciences Council of New Zealand/Medical 2011/12 to 2014/15
United Kingdom 4%
Other 3%
Fiji 4%
South Africa 2%
Australia 1%
USA 1%
India 5%
Phillippines 18%
New Zealand 62%


MLS Gender and Age 2015 - 2016
Source: Medical Sciences Council of NZ
Number of MLSs
200
180
160
140
120
100
80
60
40
20
0
20-24
25-29
30-34
35-39
40-44
45-49
50-54
55-59
60-64
65-69
70-74
75-80
Age
Female
Male
Not Stated




The intake of Bachelor Medical Laboratory Science (BMLS) students from 2011 to 2015 is detailed below.

| | Massey University | Auckland University of Technology (AUT) | Otago University |
|---|---|---|---|
| 2011 | 108 | 40 | 22 |
| 2012 | 119 | 50 | 30 |
| 2013 | 127 | 48 | 19 |
| 2014 | 114 | 60 | 33 |
| 2015 | 110 | 41 | 14 |
| 2016 | 8 | 16 | 31 |

Further information that would be helpful:

- meaningful analysis of hospital, community suppliers; and
- Employer/ownership impact on consolidation of laboratory services.

**APPENDIX TWO**

# The Future Laboratory is here

There is already a "different view" of how laboratory sciences are arranged driven from technological advances. The blood sciences as opposed to the tissue sciences for instance, suggests workforces able to manage a wider range of work in what have traditionally been seen as specific disciplines, as a direct result of the merging of technological processes.

We will see increasing need for technicians to be the main workforce running highly automated laboratory services albeit the role of scientists in management, overall supervision and quality assurance will continue. Within highly automated laboratories it is technology that is driving how work is segregated.

However at the results end of the process the analysis and interpretation will by necessity remain discipline specific: no matter how the micro result is obtained, to interpret that result will require the skills of a microbiologist (not a chemist).

**Closer to Home; direct patient engagement.**

Point of Care Testing (POCT): Changes in practise such as being closer to home and the use of community integrated services see POCT beginning to grow. This will increase rapidly as technology advances so maintaining the quality of these systems as well as interpretation of outcomes by suitably qualified personnel will be increasingly required. Desired outcomes include "closer to home", results that correlate with laboratories, piece of mind technology that is supported and checked by laboratories (with no commercial conflict of interest).

How the results are produced (technology driven) will demand a different workforce distribution from how they are interpreted and communicated. The latter will still require a high degree of discipline specific knowledge, team work between different disciplines and types of practitioners, and communication skills capable of effectively engaging with clinicians and patient directly.

For instance, in the area of cancer diagnosis, treatment and maintenance we have the spectrum of histological diagnosis of disease, companion testing, interfacing both with clinicians and with the patient who increasingly is being managed at home often in conjunction with pharmacy input and periodically in a maintenance and monitoring state.

Providing direct laboratory feedback to patients through IT portals is upon us: how we assist the patient to make best use of that information is a key element to successfully treating patients closer to home.

**Provincial and Tertiary Laboratory Services**

What will be needed in a large reference laboratory as opposed to generalist workforce in provincial setting and how both skill sets are maintained will of necessity also be different.

| **Central Lab** | vs | **Provincial lab** |
|---|---|---|
| Scientists managing the systems | | |
| Role extension for clinical scientist's | | multiskilled scientists and technicians, |
| Technicians doing the routine work | | Clinical scientists / shortage of pathologists |
| Within the systems POCT | | Point of care testing |
| Point of care testing | | |

**Work areas for throughput will be increasingly technology based with the disciplines "hung off" the technology:**

- Blood Sciences
- Tissue
- Molecular
- Infection
- Point of Care Testing

**Blood Sciences**
- Immunoassay
- Biochemistry
- Haematology / morphology / flow cytometry
- Coagulation
- Toxicology / chromatography
- Blood Bank/ Specialist Transfusion Services

**Tissue Science**
- Anatomical Pathology (histology / gynae and non-gynae cytology / EM).
- Molecular
- Forensic / coronial / perinatal pathology

**Molecular** → FISH, /cytogenetics/ non-invasive pre-natal testing/ Micro-array / Massive parallel sequencing / liner sequencing, digital PCR.

**Infectious** → bacterial and viral PCR /Automation /manual culture/ mycology/ parasitology/ emerging diseases

What follows is a breakdown of some of the factors affecting disciplines as they currently exist in our laboratory services to give an indication of the quantity and direction of change upon us.

### Microbiology

- Virology moving to micro as PCR increases and drives change
- Molecular - PCR
- Increase links to:
  - Public Health/ Infectious Disease/ Pharmacy/ Communicable disease
- Speed of disease, surveillance and responsiveness (24/7) – isolation mechanisms
- Emerging diseases, resistant bacteria, viruses
- Increased automation, increased responsiveness, TAT's especially containment/ direct patient value.
- Improved use of data and informatics

### Biochemistry and Haematology

- Increased automation
- More volume with conveyor belt technology.
- Different technology i.e. POCT, Digital Haematology
- Increased use of Mass spectrometry
- Surveillance
- What it means?
- Artificial intelligence supporting testing and diagnosis/monitoring as well as used to provide wider interpretive information.
- Process harmonisation across several disciplines

### Blood Bank

Blood Bank

- 24/7 Services
- Potentially patient blood grouping will be integrated into central robotics in 5 year horizon – Blood Bank
- Decreased demand for red cells due to improvement in blood management at point of use

Specialist Transfusion Services

- Blood collection focused on Plasma donations due to increased demand for immunoglobulins
- Stem cell harvesting, processing and storage increasing
- New products and services being requested of the Service eg serum eye drops production
- Potential to manage the Bone supply nationally, - testing and storage
- Impact of the update to the Human Tissues Act on tissue and bone activities nationally
- Changing technology for Tissue Typing and Red Cell Reference labs using genomics

- Increased need to identify pathogens in blood supply earlier and certainty of clean blood products.
- More focus on process improvement methodologies in all areas
- Pathogen inactivation technology moving mainstream to improve the safety of blood products

### Anatomical Pathology

- Increasing pressure on TAT
- Companion diagnostic testing
- Increasing work
    - ageing population
    - increase in cancer
- Increasing complex laboratory pathways
- Molecular histology (tumour genotype)
- DNA that caused the tumour – outcomes or treatment
- Digital Pathology – transmission of data visually
- FNA's - assessing quality of material taken, rapid assessment of material for frozen sections etc.

### Cytology

- Decrease in gynae cytology, transition of staff from gynae to non gynae
- Increase in non gynae cytology (cancer, FNA) but overall decrease in staffing requirement
- Increase in Digital Pathology
- Scientists developing more expert skills doing tasks previously performed by Pathologists

### IT Capability

- Robotics – will they replace technicians or increase the number of technicians required.
- Increasing knowledge – increased number of scientists required.
- Increasing patient knowledge and interaction.
- Use of information – our product is information (vs data)/ interpretation / patient focussed and interfacing with patients and clinicians.

### Emerging Disease

- Change in population
- Older population
- Increase in diseases e.g. Haemogloginopathies.
- Increase in non-invasive pre-natal testing (for downs, genetic disorders)