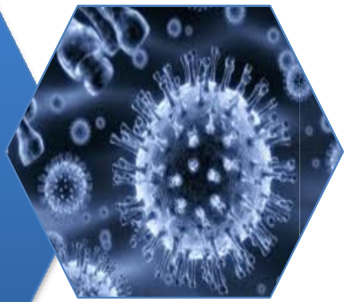
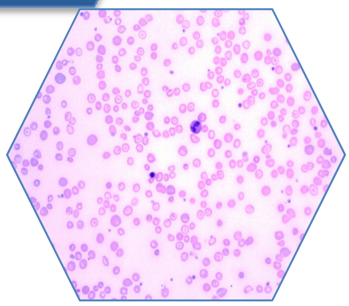
# Career Structures and Pathways for the Scientific Workforce in Medical Pathology Laboratories



July 2011

Final Project Report



Prepared for the Australian Government's Department of Health and Ageing

Human Capital Alliance

*Human capital specialists*

## Final project report preparation and format

This Final project report has been prepared by Human Capital Alliance (International) Pty Ltd for the Department of Health and Ageing. The Final Project Report includes the revised Discussion Paper (the final report deliverable under the project after the stakeholders' workshop held in June 2011) and includes the Information Paper (the first project deliverable) and a separate Labour Market Analysis report as appendices, thereby assembling all project reports within the same document.



## Disclaimer

## Acknowledgements

We acknowledge this country as belonging to the Aboriginal and Torres Strait Islander peoples of Australia. Australia is the only place in the world where Aboriginal and Torres Strait Islander Australians belong. There is no place in Australia where this is not true.

In addition, HCA wish to acknowledge and thank Departmental staff who commented on several drafts of the project reports. A number of other industry and relevant professional association stakeholders also contributed through documentation, networking on behalf of HCA and sound knowledge and advice through personal communication. In particular the members of the Project Reference Group were most helpful. The Group included representatives from:

Australasian Association of Clinical Biochemists

Australian Institute of Medical Scientists

Royal College of Pathologists of Australasia – Faculty of Science

Human Genetics Society of Australasia

Australian and New Zealand Society of Blood Transfusion

Australian Society of Cytology Inc.

Haematology Society of Australia and New Zealand

Australasian Society of Clinical Immunology and Allergy

Australian Society for Microbiology

Department of Health & Ageing

Dr Peter Flett was included on the Group to provide a specific workforce planning perspective.

The Endocrine Society of Australia and the Fertility Society of Australia[1] participated in the first meeting of the Project Reference Group, as invited, and made a valuable contribution. However, both societies subsequently chose to withdraw from the Project Reference Group for the remainder of the project because they felt the project was of less relevance to their constituents at this point in time.

[1] In the initial PRG meeting a distinction was made between the work done by members of the Fertility Society of Australia whose scientists are working to produce an embryo as a *living being* in comparison to the remainder of the scientific workforce in medical pathology laboratories who are generally working with pathology samples or specimens relating to *disease*.

# Contents

# Executive Summary

Human Capital Alliance (HCA) was commissioned by the Department of Health and Ageing (DoHA) to undertake the *Career Structures and Pathways for the Scientific Workforce in Medical Pathology Laboratories project*. The objective of this project was to provide an understanding of current and future workforce requirements and the appropriateness and adequacy of current supply strategies, and to investigate options to promote workforce retention especially through career pathways development for the scientific workforce in medical pathology laboratories. The medical pathology laboratory scientific workforce is defined as including senior scientists, medical laboratory scientists, medical laboratory technicians and laboratory assistants although individuals within each workforce grouping may hold job titles that vary somewhat from these specific occupational titles.

In recent years industry stakeholders have begun to voice concerns about the way work is organised in medical pathology laboratories in Australia due to a fragmented labour market in which several markedly different markets support different career frameworks. Most notable differences are between 'public' and 'private' markets; 'rural' and 'urban' markets; and markets in different jurisdictions. Many of the differences in the Australian scientific workforce in medical pathology laboratories career frameworks are able to be attributed to (or consolidated by) prevailing industrial arrangements. Accordingly, an investigation of relevant awards and enterprise bargaining agreements was undertaken and reported on in Section 4 of this Final Project Report.

The most popular approach to modifying career frameworks within the scientific workforce in medical pathology laboratories overseas has been to seek to 'extend' pathways for the professional component of the workforce. The flag bearer overseas for advanced and extended practice has been certain States in the USA and Canada. There has been a push in the USA for the development of laboratory scientists into the domain of clinicians, gradually supplementing (or augmenting) the supply of pathologist labour. In the USA occupational titles such as 'clinical laboratory scientist' or 'clinical doctorate in laboratory sciences' and in Canada the 'pathologist assistant' have emerged while in the UK the terms 'clinical scientist' or 'consultant clinical scientist' have been promoted.

The most complete and compelling career structure model for the scientific workforce in medical pathology laboratories has been developed and implemented in the UK. There, a career framework has been constructed specifically for the healthcare scientist that provides an important reference for this project. It is built on the concept of skills escalation and offering flexible career opportunities to meet workforce service and individual needs.

The UK framework aims to:

- introduce an integrated career framework encompassing all disciplines and employment groups within the workforce based on roles and function and linked to transferable skills and competencies;
- clearly identify pathways for progression and transfer, supported by learning and development providing enhanced opportunities; and

- provide national consistency and maximum flexibility to support local service delivery, the expansion and extension of current roles; and the emergence of new roles.

Some of the elements and principles of emerging overseas career frameworks are beginning to find expression in more recently constructed industrial arrangements in Australia (particularly for public sector employees in Queensland and Western Australia), although there is significant scope still for innovation and change elsewhere and even in the areas mentioned.

Significant stakeholder input to this project has been analysed and the 'findings' gathered into 'themes' in the Final Project Report, where effort is made to capture and express the 'major issues' common to discussions across stakeholder groups in many different forms (focus group discussions, employer interviews, key informant interviews, case studies, etc.). Where possible and appropriate, evidence from other sources (secondary data analysis, literature review) that supports (or disputes) the central message of the 'theme' is introduced.

The 'themes' which are explored in this Final Project Report include:

- workforce boundaries around the medical pathology scientist workforce, and within the workforce between assistants, technicians and scientists and between different disciplines;
- apparent labour market conditions and the possibility of segmented labour markets that behave in different ways — from which there are implications for new graduate supply, preferred training providers and preferred career structures to foster early careers;
- potential deskilling of certain labour markets as a result of centralisation of testing processes (for instance arguably rural and some 'branch' private sector laboratories are most affected);
- use of competencies as a means of understanding skill and knowledge versus qualifications and how these might better underpin a range of human resource decisions;
- some aspects of scientist workforce behaviour that are impacting on available supply and have implications for career frameworks, such as perceived high turnover of scientists at specific career levels and durations, including those associated with scientists' progression beyond the first 5-7 years in employment and barriers to entry to senior scientist levels;
- limited pool of 'middle level' scientists able to progress easily to senior scientist roles as it is expected that large numbers of senior scientists will (shortly) reach retirement age and exit the workforce;
- varied possible pathways to senior scientist levels but in most cases there is an implicit requirement or specific commitment to *management* development. This might be unattractive for many scientists potentially interested in senior scientist careers;
- support for *Clinical* senior scientist roles where such roles can be defined and particularly in disciplines in which pathologist numbers and influence are low; and
- a range of career structure possibilities that have been already explored by employers or provided by persons thinking about the issue.

Each of these issues is explored, primarily from the perspective of meaning for career frameworks, how current structures might be limiting or problematic or even be contributing to how issues are expressed. How alternative career structures might deliver better workforce outcomes is explored.

A number of principles for any career framework for the medical pathology laboratory science workforce (and there may be more than one to accommodate the different labour market and organisational structural contexts) are able to be elicited from the 'themes based' findings. In summary, these are:

- ***comprehensiveness*** – all components of the workforce (at least laboratory assistants, laboratory technicians, medical scientists and senior scientists) should be included within a career framework;
- ***competency based processes to support career framework structures and judgements*** — more objective and transparent decision making around work allocation to staff categories, transition from education to work, progression through pay levels and promotion to higher levels of work / positions through use of competency standards;
- ***clear articulation of career pathways*** — the processes of progression and promotion must be absolutely transparent and not subject to discretionary judgements; and
- ***ample learning opportunities*** — structured learning experiences gained on the job are the most efficient and effective.

To proceed further from this Final Project Report, and begin to actualise the career framework vision it offers for the medical pathology scientist workforce, requires it seems several fairly immediate actions followed by longer term strategic actions. The following actions, broadly nominated in an order of potential commencement, are suggested:

## *Making better use of competency standards*

As noted previously, much work has been undertaken to create and maintain a set of competency standards for the scientific workforce in medical pathology laboratories by the Pathology Associations Council (see Theme 7). These competency standards have been tested repeatedly and not found wanting. They represent an under-utilised resource for improving the development, management and assessment of the medical science workforce. The following actions provide pathways for use of the competency standards.

**Action 1**: **Review current industrial arrangements** — as part of this study a preliminary examination of relevant industrial arrangements (awards and enterprise agreements) was undertaken, primarily to understand current Australian approaches to career frameworks, the level and type of variation, and to identify any patterns in the structure of industrial arrangements.

A more comprehensive audit of individual industrial arrangements would be appropriate to assess each arrangement against the principles outlined earlier that would underpin an innovative career framework and to identify elements of current arrangements that could or should be more widely incorporated into awards and agreements.

The review would be followed by the development of a *competency based template for industrial arrangements* that could be used by industrial relations parties to guide new award or agreement negotiations.

**Action 2: Supporting the wider use of competencies within the workforce** – in addition to formal industrial arrangements, development of other exemplar documentation could assist employers to use competency standards much more widely to guide or underpin a range human resources practices. This could include the following areas:

- templates that use competencies to underpin objective based career progression and promotion to higher graded roles;
- job description templates that clarify and define roles based on WORK to be performed and the competencies required to perform the work to an acceptable standard; and
- development of a skills mix guidance template for a range of common work areas or broader laboratory type situations. A skills mix guide (or many guides for different work situations) might be an important aide to NATA.

## *Gaining a thorough understanding of the labour market in conjunction with HWA*

A greater understanding of workforce size and other supply and demand variables in order to undertake labour market analysis is required. Some useful work may be completed prior to enlisting the support of Health Workforce Australia (HWA) to develop this understanding. Initially some data clarification steps could be taken to seek a remedy for the most compelling obstacles to labour market analysis (Action 3) to pave the way for HWA to explore a more complete methodology for understanding demand (Action 4) and then to conduct a traditional labour market analysis (Action 5).

**Action 3**: **Explore and assess the feasibility of different approaches to build current data on workforce numbers and skill mix** - As noted in the separate report describing the workforce (see Appendix B), data crucial for the conduct of medical pathology laboratory workforce planning is unavailable or untrustworthy. Arguably, since it affects all other workforce calculations and projections, the most critical data problem is the estimate of workforce size. In this study wildly varying estimates of the workforce size have been presented, none of which at this time promotes great confidence. It is suggested that the following actions be undertaken:

- Since another Population Census is close (this year) work with ABS to ensure the coding of persons who fit legitimately within the boundaries of the medical pathology laboratory scientist workforce is essential. It is assumed that work on the ANZSCO codes (and descriptors) themselves might be too late, however if this was possible then an even better result might be conjured from the Census data.
- A feasibility study of Medicare Australia [again] collecting data on the types of laboratory staff employed in medical pathology laboratories on the *Application for approval of premises as an accredited pathology laboratory (Section 23 DN, Health Insurance Act, 1973)* form. A practicable approach to processing data collected by Medicare Australia into information needs to be developed; and,
- NATA could be approached to collect (or ensure employers collect) data on the types of laboratory staff employed in medical pathology laboratories during their accreditation processes. Again the feasibility of this

course of action needs to be assessed and realistic processes for it to happen designed and provided to NATA to implement.

**Action 4: Build data on service / labour demand** —The other problem area for data is in relation to labour demand. Secondary data sources such as Medicare Benefits Schedule (MBS) data as a measure of trends in demand for private practice labour can be explored in more detail, notwithstanding this source being challenged by stakeholders for a range of reasons ('coning' practices, private billing, unreported non MBS tests, etc.). Similarly, public sector utilisation data can be collected, and despite the current lack of consolidated service utilisation data from the public sector, this seems not to be a significant problem. Some interesting studies have been undertaken around growth in demand at least for MBS item services (e.g. Britt, 2008), however these studies are complicated by the rapidly changing nature of the testing environment itself, making relationships between service volume and labour requirements difficult to draw, especially into the future.

Ideally secondary data sources would only be used to provide a 'support' picture for a more precise understanding of labour demand generated from the capture of primary data. The latter data would be generated by 'ground up' collection of data from an intelligent sample of medical pathology laboratory services. Since there are only approximately 130 employers in Australia, a thorough case study approach to a sample of carefully selected (representative) employer cases, based on the need to extrapolate the data to the entire industry, would make sense. This approach would generate estimates of demand that could be tested against estimates derived from secondary data, but more importantly would generate a more realistic sense of the future based on the likely decisions of many employers within the market.

**Action 5**: **Undertake labour market analysis** — Again for this project much of the ground work for a formal and traditional workforce planning exercise was completed, the results of which are reported in Appendix B. In Section 6 Theme 3 some qualitative analysis of the labour market was detailed, with views expressed on the possible state of various labour market segments.

Ideally, projected labour market analysis would be undertaken on the market segments (e.g. public / private / not for profit; urban / rural) and a national picture developed by aggregating the segments. The rapidly changing and uncertain technology environment lends itself to 'future search' methodologies.

## Improve structured training and clinical practice

Apart from entry level (undergraduate) training into medical laboratory scientist roles, which is largely (though not exclusively) governed by AIMS accreditation processes, training for other roles in the medical pathology laboratory science workforce is often unstructured and informal. There are several points in the proposed career framework model (see Figure 8) where more highly structured and formal, on and off-the-job and competency based training is suggested.

**Action 6**: **Support structured training for senior scientists** — The most critical area of investment in structured training proposed in the short term is preparation for advanced practice (senior scientist), a registrar type training post. While such a training post does not yet exist in Australia (although in WA a Masters level postgraduate course has been constructed through a partnership between PathWest and the University of WA that is claimed to be very close to a registrar post), appropriate models to copy have been well established in the UK and North America.

It seems unlikely that industry (especially the private sector) in the first instance would provide financial support for registrar positions, and so significant government subsidy for such positions seems inevitable for them to eventuate. State and Territory Governments might see the wisdom of this course of action similar to the thinking behind the WA Government initiative — the vast majority of registrar posts for advanced medical training are currently so supported.

Additionally (or alternatively), the Commonwealth Government and / or HWA may be interested to support developments in this area as an extension of a broader role in support of expanding clinical practice training for a range of health professions (a COAG initiative being implemented through HWA). Clearly also, the ambitions of HWA in health workforce innovation and reform, in particular to develop health workforce models to support new models of healthcare delivery, can be rapidly actualised in the medical pathology laboratory services area through a comparatively modest investment in a reasonable number of registrar posts.

**Action 7: Clinical practice for new graduate scientists** — In cases where the undergraduate medical laboratory science course includes a significant 'built in' practical component, for example like the RMIT course, there is a seemingly good relationship between trainees and employment. However where courses have limited and a widely considered insufficient practical component, it is considered advantageous to employ graduates initially in a 'graduate trainee' program.

Third party support of 'graduate trainee' programs would be contentious. For many health professions there is a long tradition of support for 'graduate trainee' processes (e.g. internships for medical practitioners, traineeships for nurses and physiotherapists, preceptorships for pharmacists, etc.). A precedent for a similar such intervention for medical pathology laboratory scientists has recently been established in QLD Health. However it could be argued that these positions and programs have always been the responsibility of employers, since they are the immediate beneficiaries, and they have supported them in the past.

It would seem valuable to explore further the way medical laboratory science undergraduate courses are likely to evolve in the future and the extent to which the RMIT professional practice year model will copied by other AIMS accredited course providers, thus arguably obviating the need for traineeship posts. If this type of course evolution though is not likely, ways of introducing more structured and uniform (and equitable) *education to work transition* processes across the labour market segments might need to be canvassed.

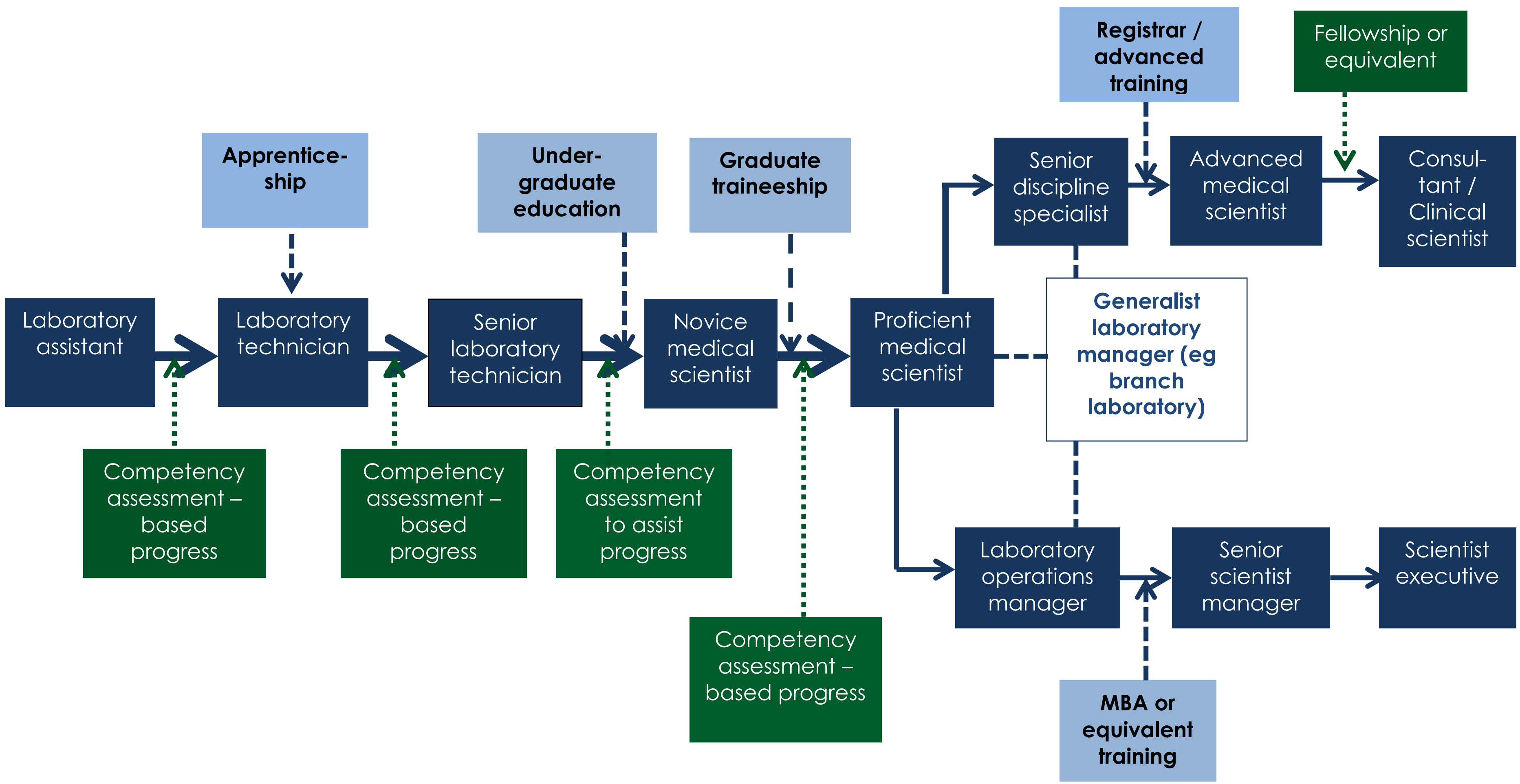
Investment in structured training of the professional workforce, particularly at the senior scientist level, will have a powerful effect on the career framework for the medical science workforce. In pursuit of reform at the 'top end' of the career path, it might be easy to neglect the shortcomings in training at the assistant and technician level. And yet, for the future quality of medical pathology laboratory services one could argue investment at this level is equally if not of greater importance.

> **Action 8: Training of technicians** — Apprenticeships and traineeships for aspiring laboratory technicians and assistants, which result in VET qualifications from largely on-the-job training processes, are strongly favoured by employers in some quarters. This is especially so in rural areas where identifying and training the workforce *locally* is perceived to alleviate workforce shortages.
>
> There is a range of VET courses specifically designed to prepare workers for support level roles in laboratories, although not specifically for medical pathology laboratories. Investigation of the NCVER graduate outcomes data for these courses could provide a better understanding of the actual, current market share of graduates from appropriate VET courses / qualifications that enter the medical laboratory workforce. It is anticipated that the actual 'market share' from these course for medical laboratories is in fact low and attempts could be made to talk with the VET sector and pathology laboratory employers to increase their uptake by offering apprenticeships and traineeships. An advantage of this is that training would then automatically become more specific to the pathology laboratory setting as well as increasing the supply from this source.
>
> Fortuitously funding for these apprenticeships might be possible from the education and training system, but a strong case would need to be developed and each State Training Authority approached (possibly with the same business case).

No doubt other actions could be envisaged, but these actions may begin to shift the medical pathology laboratory workforce at an accelerating rate towards adopting and implementing new career framework models that act to inspire, encourage and invigorate a future generation of medical pathology laboratory assistants, technicians and scientists.

A draft career framework that satisfies the principles set out in this Final Project Report and which borrows appropriately from overseas frameworks and emerging Australian thinking is proposed (see Section 7) as follows:

**Outline of possible career framework for the scientific workforce in medical pathology laboratories**



# Section 1: Background

Human Capital Alliance (HCA) has been commissioned by the Department of Health and Ageing (DoHA) to undertake the *Career Structures and Pathways for the Scientific Workforce in Medical Pathology Laboratories project*.

The objective of this project was to provide an understanding of current and future workforce requirements and the appropriateness and adequacy of current supply strategies, and to investigate options to promote workforce retention especially through career pathways development for the scientific workforce in medical pathology laboratories. The latter task is the primary focus of this Final Project Report which, along with the previous Information Paper (see Appendix A), has both focused on the need for new career frameworks and how they might be structured.

The scientific workforce is defined as including senior scientists, medical laboratory scientists, medical laboratory technicians and laboratory assistants although individuals within each workforce grouping may hold titles that vary somewhat from these specific titles.

As noted above, this Final Project Report is the second deliverable to the Project Reference Group. It aims to present the findings of data collection and analysis processes together with a concluding discussion around implications for a career framework for the scientific workforce in medical pathology laboratories. The Final Project Report includes:

- a brief overview of the methodology and actual consultancy research activities;
- a summary of issues raised in the previously released Information Paper;
- analysis of feedback and comments received through stakeholder submissions, meetings held with stakeholder groups and employer organisations and selected secondary data. This analysis is organised into a number of workforce themes, all of which have direct relevance to the need for revised thinking on career frameworks or suggest ways forward for such frameworks; and
- concluding discussion around implications for a career framework for the scientific workforce in medical pathology laboratories.

The outcomes of analysis of secondary data to describe current and future medical pathology laboratory workforce supply and demand is published as Appendix B to this Final Project Report.

# Section 2: Summary description of methodology

The method used for this project, in terms of the activities undertaken, is outlined in Figure 1 below.

**Figure 1: Overview of method / activities for the project**

Step 1
- Conduct one day workshop with Project Reference Group

Step 2
- Collect & analyse secondary data

Step 3
- Review international literature & documentation
- Prepare Information paper

Step 4
- Invite written submissions from selected stakeholders

Step 5
- Analyse secondary data sources to create estimates of future supply & demand

Step 6
- Undertake extensive stakeholder consultations

Step 7
- Conduct case studies with 20 employers of the medical pathology science workforce to better understand career pathway options

Step 8
- Synthesise project findings through desk analysis
- Conduct final one day workshop with the Project Reference Group

Step 9
- Draft and submit final report after accepting suggestions for modification and editing to publishable standard

The way in which each project activity was carried out is described in greater detail below.

### Step 1: Initial project reference group workshop

On the 24th of November 2010 shortly after the project commenced a one day workshop was conducted with all (12) members of the Project Reference Group (PRG), DoHA's project monitoring team and HCA.

The workshop commenced with opening and introductions by the Department, followed by a power point presentation and overview of the project and draft project plan by HCA. The discussion was then opened up to each of the members of the PRG to give a brief description of their association and relevant workforce issues and concerns as well as to identify their priority concerns. In no particular order of importance, the priorities identified were as follows:

- role delineation between types of laboratory scientist workforce categories;
- consider remuneration;
- career progression / framework options (including technicians);
- how to make it an attractive profession;
- emerging technology and its influence on demand;
- how to address the upcoming shortages;
- understanding of the breadth of difference between the workforce groups and how they will be affected by upcoming shortages;
- how to influence TAFE about aspects of quality in regard to VET level training, along with content and the number of graduates;
- well described workforce able to engage with each other, funding implications, what must be taken into account and the largest barriers ( from the Commonwealth); and
- description of what workforce supply we have now and what we will have in 3-5 years.

At the end of these discussions each scientific workforce group was invited to provide further information, documentation, and literature or comment as they wished.

As a follow up to the workshop attendees were sent a request for feedback on relevant and available literature, current association membership numbers and some information on membership coverage, and arrangement options for stakeholder consultations. All PRG members responded and provided the requested information. This initial workshop set the tone for the project and clearly defined its priorities, objectives and required outcomes.

### Step 2: Collect & analyse secondary data

In carrying out step 2 extensive secondary data was collected, collated and analysed. Table 1 below provides a brief overview of the data sets used to inform this stage of the project.

**Table 1: Secondary data sources gathered and analysed**

| Data source | Information provided |
|---|---|
| ABS (Australian Bureau of Statistics) | Number of employed persons in occupation codes ANZSCO (Australian & New Zealand Standard Classification of Occupations) 06-234611 and 311213 by age, gender, hours worked and level of highest educational attainment |
| Association membership data | Current membership number, percentage of total workforce covered by membership numbers, overlap of membership with other association included in the study and trend membership data going back 5 years |
| DEEWR | Commencements, enrolment and completions of AIMS accredited and related courses in Australian universities. Recent trends and projected supply of newly qualified graduates. Estimation of the number of commencements required to meet future demand under various scenarios. Demographic characteristics of people undertaking and completing medical science courses |
| University data from AIMS accredited course providers[2] | 2010 enrolments by year 1-3(4), graduations 2009-2005 and projected enrolments 2011-2015 |
| NCVER | Patterns of enrolment and completions of relevant VET courses potentially leading to employment as technical officers and laboratory assistants |
| DIAC & AIMS | Data on overseas arrivals and departures, skilled migration, temporary migration (Visa 457) and onshore visa applications, information on the net gain to Australia of medical scientists |
| MBS | Demand for medical pathology service trends all item numbers associated with pathology services from 2005/06 financial year to 2009/10 |
| NPAAC & URBIS survey | Various workforce trends, participation rates, numbers, and distribution |

[2] Data collected by HCA from relevant schools

**Step 3: Review international literature & documentation & Prepare Information paper**

In satisfying the requirements of step 3 an extensive search for relevant literature was undertaken looking at literature from Australia, New Zealand, the USA, Canada and the UK and further steps were taken to obtain literature from the USA and Canada through personal contact with key informants identified by the Department, PRG members and the HCA team.

The literature search was built around existing documentation already gathered by the Department, the consultant or PRG members. This was supplemented by an extensive search of the web and relevant abstract databases. The databases that were interrogated were:

- Medline, PubMed electronic databases;
- internet search engines (Google Scholar, Scirus);
- internet sites of State Governments in Australia; and
- citation checking.

Set out in Table 2 below is the search criteria for the literature review.

**Table 2: Literature search criteria**

| Search terms | | |
|---|---|---|
| **Workforce** | **Human resource issues** | **Service settings** |
| Medical scientist | Work organisation | Pathology |
| Clinical scientist | Career development / progress | Laboratory |
| Technician | Education & training | Research |
| Technologist | Supply / Demand | Urban – rural service location |
| Assistant | Role delineation | |

The review of the literature attempted to differentiate between different types of literature reflecting research studies of reasonable scientific method and articles that enhanced the understanding of current practices, offered viewpoints of specialists in the field (e.g. editorials and commentaries) and reports on surveys of opinion.

The literature gathered provided data on levels of medical pathology laboratory workforce but was poor in regard to career frameworks in certain overseas countries and provided limited comment on trends in specialist activity. The findings of the literature review were first reported in the Information Paper.

**Step 4: Invite written submissions from selected stakeholders**

Following acceptance by the Department and the PRG of the Information Paper it was published on DoHA's website for all interested stakeholders to read and provide comment. The Information Paper was also provided to all attendees at the focus groups, employer interviews and case studies prior to their consultation with HCA. The purpose of the Information Paper was to inform these consultations processes and elements were discussed during these consultations.

All attendees of any of the consultation processes for this project were invited to submit a written submission to the HCA project team if they so desired.

**Step 5: Analysis of secondary data sources to create estimates of future supply & demand**

Step 5 was largely a continuation of step 3, except at this stage of the project more extensive analysis of future supply and demand labour markets was explored. As noted in Section 1, the labour market analysis component of the consultancy project became a less compelling objective and in any case proved difficult to complete using classic modelling approaches without some further original data collection. The findings of the labour market analysis actually undertaken though are reported in summary in this Final Project Report at Appendix B.

**Step 6: Undertake extensive stakeholder consultations**

Over the first four months of the project (January to April) extensive stakeholder consultations in the form of focus groups forums (13), case studies (17) and employer interviews (6) were undertaken. These stakeholder consultations generated significant interest in the project and provided an enormous amount of feedback, insight and qualitative data to be considered together with the findings of the project. These direct consultations were further supported by email submissions (21), completed feedback/survey forms by individuals who had attended a focus group forum (10)[3] and numerous phone calls and in person interviews.

Table 3 below illustrates the size and place of focus group consultations. These consultations were not limited to attendance by the hosting organisation's employees only and efforts were made through professional associations to invite broad participation.

[3] Because of the large numbers at some focus group discussions some participants felt they could not give voice to their issues. Hence they were afforded a further opportunity to contribute in writing.

**Table 3: List of focus group consultations by location and number of participants**

| Location | Participants |
|---|---|
| NSW - hosted at the Clinical Sciences Building, Concord Hospital 7 March 2011 | 81 |
| SA - hosted at the Rieger Building 11 March 2011 | 39 |
| QLD - hosted at Sullivan Nicolaides Pathology 14 March 2011 | 39 |
| WA - hosted at Path West 15 March 2011 | 21 |
| ACT - hosted at ACT Pathology 18 March 2011 | 18 |
| Senior scientists teleconference 21 March 2011 | 9 |
| VIC - hosted at Royal Melbourne Hospital 22 March 2011 | 47 |
| Fertility Society of Australia - hosted at University of Melbourne 23 March 2011 | 13 |
| Cytology - hosted at the Victorian Cytology Service 24 March 2011 | 6 |
| TAS - hosted at Royal Hobart Hospital 28 March 2011 | 13 |
| Rural & remote scientists teleconference 30 March 2011 | 9 |
| Young scientists teleconference 31 March 2011 | 11 |
| NT - hosted at Royal Darwin Hospital 5$^{th}$ of April 2011 | 11 |

The 17 case studies were undertaken in all States and Territories as follows:

**Table 4: List of case study locations**

| Jurisdiction | Number of case studies |
|---|---|
| ACT | 1 |
| NSW | 5 |
| NT | 3 |
| QLD | 1 |
| SA | 1 |
| TAS | 2 |
| VIC | 2 |
| WA | 2 |

Most of the case studies were public sector employers (8), although several private sector (6) and not for profit (3) service employers also participated in the study. As might be expected, most of the case study employers were located in metropolitan areas although nearly half (48%) had branches in rural and even remote areas.

The medical pathology laboratory scientific workforce included in the scope of this study was hugely supportive of this project and continued to participate throughout each step of the project.

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Identified above as part of a broad consultation effort, the case studies collected quantitative and qualitative data to allow an understanding to be gained of:

a.) how work is done;
b.) how many persons the work requires;
c.) what types of personnel are required (skills mix);
d.) how this personnel is deployed and supervised;
e.) the organisational structures;
f.) industrial arrangements;
g.) job classifications/job descriptions;
h.) recruitment processes; and
i.) career structure / progression approaches.

Data gained through the stakeholder consultations was entered into an ACCESS data base. De-identified findings are reported in the Final Project Report and its Appendices.

During the case study data collection **job descriptions** were collected. Forty eight job descriptions were collected and entered into an ACCESS data base, de-identified and analysed for commonalities in remuneration levels, competency and academic requirements. The findings of this analysis are reported in the Final Project Report and its Appendices. The types of job descriptions collected are as follows:

**Table 5: Frequency of job description positions**

| Type of position | Frequency of Type of position |
|---|---|
| Assistant | 9 |
| Technician | 7 |
| Senior Technician | 4 |
| Junior Scientist | 11 |
| Mid-Level Scientist | 9 |
| Senior Scientist | 8 |

**A review of award structures** was also undertaken and is also beyond the original project planning and scope but was seen as adding significant value to the project. Award structures from various states were collected and analysed for similarities and compatibilities with special attention paid to pros and cons of each in regard to potential career frameworks. The findings of the review of award structures are reported in the Final Project Report and its Appendices.

**Step 8: Synthesis of project findings through desk analysis and final one day workshop with the Project Reference Group**

The Project Reference Group, the Department and HCA met to workshop the full project activities undertaken, methodologies applied, findings generated and resultant products developed (Information Paper and Discussion Paper) as well as setting the parameters and requirements for the Final Project Report.

**Step 9: Draft and submit final report after accepting suggestions for modification and editing to publishable standard**

The project concluded according to schedule by the end of June 2011.

# Section 3: Workforce composition

In order to describe or enumerate any workforce, it is important to clarify what is being counted. For many workforces these boundaries are easily set with registration requirements. However, in the medical pathology laboratories scientific workforce there is no registration requirement and only broad guidelines and general conventions govern employment decisions. The workforce is characterised by multiple job titles and multiple skill levels.

In this context, what makes sense is to study those parts of the medical laboratory science workforce that (a) contributes in the most critical way to the outcomes of the work, (b) are the most closely related and potentially interchangeable forms of labour, and (c) are the most difficult forms of workforce to develop. The Department and the PRG have essentially designated the following workforce categories as fitting the above criteria:

- Specialist pathologists – medical graduates with an additional five years specialist study and training to become expert in the use of laboratory tests to diagnose and treat disease. All pathologists have the role of interpreting the laboratory findings in a clinical context.
- Medical laboratory scientists – generally graduates (although many of the older scientists have honed their skills on the job from lesser initial qualifications) with specific training in medical laboratory science and experience in testing in at least one of the disciplines of pathology.
- Technical officers or medical laboratory technicians – are workers with two years' post-high school training to the Certificate IV or Associate Diploma levels. Although they work under the direction of a medical laboratory scientist, they are able to do most routine work in the laboratory.
- Laboratory assistants – are workers with no formal training other than that provided within the laboratory to meet specific needs.

From the above list, the specialist pathologists are excluded since they have been studied elsewhere (e.g. AMWAC, 2003) and are considered separately to this study as they belong to the broader medical specialist workforce[4].

[4] One could easily argue the other way that the medical pathologist workforce cannot be considered in isolation especially from medical scientists, and especially when attempting to understand and estimate workforce demand. Boundaries are inevitably arbitrary though and ultimately determined on varying forms of logic. In any case, even though specialist pathologists are excluded from this study's definition of the scientific workforce in medical pathology laboratories, it will be important to understand the role of pathologist as it impacts on the supply of and demand for the workforce that is defined for this project. Recent pathologist workforce studies have identified a severe shortage of pathologists in Australia. This shortage is driving work that in the past may have been performed by a pathologist into the role of scientists. For instance, the bulk of chemical tests are now analysed and reported independent of pathologists and even in anatomical pathology increasing amounts of the 'work up' of tissue samples is being undertaken by scientists. This has a flow on effect to other parts of the medical laboratory science workforce.

Within the boundaries determined for this study of scientific workforce in medical pathology laboratories the following occupational categories (in proportion size) are included:

- Senior medical laboratory scientists[5] (3.6% of the total estimated number in the medical pathology scientists workforce[6]);
- Medical laboratory scientists (50.0%);
- Medical laboratory technicians (21.4%); and
- Laboratory assistants (25.0%).

Urbis (2011) estimated the total size of the medical pathology laboratory scientist workforce (extrapolating from a survey response rate of 22% of total employers) to be 13,022. They estimated the size of the scientist only workforce to be 6,992. This is a significantly lower estimate of the total workforce than that able to be constructed from ABS Population Census data. In the 2006 Census ABS coded (and therefore counted) a total of 13607 persons who worked at least one hour in the week prior to the Census as a medical laboratory scientist (Australian & New Zealand Standard Classification of Occupations [ANZSCO] code 234611) — more than double the Urbis estimate.

While both estimates need to be accepted with some caution, the stakeholders consulted through this project would probably favour the Urbis report estimate[7]. Stakeholders repeatedly questioned the ABS estimates and argued that other forms of (non pathology laboratory) medical scientists were possibly inflating the ANZSCO code 234611count, partly the result of self report problems and partly because of the inclusion of the research laboratory workforce. The ANZSCO description for Code 234611 (see box) seems quite clear though and unlikely to produce coding errors[8].

**MEDICAL LABORATORY SCIENTISTS** (ANZSCO 234611) conduct medical laboratory tests to assist in the diagnosis, treatment and prevention of disease.
Tasks Include:

- preparing tissue sections for microscopic examination
- examining and analysing samples to study the effects of microbial infections
- analysing samples of body tissue and fluids to develop techniques to aid in the diagnosis and treatment of diseases
- advising Medical Practitioners on the interpretation of tests and methods for use in the diagnosis and treatment of disease
- setting up the steps and rules of laboratory medical testing
- operating and maintaining laboratory equipment
- maintaining laboratory quality assurance and safety standards
- preparing scientific papers and reports

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[5] As defined by NPAAC (2007) and based on the definition included in the Health Insurance Act 1973

[6] This data obtained from the employer survey data of the National 'Survey of the Pathology Workforce' (Urbis, 2011)

[7] The Urbis survey data was not available to present to consultations so only figures based on the ABS Population Census data was displayed.

[8] Note that the ANZSCO code description for 'Medical Laboratory Technicians (311213) is not as equally concise and leaves room for counting inaccuracy, a point discussed in the separate 'Labour Market' document.

A more credible and current estimate of workforce size is desperately required. The next Census is to take place later this year however stakeholders suggested that rather than trying to negotiate with ABS to change their coding prior to this Census[9], alternative approaches to consider might be:

1. Medicare Australia could be approached to share data[10] on the types of laboratory staff employed in medical pathology laboratories collected through the process of *Application for approval of premises as an accredited pathology laboratory (Section 23 DN, Health Insurance Act, 1973)*; or
2. National Association of Testing Authorities (NATA) could be approached to collect (or seek to require collection of) data[11] on the types of laboratory staff employed in medical pathology laboratories as part of their accreditation processes against NPAAC requirements.

These options are discussed further in Section 8 and in the Labour Market Considerations Appendix B.

The medical science workforce is also segmented internally for the purposes of allowing specialisation and for delineating roles (see more on this in Section 6, Theme 2). The segments relate largely to the testing techniques applied to different types of diseases and conditions, and as a consequence the type of work can be quite 'specialised', especially in larger pathology laboratories. The recognised pathology scientific disciplines are Histopathology, Cytopathology, Microbiology, Haematology, Immunopathology, Blood Banking (Transfusion Medicine), Chemical Pathology, Toxicology and Genetics and Cytogenetics.

[9] There is still though it seems value in approaching ABS to discuss the coding process in an effort to perhaps improve their coding accuracy.

[10] While it is generally understood that this data has been collected in the past (but probably never collated), there is some uncertainty as to whether this data is still collected.

[11] Most stakeholders considered it might not be appropriate or feasible to require NATA itself to collect staffing data. However they could require its collection for collation and analysis by a third party, from which NATA and NPAAC might gain intelligence for further consideration of the standards and how accreditation processes might be improved especially around the staffing issue.

# Section 4: Australian career frameworks

The way work is designed and allocated to individual workers and classes of workforce within a medical pathology laboratory is not neutral in regard to workforce supply or demand. Work organisation models can potentially impact on the quantity and quality of workforce demand and hence the availability, nature and productivity of workforce supply. In recent years industry stakeholders have begun to voice concerns about the way work is organised in Australia due to a fragmented labour market in which several markedly different markets support different career frameworks. Most notable differences are between 'public' and 'private' markets; 'rural' and 'urban' markets; and markets in different jurisdictions.

Many of the differences in the Australian scientific workforce in medical pathology laboratories career frameworks are able to be attributed to (or consolidated by) prevailing industrial arrangements. Accordingly, an investigation of relevant awards and enterprise bargaining agreements was undertaken. These industrial arrangements were collected from employer interviews and case study participants and facilitated an initial analysis which is summarised below:

**Public sector awards** and agreements generally cover scientific and 'technical' staff in public sector medical pathology laboratories separately. This suggests a strong demarcation between professional (scientific) and paraprofessional (technician) workers.

Medical science roles in public sector pathology laboratories are dependent on completion of a relevant undergraduate science degree and occasionally include a trainee scientific role for individuals currently enrolled in a degree. Lower level senior scientific roles can be occupied by individuals only with an undergraduate qualification, however generally they require a Masters degree or Fellowship of a relevant society for example, AACB (Australian Association of Clinical Biochemists) or AIMS. Where entry of a person only with undergraduate qualifications has been arranged, there are generally limits to how far this person can progress along the salary scale. In NSW for instance progress halts after the third anniversary of the person entering the senior scientist role and in Victoria after eight years (Grade 3).

Senior scientists responsible for specialist laboratories and senior (or principal) scientists in management roles require a PhD or Fellowship qualification in NSW after their fourth anniversary and in Victoria there is no further qualification requirement noted for Grade 4 and above but an expectation of ten years experience. The SA award only requires a medical scientist to hold a relevant science degree and the award does not require a higher qualification for more senior roles, although in practice this tends to be an important consideration in career progression.

Progress from about year 5-7 years after commencement of practice to a senior scientist role was an issue that commonly came up in consultations as it was perceived that there was a lack of senior scientist roles available. Scientists occupying the senior roles had been incumbent for an extended period of time and essentially for progression of a more junior scientist to occur, a position had to become vacant. A number of consultations across all jurisdictions highlighted that for scientists wanting to progress there was a perception that unless they decided to take a management pathway that there would be a limited chance of acquiring a senior scientist role in a specialist area.

The SA award differs from the NSW and Victoria awards by providing for a management (medical scientist) pathway alongside the existing scientist stream. This effectively can create an 'expert' or specialist stream following appointment to a senior scientific role. The SA award also provides recognition of senior scientist expertise by providing an allowance for 'scientific excellence'. In order to 'classify' principal scientist roles in NSW, the award allows for progression dependent on the number of hospital beds.

Some of the frustrations with current public sector industrial arrangements were well expressed by one stakeholder from NSW in a written submission to the project:

> *"The current award has a career structure relevant to the 80's however considerable restructuring has occurred since such that the current definitions have little contemporary relevance. With the concept of Area Health services developed the responsibilities have grown to include area based service as well as rural and metropolitan yet adjustments have not been made to reflect changes to work value, nor has accommodation been made for the new structures, boundaries, responsibilities or workload. New terminology was introduced – Supervising scientist, Service unit manager, Operations manager, Chief operations officer but the award has not [properly defined] these terms nor a revised career structure been developed."*

**Private sector and Not for Profit industrial instruments** investigated for this project were commonly enterprise or collective bargaining agreements covering a single employer. These awards generally were more comprehensive than the public sector awards and included the majority of workers within medical pathology laboratory settings and collection centres. At a minimum, private and not for profit industrial instruments tended to cover technician roles with medical scientists and sometimes included technical assistants, collection staff, couriers, and administrative staff. In the majority of cases progression was based on annual increments with provision to progress staff on competency or merit.

Career progression within the private sector scientific workforce in medical pathology laboratories was at the discretion of management with roles able to be created to reward expertise or to adjust to changes in market requirements. The majority of private sector organisations acknowledged that their staff were not paid at the same rates as the public sector staff however they were able to provide a broader range of allowances and benefits (especially in professional development) than the public sector. Some private and not for profit sector employers however did attempt to match the public sector wages rates in order to retain staff as they acknowledged the huge training investment in their staff and had the flexibility to be able to reward well performing staff in an attempt to retain them.

Scientific roles in the private and not for profit sector are also subject to the same qualification requirements as the public sector. However, a number of private sector employers would employ staff for technician and assistant roles without any tertiary qualifications as they were prepared to train staff and support them in achieving a Certificate IV or Diploma qualification. Generally, their industrial instruments did not have requirements for qualifications for non scientific roles.

The analysis of this collection of awards and agreements allows several generalisations to be formed. The more common elements (to which there are some obvious exceptions) are:

- Public sector awards and agreements suggest a strong demarcation between professional (scientific) and paraprofessional (technician) workers;
- Private sector awards tend to be more comprehensive on the one hand and cover most workers within the medical pathology laboratory setting, but on the other hand rarely include other settings or forms of worker;
- Public sector awards generally cover all workers across the jurisdiction encompassing all the employers (although in most jurisdictions in the public sector now that is very few and indeed in several jurisdictions amounts to a single employer). Private sector instruments tend to more frequently be enterprise based agreements and therefore cover a single employer;
- the number of classifications within awards and agreements (grades, levels, salary points, etc.) are generally greater for medical laboratory scientists than for medical laboratory technicians;
- most industrial arrangements have several 'hard' internal boundaries. The most common apply to the boundary between technicians and scientists, where an undergraduate qualification is required to 'jump' the boundary. The other relates to progression from scientist to senior scientist. While this boundary is slightly more porous, the demonstration of academic achievement (e.g. relevant postgraduate qualification, publication of research papers) is generally mandatory; and,
- within and between all related awards and agreements there is significant overlap in salaries between different classes of medical pathology laboratory workforce, implying an overlap in competence and actual work allocation.

The consultations and case studies in particular found that, despite the relative inflexibility of awards and agreements, employers are responding to business, labour market and 'science' context drivers as innovatively as they can. The ways in which laboratories might have adjusted their workforce to meet increasing service delivery requirements includes:

- increasing the role of medical laboratory scientists to assume more responsibility for making clinical judgements on tests results, especially in the area of chemical pathology;
- substituting scientist roles with technicians in order to allow scientists to assume higher skilled duties or to reduce the total cost of wages. In some jurisdictions this is facilitated by double classification of jobs (e.g. Medical Scientist 2/ Technical Officer 3); and
- of course any movements of scientists and technicians to higher skilled work requires consequent increases in the capacity of laboratory assistants through limited technical training to up skill them within the laboratory in order to conduct the majority of routine work.

These employer actions are discussed at more length later in this Final Project Report.

# Section 5: Alternative career frameworks

The most popular approach to reviewing and modifying career pathways within the scientific workforce in medical pathology laboratories overseas has been to seek to 'extend' pathways for the professional component of the workforce (see for instance Legge, NZ, 2008 and 2009). This is not an unusual phenomenon; the professional component of any health workforce is normally the best organised and generally the most ambitious and therefore the most likely to push boundaries.

The flag bearer overseas for advanced and extended practice has been certain States in the USA and Canada (see the end of Section 6 for several examples of relevant job descriptions). There has been a push in the USA for the development of laboratory scientists into the domain of clinicians, gradually supplementing (or augmenting) the supply of pathologist labour. The USA in particular has a history of substitution for medical practitioner labour having developed the nurse practitioner and the physician assistant (Legge, NZ, 2008). In the USA occupational titles such as Clinical Laboratory Scientist or clinical doctorate in laboratory sciences (Doig, 2005) and in Canada the pathologist assistant (Dufour, 2007) have emerged while in the UK the terms clinical scientist or Consultant Clinical Scientist have been promoted (RCP, 2005).

The most complete and compelling career structure model for the scientific workforce in medical pathology laboratories has been developed and implemented in the UK. There, a career framework has been developed specifically for a healthcare scientist which provides an important reference for this project. The career framework is built on the concept of skills escalation (Department of Health, 2005) and offering flexible career opportunities to meet workforce service and individual needs.

The UK framework aims to:

- introduce an integrated career framework encompassing all disciplines and employment groups within the workforce based on roles and function and linked to transferable skills and competencies;
- clearly identify pathways for progression and transfer, supported by learning and development providing enhanced opportunities; and
- provide national consistency and maximum flexibility to support local service delivery, the expansion and extension of current roles; and the emergence of new roles.

The UK healthcare scientist career framework originally created nine levels or grades around three major categories of workforce in line with the broader National Career Framework for Health. The three major categories proposed were Healthcare Science Assistants, Health Scientist Practitioners and Healthcare Scientists with the roles defined as:

- Healthcare Science Assistant - entry level, undertakes a range of tasks and protocol based roles, access learning and development programs and qualifications to move to practitioner training programme;
- Healthcare Scientist Practitioner - works within a discipline or related disciplines or in a range of healthcare settings to deliver and report a range of

tests, investigations and interventions on patients, samples or equipment. Provide therapeutic interventions in patient-facing roles, some of which may be specialist. Further develop into more senior roles of practice and management and training and education; and

- Healthcare Scientist - has clinical and specialist expertise underpinned by theoretical knowledge and experience and will:
  - undertake complex scientific and clinical roles, including those working directly with patients;
  - analyse, interpret and compare investigative and clinical options;
  - make judgements involving complicated facts or situations which impact on patients;
  - be involved in innovation and improvement;
  - potentially participate in research and development; and
  - be involved in the education of trainees and other learners in the workplace."

Later work on the UK model introduced a Healthcare Science Associate level classification between assistants and practitioners, thus creating a category akin to the medical laboratory technician role in Australia.

There are several important differences between what has been proposed and is being implemented in the UK as a career framework or structure for the scientific workforce in medical pathology laboratories and what has been proposed or enacted elsewhere (including Australia):

1. the UK approach is ***comprehensive*** and the Framework attempts to encompass all forms of scientific workforce in medical pathology laboratories that could and essentially do overlap in role and function and therefore augment (or substitute) for each other in the labour market;
2. the UK approach facilitates the casting of a ***broader*** (recruitment) net when considering the building of supply capacity of the scientific workforce in medical pathology laboratories. As per the aspirations of the 'skills escalator' discussed earlier, recruitment into the scientific workforce in medical pathology laboratories can be at multiple points, all of which are potentially attractive since they offer immediate career progression and long term significant prospects; and
3. the UK approach genuinely attempts to create reasonable ***articulation*** between different categories of scientific workforce in medical pathology laboratories. This is done through a culture change of open encouragement for progression, a clear and transparent pathway, considerable recognition of prior learning through various means (including on-the-job learning), clearly defined educational processes to manage hurdles and support for training and education to those who are genuinely interested in progressing[12].

[12] This is a very important aspect of the UK approach and is, argued by many stakeholders, a point of major divergence from the observable trends in Australia. In both public and private pathology organisations in Australia seems to have been a trend in the past decade to reduce operating costs by redefining roles in the workplace and by reclassifying certain positions from scientific grades to technical grades. This indicates a culture which is focussed on limiting progression to senior roles and responsibilities. This is discussed in more detail in later sections.

Apart from the UK, thinking on career pathways as noted earlier has largely been on 'scientist' careers and seeking ways to justify support and facilitate advanced or extended scientist roles. The most articulate expression of the Australian position has been that offered by the AACB and described in a paper authored by Badrick (2008) (see Annexure A of Appendix A, Information Paper). In the 'Career Framework' proposed by AACB there are six classifications or levels / grades of scientist *viz.*:

- trainee scientist;
- scientist;
- pre-specialist scientist in training;
- specialist scientist;
- clinical scientist; and
- laboratory manager.

At a practical there have been some innovative developments in Australia illustrated by Western Australia[13] and Queensland's new public sector industrial arrangements which have been changing over the last few years. A large amount of effort has been put into attempting to create industrial instruments that are more 'forward thinking' than their contemporaries.

**Queensland's** award is unique in that it is the result of an attempt to reclassify and bring parity to all allied health practitioners and was driven by health workforce shortages across the State. Queensland's award has the following features:

- the award covers all 45 allied health groups except dental officers in an attempt to broadband salary structures;
- there are eight health practitioner (HP) levels with differing incremental levels which decrease as the levels advance. Medical laboratory technicians (must have a Diploma) are classified as HP2-5 and medical scientists (must have a science degree) HP3-8. This overlap acknowledges the similarity in roles of experienced technicians and graduate scientists;
- medical scientists can choose a management or clinical (specialist) stream from HP4 to reach the top level, HP8;
- HP1 is a cadetship/trainee level for medical scientists. Qld Health has a trainee program for up to 10 trainees which includes one year supervised training and mentoring as a multi-skilled scientist. The trainees are placed in urban and regional labs and are an important recruitment strategy;
- the award has allowances for professional development and study leave; and
- there is a higher education incentive allowance ending at HP4 for relevant job role qualifications. However, Fellowships do not qualify.

Extensive effort has been expended in WA to design an extended career pathway for scientists in medical pathology laboratories at PathWest. The proposed extended roles include, Clinical Scientist and Senior Clinical Scientist. The main duties for each role would include:

- *Senior Clinical Scientist* – This is the advanced level for clinical scientists who have developed skills in their specialist area to a nationally or internationally

[13] The new PathWest instrument has not yet been published and therefore was unavailable to this project but some of the thought processes underpinning the new direction have been provided.

recognised level. In this position, these experienced clinical scientists, will provide recognised expert knowledge, methodologies and services in a specialised area of Pathology including advice to pathologists and external clinicians.

- *Clinical Scientist* – These scientific professionals will advise their department on strategic direction, innovation and scientific interpretation as well as give specialised advice to pathologists and clinicians in their area of expertise. They will develop and deliver research and educational activities within their area of expertise.

The entry point to these roles is through a Masters of Laboratory Medicine at University of Western Australia. This course is three years part time and the entry requirements include five years experience as a medical scientist working in a medical pathology laboratory. Within PathWest, the course is provided as a supported scholarship and represents the closest example of a registrar post in Australia.

The differential proposed in the career structure for the role of Senior Clinical Scientist recognises a PhD or Fellowship level qualification from a recognised speciality discipline comparable to the Fellowship of the Faculty of Science of the RCPA, as well as ten years experience within a medical pathology laboratory.

# Section 6: Major issues identified

This section of the Final Project Report draws primarily on the significant stakeholder input to this project noted earlier in the 'Methodology' section and is expressed as 'themes', where effort is made to capture and express the 'major issues' common to discussions across stakeholder groups in many different forms (focus group discussions, employer interviews, key informant interviews, etc.). Where possible and appropriate, evidence from other sources that supports (or disputes) the central message of the 'theme' is introduced.

The 'themes' which are to be explored in this section include:

- workforce boundaries around the medical pathology scientist workforce, and within the workforce between assistants, technicians and scientists and between different disciplines;
- apparent labour market conditions and the possibility of segmented labour markets that behave in different ways — implications for new graduate supply, preferred training providers and preferred career structures to foster early careers;
- deskilling of certain labour markets as a result of centralisation of testing processes (rural / private);
- use of competencies as a means of understanding skill and knowledge in comparison with qualifications and how these might better underpin a range of human resource decisions;
- some aspects of scientist workforce behaviour that are impacting on available supply and have implications for career frameworks, such as high turnover of scientists at specific levels and time periods and including those associated with scientists' progression beyond the first 5-7 years in employment and barriers to entry to senior scientist levels;
- limited pool of 'middle level' scientists able to progress easily to senior scientist roles as it is expected that large numbers of senior scientist will (shortly) reach retirement age and exit the workforce;
- varied possible pathways to senior scientist levels but in most cases there is an implicit requirement or specific commitment to *management* development. This is unattractive for many potential candidates.
- support for *Clinical* senior scientist roles where such roles can be defined and particularly in disciplines in which pathologist numbers and influence are low; and
- a range of career structure possibilities that have been already explored by employers or provided by persons thinking about the issue.

Each of these issues will be explored, primarily from the perspective of meaning for career frameworks, how current structures might be limiting or problematic (even contributing to issues) and how alternative structures might deliver better workforce outcomes.

## Theme 1: Boundaries within the medical pathology laboratory science workforce

The medical pathology scientist workforce is not unique in structure within health workforces. However, it has several very distinctive characteristics. It is closest in structure to the nursing workforce, where, just like nursing, there are three discernable tiers of labour viz.: a professional level (medical scientists / registered nurses), a paraprofessional level (medical laboratory technicians / enrolled nurses[14]) and a semi-skilled level (laboratory assistants / assistants in nursing). Like nursing, there are no hard and fast rules on the mix of skills employed by various employer bodies, allowing for significantly different staffing decisions to be made by employers in seemingly very similar work circumstances. The regulatory constraints on nursing labour (for instance there are many tasks only a registered nurse can perform) are less obvious for the scientist workforce, there being only broad NATA standards and supervision guidelines to suggest employment practice.

Unlike nursing, which is highly regulated in its relationship with medical practitioners (except in locations / contexts where medical practitioners are scarce), the permeable boundaries between levels of labour *within* the broad medical pathology science workforce are mirrored to a large extent in relation to medical practitioners (pathologists, haematologists, immunologists, etc.). Apart from some areas of pathology work (notably that which falls broadly under the area of 'anatomical pathology'), a surprisingly open relationship exists between scientists and medical practitioners. Unlike most other areas of health, medical scientists have assumed responsibility for large areas of work formerly the exclusive domain of pathologists, including some areas of complex clinically-related judgement. Although this situation is by no means uniform across all types of medical pathology work, all types of employer or medical pathology sectors (public, private, not for profit), it remains a distinctive point of differentiation with other similar health professions. Ideally, this needs to be better and more formally articulated in career frameworks.

The relative strength of the relationship between medical scientists and pathologists, on the basis of evidence presented in consultations throughout Australia, is poorly understood and acknowledged. On the contrary, the popular perception of medical scientists is that their scope of practice is being significantly controlled by pathologists and the structures of the pathology profession (e.g. RCPA, private pathology practice ownership). While this is no doubt true in many circumstances, an observation of the consultant would be that medical scientists *on average* operate with greater autonomy than most non medical health professions and that medical pathologists highly respect the work of medical scientists and explicitly, or at worst implicitly, acknowledge the partnership relationship. The strong relations are reminiscent of other highly technical areas of health service, such as neonatal intensive care or intensive care medicine, where medical practitioners greatly value the input of their highly technically knowledgeable colleagues.

As noted above the boundaries within the medical pathology scientist workforce are quite porous, in so far as different forms of medical pathology scientist labour appear to be highly substitutable.

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[14] Termed 'Division 2 nurses' in Victoria.

The most interesting boundary in this regard is that between medical laboratory technicians and medical scientists. These boundaries are established ostensibly on the basis of qualifications — from the vocational education and training sector (Certificate IV / Diploma) and the higher education sector (undergraduate science degree) respectively — and patrolled by a combination of industrial arrangements and industrial agencies, professional associations and by agencies charged with maintaining laboratory standards (including standards of worker competence). These forces of 'regulation' are combatted by two major phenomena:

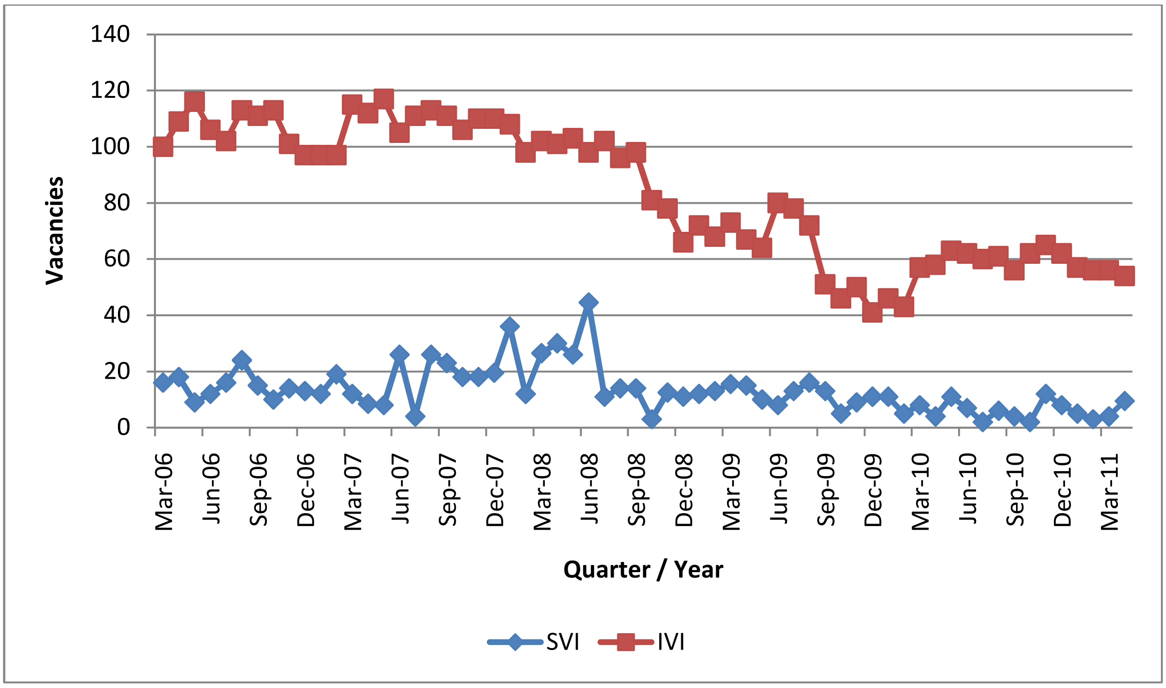
- Change in levels of automation of key laboratory testing processes — in certain areas of pathology practice (e.g. chemical pathology) automation has effectively deskilled the work to such an extent that many observers suggest it is difficult to tell apart most of the time a scientist and technician sitting together at the laboratory 'bench'[15]. Many argue that the imperatives for efficiency gain are explicitly implied in the cost restraints that have been imposed on both private and public sector pathology services (see for instance AAPP and NCOPP) which have promoted substitution of capital (equipment) for labour. Employers have reacted in their own way to these circumstances … sometimes responding to the deskilled environment to substitute technicians (or even assistants) for scientists, at other times believing the equipment is substituting for more routine work and competence, therefore removing technician labour and leaving a requirement still for scientists.
- Improvement in the supply of medical scientists — contrary to the findings of the recent workforce survey which identified a shortage of scientists (Urbis, 2011), the available evidence provided to this study has been that an over-supply of scientists exists, especially for less experienced practitioners[16]. In urban areas especially where the bulk of employment occurs, stakeholders consulted revealed no recruitment difficulties were being experienced. Figure 2 plots the trend in newspaper (SVI) and internet (IVI) vacancies over the last 5 years supports this perspective — there has been a gradual trend to less vacancies[17]. Many employers have clearly reacted to this enhanced availability of science graduate supply by employing science graduates in technician roles. The most likely to suffer in this way have been graduates of non AIMS accredited courses, but even some graduates from AIMS accredited courses have reported difficulty finding employment and the need to accept lower paid non science roles in the hope that working in a laboratory will ultimately deliver a scientist position.

[15] Of course, as will be explored later, there are fundamental differences in the **some** of the work being performed that support the use of two types of labour.

[16] Clearly there are specific geographical (ACT and the NT for instance, and rural locations more generally)) and work sectors (where remuneration is lower than competing parts of the labour market) where the general observation does not hold and workforce shortages can be identified.

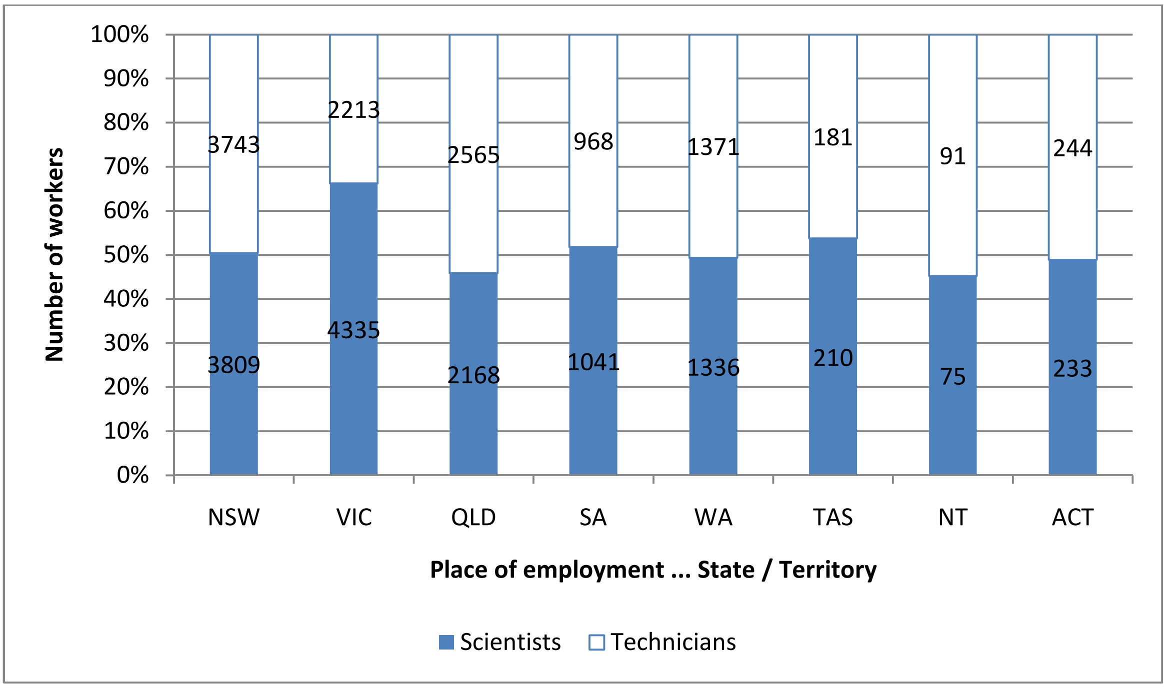
[17] A lower rate of advertised vacancies could be interpreted as a reduction in demand, however it invariably indicates better labour supply conditions since increased opportunistic recruitment from a more available pool of supply (word of mouth, personal approach, graduate recruitment, etc.) reduces the need to advertise.

**Figure 2: Trends in vacancy statistics for medical scientists (ANZSCO 234611) based on newspaper (SVI) and internet (IVI) advertisements: March 2006 to March 2011**




That employers have responded to the above phenomena in varied ways was evident from the case study interviews and in a broad way is confirmed through an examination of how the medical laboratory scientist and technician workforces are distributed between the States and Territories as shown in Figure 3.

**Figure 3: Distribution of the medical laboratory science workforce by State or Territory**




*Source: ABS Population Census, 2006*

The distribution of the workforce roughly accords with what might be expected on the basis of respective State and Territory population size. The interesting aspect though is the variation between States and Territories in the workforce balance between scientists and technicians. In this regard Victoria is the standout. While the number of medical scientists as a proportion of the total medical laboratory science workforce varies in other states between a low of 45.2% (Northern Territory) to a high of 53.7% (Tasmania) with the others all slightly higher or lower than 50%, the proportion in Victoria is 66.2%.

Data collected in Victoria attributes the more professionalised medical pathology laboratory science workforce to strong union intervention[18], which has maintained a vigilant watch especially on public sector employers' recruitment behaviour, and 'regulated' their staffing decision making within the skills mix dictates of the award[19]. Thus the 'regulatory' factors are in the ascendency over the influence of the 'market' in determining workforce structure. In other States and Territories cost considerations appear to have prevailed more often. This is not to suggest technicians are being placed into scientist roles (all the case study employers interviewed confirmed the importance of scientists with appropriate qualifications being in scientist roles[20]), but rather workforce requirements are being reassessed in line with changing circumstances and scientist positions when they fall vacant being converted into technician (or even assistant) positions. It is a fine, but necessary, distinction. Whether the same result eventuates, however the distinction is made, is difficult to judge.

Again, though, ideally decision making would be in keeping with an accepted career framework and a principle of getting the right workforce in place for the work required to be performed. This is a theme that will be returned to again later. It is generally considered poor human resources management to have persons performing work for which they possess skills they are not using (for instance scientists in technician roles) and equally problematic for staffing decisions to be made on the basis of cost *savings* (which might place assistants and technicians in roles that should be performed by scientists) rather than cost *effectiveness*. In the former case poor staff retention and / or productivity outcomes might be expected, in the latter case staff stress might be expected and ultimately the accuracy of test outcomes (and patient safety) placed at risk. Some anxiety was expressed in the consultations that some employers are indeed placing at risk test quality.

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[18] An unusual union structure exists in Victoria whereby not only is there separate awards for each type of medical pathology science workforce but also there is separate representation and advocacy for each labour category (because of internal divisions within the Medical Scientists Association, Victoria). This structure, whether intended or not, effectively supports competitive advocacy on behalf of different workforce segments.

[19] Medical Scientists Award Victoria.

[20] That is, none of the case study employers interviewed would consider placing a technician in a 'designated' scientist position. This raises an interesting question though about scientist/technician substitution. While employers would not consider placing a technician in a "designated" scientist role one needs to understand how the employer arrives at this designation. One would assume that it is based on some assessment of the breadth, and depth of knowledge and the range of competencies required to fulfil the role requirements. This is an issue that needs further examination.

## Theme 2: Segmentation of the scientist workforce

Specialisation within health professions is widespread and well accepted across most if not all practice areas. Typically processes of specialisation follow the medical practitioner model where there is an initial period of generalist practice (internship, residence), during which a deliberate attempt is made to expose novice practitioners to several areas of 'specialist' practice. The decision can then be made to pursue a specialist career, or remain a generalist, the former pathway normally requiring extensive training. The specialist role tacitly acknowledges that the knowledge base is too broad for a generalist to assimilate and manage. In most health professions a structured relationship is formed between specialist and generalist practitioners.

There many ways that specialist practice can be categorised, but it would normally fall into one of the following (Sparacino, 2005):

- Population (e.g. paediatrics, geriatrics, women's health);
- Setting (e.g. critical care, emergency room);
- Disease (e.g. diabetes, oncology);
- Type of care (e.g. psychiatric, rehabilitation); or
- Type of problem (e.g., pain, wounds, stress).

Compared to most other (non medical) health workforces, there is a high degree of segmentation of the medical scientist workforce into what most stakeholders term specialist areas of practice[21]. However, there are three seemingly important ways in which the medical pathology scientist profession differs from other health workforces in its approach to specialisation:

- other health workforces (medical specialists or clinical nurse specialists for instance), almost invariably require higher level (post graduation) studies / qualifications to obtain the title 'specialist'. This is not necessarily the case with medical scientists, although later a range of ways career frameworks might foster and recognise postgraduate study will be canvassed;
- in reality, 'specialisation' for medical scientists virtually commences the moment a graduate is employed into one of the recognised pathology disciplines. Even within these disciplines there is further functional and/or process departmentalisation (subspecialisations). This can, indeed often does, happen from day one of employment. There is little recognition therefore for 'generalist' medical pathology scientists, and instead the term 'multi-skilled' seems to be preferred[22]; and
- the approach to creating specialisations within the medical pathology scientist profession is quite different and relates poorly to the above categories common for 'clinical' specialists.

There are two main ways specialist categories of medical pathology scientists have been created, one driven by the profession, the other by pathology laboratory

[21] Some observers eschew this term in favour of 'disciplines' while others still seem to prefer the term 'craft'

[22] It might be argued that scientists practising in the areas of biochemistry and haematology, especially operating across these two areas, are generalists. There are many though who would maintain these to be separate specialist disciplines.

service providers, with different motivations but with a certain degree of harmony (so far) in the outcome.

The approach from **the profession** has been to differentiate specialist practice on the basis of knowledge of laboratory processes[23] (e.g. chemical tests, microscope examination, culture exams) and the materials examined in assays (e.g. cells, fluids, blood, tissues). Historically these processes have been correlated with different types of pathogens and disease, however this is becoming less the case. For example, molecular techniques such as nucleic acid extraction and PCR are now in standard use across most if not all the recognised pathology disciplines. The Information Paper (Appendix A) identified the following currently recognised areas of specialisation or disciplines:

- Histopathology: examining organs, tissue and cells to decide if a disease is present and what effect it could have on the patient e.g. whether a breast lump is cancerous or not;
- Cytopathology: the examination of small samples of cells from various samples (e.g. Pap smears, body fluids, epithithelial brushings and fine needle aspiration form various sites) to identify abnormalities such as cancer.);
- Microbiology: the study of bacteria, fungi, parasites and viruses to examine, diagnose, treat and prevent the spread of infection. Outbreaks of food poisoning, meningitis or a virulent strain of flu would be investigated by a microbiology or virology laboratory;
- Haematology: the study of blood cells in order to identify any abnormalities. Haematologists diagnose and treat a variety of blood disorders including anaemia, haemophilia and blood cancers, including leukaemia;
- Immunopathology: focuses on disorders of the immune system and the body's ability to resist invasion by foreign organisms. Immunologists play a key role in transplants and diseases like HIV-AIDS;
- Blood Banking (Transfusion Medicine): combines haematology and immunology disciplines for testing compatibility and quality of donated blood;
- Chemical Pathology: the study of body fluids such as blood, urine, saliva or spinal fluid to detect abnormalities and make a diagnosis e.g. diabetes, high cholesterol and nutritional disorders;
- Toxicology: the study of the effect of different substances on people, animals and the environment. Toxicologists can diagnose poisoning and help devise a treatment; and
- Genetics and Cytogenetics: the examination of chromosomal and genetic abnormalities. This covers a range of issues such as prenatal diagnosis (e.g. Down's syndrome), predictive testing for cancers and reactions to certain drugs.

The Urbis Workforce study adopts this taxonomy, and also notes a broader division of labour into areas of *clinical pathology* that refers to chemical pathology, haematology, microbiology, blood banking and genetics/cytogenetics and

[23] Most stakeholders argue that specialisation is the result of a fast growing knowledge base with a burgeoning number of assays. The breadth of this knowledge base they argue has grown beyond the capacity of any [generalist] individual to hold and master.

*anatomical pathology* which is used to group histopathology and cytopathology. At least one award finds a middle pathway between these two means of classification and identifies four major areas of work *viz*.: haematology, anatomical, [bio]-chemical, and microbiology. As noted earlier, this project observed that multi-skilling was most commonplace where it involved people working across haematology and biochemistry, and increasingly microbiology departments (with the uptake in the latter department types of molecular testing techniques).

The approach from **the service providers** has been to focus on departmentalisation, or a division of labour whereby workers concentrate on performing fewer tasks but at much greater levels of proficiency. There are two relevant forms of departmentalisation in the case of medical pathology laboratories, based on function and process. These two can be defined as:

- Functional departmentalisation — Grouping activities by functions performed. Activities can be grouped according to function (work being done) to pursue economies of scale by placing employees with shared skills and knowledge into departments.
- Process departmentalisation – Grouping activities on the basis of product or service or customer flow. Because each process requires different skills, process departmentalisation allows homogenous activities to be categorised. The growth of 'specialised' specimen reception centres is a case in point, where the commonalities in processing and advancement in information technology have enabled previously separate processes to be aggregated.

Departmentalisation can be used in all types of organisations, and is essentially a division of labour motivated to derive greater efficiency in resource use.

Despite the lack of a requirement on medical pathology scientists for postgraduate study in order to 'specialise', the on the job learning processes involved in specialising (that is development of 'craft' skills) are quite considerable. One stakeholder through a written submission to the project noted:

> *"In regards to the fragmentation of the scientific workforce by discipline, from the Microbiology point of view, it can take (at least) 3-4 years to rotate through the different sections of a Bacteriology Department. If Serology and Virology were included in this, it could take 5-6 years to rotate through a Microbiology Department. A scientist moving between disciplines in a laboratory is of limited value from the Microbiology Department perspective. If a scientist spends 5 years in a Microbiology Department and then rotates through Chemistry, Haematology, etc., returning to Microbiology 6-7 years later, that scientist will need to be retrained. There is more crossover within some disciplines as instruments can perform tests across different disciplines, but this does not happen in Microbiology. Once a scientist enters a Microbiology Department, they remain there due to the amount of time required to train."*

The advantages of specialisation / division of labour as outlined above are many. To the professional there is the prospect of higher pay for specialised work (although this does not seem to have materialised in virtually any industrial arrangement for medical pathology scientists) and improved skills at that job. For service providers the advantages are specialist scientists become quicker at producing results (particularly important for the labour intensive assays prominent in cytology for example), production levels are thus increased and production becomes cheaper per test result. The disadvantages to the business are the greater initial cost of training workers (the above quote being a good example of this) and quality of production may suffer if workers become bored by the lack of variety in their jobs. The main disadvantage to professionals is that areas of specialist work become a target for investment and capital substitution for labour.

From a career frameworks perspective, the somewhat unique circumstances of specialisation, as occurs in the medical pathology laboratory science workforce, presents both opportunities and challenges.

One of the challenges is that new tests and test processes are emerging and some are being applied increasingly across many discipline areas. Despite significant similarity in applications, there have been few attempts so far within organisations to aggregate these activities on a functional basis. If organisations (based on the motivation that supports departmentalisation described above) were to shift to organisation of work on a functional basis the logic supporting some current specialisation categories might be threatened. Another challenge is that a generalist (or multi-skilled) medical scientist receives limited recognition, and yet this category of scientist forms a sound platform for certain ‘specialist’ career pathways (for instance ‘specialist’ rural practice, specialist practice in small or branch private practice laboratories, specialist scientist / laboratory manager roles).

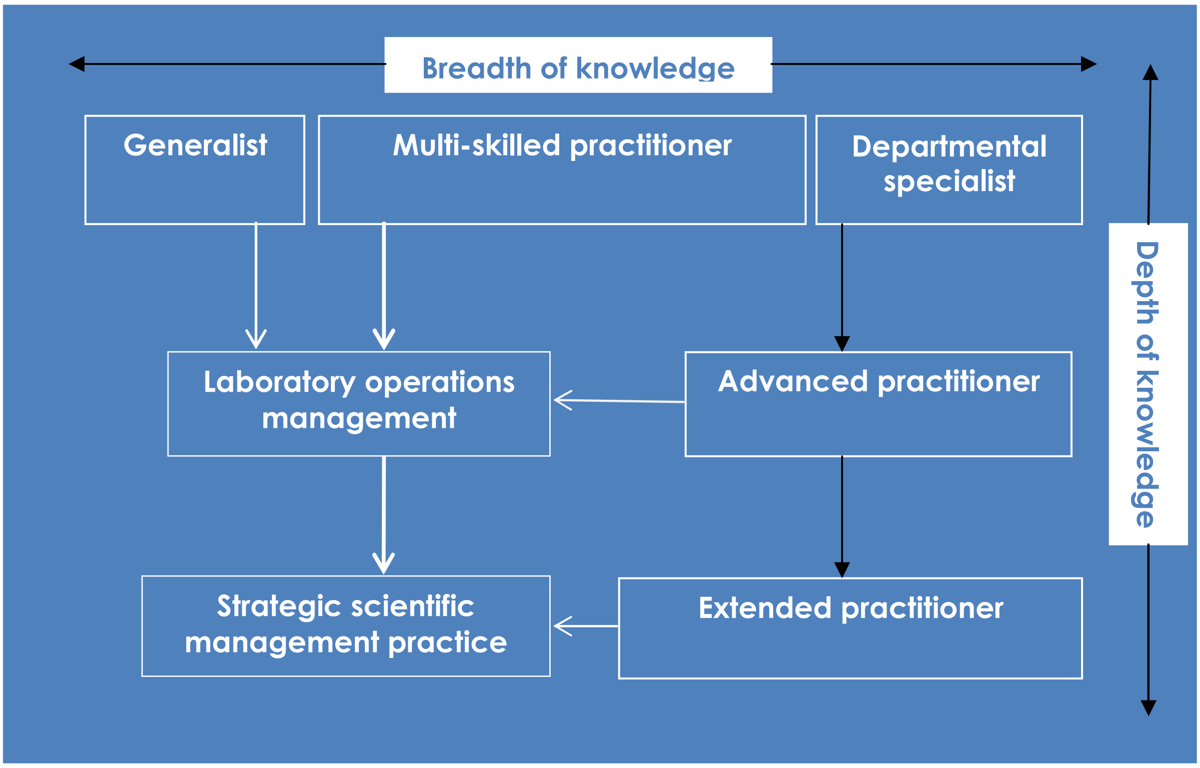
One of the opportunities is that some clear pathways for knowledge and skill development as a basis for ‘enhanced’ or ‘advanced’ practice are well established. Additionally, since the scope of practice of the medical pathologist scientist workforce, including advanced practice, is so well determined in the competency standards (PAC, 2009; see Theme 7), the ground is also well laid to consider ‘extended’ practice roles. These two concepts were detailed by Boyce, Kendall, Mattiussi, McIntyre, Ridoutt, Bagnulo & Schoo (2010) as follows:

> ‘Advanced practice’ describes practice at the highest level of expertise within the scope, inclusive of complex decision making and crisis management skills. Professionals practicing at the advanced level are generally required to have undertaken appropriate specialty training.
>
> ‘Extended’ practice, while closely aligned with advanced practice, integrates selected extensions of practice, such as initiation of diagnostics, referral to medical specialists, admitting and discharge privileges, etc. all of which are outside the scope of ‘typical’ practice. Even though these ‘extensions’ often only constitute a small part of the overall function of an extended practitioner, they differentiate extended practice from other advanced clinical practice.

The opportunity then is to fashion career pathways that recognise as much ***breadth*** of knowledge (that is multi-skilling across areas of practice) and ***depth*** of knowledge as possible - that is, increasingly greater understanding and skills development within an area of pathology science to the level of being able to teach and to add to the existing knowledge base. This approach to a career framework is introduced in a simplified way in Figure 4.

In Figure 4 the concept of ‘laboratory science management’ as an area of specialist practice is introduced. The suggestion is that laboratory management careers are most likely to open up for scientists who have developed broad knowledge across a range of disciplines, however movement from discipline specialist roles would not be impossible[24].

**Figure 4: Simple career framework based on specialisation**




## *Theme 3: Labour market influence*

It was not possible to undertake a formal and traditional workforce planning exercise for this workforce as part of this consultancy project to definitively determine the status of the medical pathology laboratory science labour market. First, this was out of the scope of the project, and second, and more importantly, all the data that needs to be available for a proper workforce planning undertaking does not currently exist. In Appendix B data currently available on elements of the supply of and demand for the medical pathology science workforce is described along with an analysis of what else needs to be obtained in order to undertake workforce planning. This hopefully will provide an appropriate entry point for Health Workforce Australia to undertake further detailed analysis in relation to the Pathology Workforce.

Despite not having undertaken a formal labour market analysis, in an earlier section it was nevertheless asserted that the medical pathology laboratory science workforce was not in shortage, and could possibly be in a slight over-supplied situation, at least in certain segments of the market. This assertion was based on anecdotal evidence provided through the many consultations. It was supported, at least for the scientist segment of the workforce, by vacancy trend data (see Figure 2).

[24] Although as will be argued elsewhere, the two career pathways are likely to be appealing to quite distinctly different scientist populatoins.

The cause for optimism in regard to the state of the labour market is largely the consequence of **graduate supply of scientists** being assessed as adequate or quite strong in most places in Australia. The anecdotal exceptions to this 'rule' are:

- the ACT public sector labour market (where consultation respondents have reported a comparatively poor pay scale for ACT scientists *vis a vis* NSW pay rates) means it is difficult to retain workers;
- the Northern Territory, where scientist supply is most often the consequence of short term residents and not long term migration to the NT;
- rural areas in general, as the work is perceived to be unattractive due to centralisation of more complex testing procedures resulting in a deskilling of the regional workforce and potentially therefore reduced pay and conditions (this is discussed in more detail later under Theme 6); and
- some private sector employment which can be considered less attractive as it can suffer from similar problems to rural areas and also have les competitive salary levels when compared with the public sector.

Graduate supply is a confusing aspect of the scientific workforce in medical pathology laboratories. There are effectively four distinct forms of new graduate supply *viz*.:

- AIMS accredited course graduate supply — for most employers this is the preferred source of supply. Graduates of these courses are argued to be more 'job ready' and possessing a lot more laboratory 'bench craft'. Moreover, some of the courses are structured in such a way as to facilitate (even mandate) significant practice time in medical pathology laboratories[25], affording prospective employers ample opportunity to form judgements on future staff candidates;
- Graduate supply from un-accredited but related medical science courses[26]. Consultations revealed that some of these courses are held in some esteem by employers, and considered to deliver different but equally attractive graduate supply to AIMS accredited courses, particularly in the areas of microbiology and molecular genetics[27];
- 'Graduate' supply from AIMS examination processes for scientists with overseas qualifications attempting to enter the Australian labour market. The consultations advised that these job applicants were generally not preferred to Australian graduates but were considered acceptable.
- Graduate supply from generic science, non accredited and non favoured courses. Use of supply from this source tends to be in assistant and technician roles.

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[25] For instance the Victorian, RMIT course, has a full year of clinical practice included in the course (this course is discussed more later).

[26] There are related non-accredited courses offered by 22 separate universities around Australia, included in which are universities with AIMS accredited courses. Courses typically include Biochemistry and cell biology, Genetics, Microbiology, Human biology and Laboratory technology.

[27] This is by no means a universally accepted perspective, even amongst employers. Representatives for AIMS itself argued that degrees with majors in microbiology or molecular genetics rarely include clinical studies nor do they include studies relating to other diagnostic laboratory parameters or even pathological associations as a basis for disease. Such graduates may well they believed be suited to a single discipline, but would usually require considerable up-skilling even in the 'specialist' discipline clinical setting. .

Based on DEEWR data, the number of graduates from all the AIMS accredited courses has ranged between 277 and 339 per annum for the last 5-6 years. If the size of the Medical Laboratory Scientist workforce (ANZSCO 234611) is assumed to be 13,369, then the current training rate from AIMS accredited courses is approximately 2.3%. This is lower than most other health professions but still considered reasonable. If the Urbis survey workforce size noted earlier of 6,992 is used to calculate the training rate then it increases significantly to 4.4%, what would be considered a very health rate. Supply from AIMS accredited courses is supplemented by supply from other related courses (see second dot point above). Theoretically this would push the training rate to a very high level by any standards.

This explains and validates the perception of a supply situation of no problems being reported (except in those particular cases identified above) in obtaining 'junior' or little experienced medical scientists. In Tasmania, where a single AIMS course supplies the market and the training rate is closer to a very high figure of 12%, some graduates are very fortunate to obtain employment in their home State but most presumably must travel to other states to obtain a relevant job (or else be satisfied with effective underemployment in their home location). The same problem is likely to impact on the NT market when graduates become available from the newly established Charles Darwin University course that proposes to seek AIMS accreditation in 2014, turning the current difficult recruitment situation for NT employers into a veritable recruiter's labour market.

From a career framework perspective, the current labour market appears to be experiencing a generally surplus supply of scientist graduates, but the situation where there are heterogeneous levels of competence and 'job readiness' presents real challenges. Employers tend to 'manage' this situation through one or more of the following actions:

- recruit directly into science positions where something of the quality and competence of the individual is known, for instance if the graduate undertook clinical practice placement with the employer or worked as a laboratory assistant whilst a student. The new graduate will often be placed with a 'buddy' (a more experienced scientist) for the first 6-12 months of employment;
- recruit into a technician position and treat this effectively as an 'internship' situation. One case study employer claimed never to recruit new graduates into scientific officer positions, instead always putting them through a form of probationary employment. This employer's argument was that they were effectively in training and not 'worth' a scientific officer salary until they had developed greater skills. In this situation there is an understanding that the recruited graduate will progress to a medical scientist role. There was noted to be great variation between employers on how this occurs and whether a position is required to fall vacant first, irrespective of the actual competency development of the individual; and
- recruit into a technician or assistant role, taking advantage of the relatively strong bargaining position of employers in the labour market, but with no formal or stated intention to progress the individual and with the onus on the individual to 'earn' a progress opportunity. This particular recruitment fate is more likely to befall graduates from non AIMS accredited courses.

In most other health professions, but particularly those subject to registration requirements, the transition from education to work is managed more consistently and uniformly across the labour market through some form of internship (for instance pharmacists, physiotherapists). Indeed, a form of internship was apparently more common in the past, and many awards (particularly public sector) still retain a 'trainee scientific officer' or similar workforce category.

These positions are rarely filled in the public sector and almost unheard of in the private sector. Thus, despite reasonably widespread support expressed in consultations for a more structured induction to medical laboratory science work for new graduates in some form of traineeship, internship or cadetship, efforts in this direction are generally waning. The reasons are several, but mostly the arguments offered related to (a) a lack of training resources ("… who has got experienced scientists with enough time to devote to training new graduates?") and (b) insufficient budget to afford essentially a supernumerary position - that is, one where fairly constant supervision would be envisaged for considerable time. Much the same arguments are raised in other areas of health service and for other health professions (nurses, physiotherapists, pharmacists, etc.) in regard to clinical training (see for instance Strickland, Kendall, McIntyre, Bagnulo and Ridoutt, 2008) — the imperatives of service delivery combined with more slowly increasing budgets have gradually removed resources for training purposes[28]. And yet, as noted earlier with the time it takes for scientists to 'specialise', training investment is being made anyway[29], simply not in a structured, formal or uniform manner. The exception to this is Queensland where a trainee program for up to 10 trainees each year has been initiated which includes one year of supervised training and mentoring as a multi-skilled (multi-disciplinary) scientist. It could be argued also that several AIMS accredited course with their extended professional practice components are already operating as *de facto* traineeships.

A flow on effect from employer behaviour in respect to recruitment of science graduates impacts on the **medical technician** workforce broadly and on graduates of laboratory technician courses in particular. Employers justify their decisions to employ science graduates in technician roles on the basis that this affords them more 'flexibility'. That is, they can occasionally utilise science graduates in higher duties (while still paying them a technician salary), but they do not have this capacity with a genuine technician. There is also the use of these positions, as noted earlier, as *de facto* training posts. The net effect of such decisions is surely to negatively impact on course enrolments in VET laboratory skills courses (with prospective students preferring to invest their time and finances into other courses of

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[28] One case study employer, with a comparatively enviable revenue base and strong thoughts on staff retention, represented the opposite picture. This employer had actually increased trainee positions, and 'rewarded' more senior scientists with the opportunity to be involved in training of young scientists.

[29] Many stakeholders observed that any new graduate coming into the organisation generally will require the same training resources as a "trainee" or "intern". More importantly perhaps the arguments offered against trainee positions are at odds with the experience of those AIMS-accredited programs which have extended professional practice as part of their undergraduate degree (UniSA, RMIT, UTAS, Curtin). Such degrees are 4-year programs (except UTAS which is 3.4 years). The laboratories that take students on placement through these programs generally expressed pleasure to have them and frequently request that students be encouraged to select their specific laboratory for their training.

study where their qualification will be more valued), or to convince graduates of such courses that a more rewarding future lies in manufacturing or other industries and not the medical pathology laboratory industry.

In line with broader human resource management theory (e.g. Dooley and Prause, 2004; Mavromaras, McGuiness and Fok, 2010), some of the case study employers interviewed believed it better to employ more appropriately qualified persons in technician and assistant roles. They argued that, not only did this promote better retention outcomes[30], but VET qualified technicians actually performed the role better. Not all employers share the view of these employers, demonstrated by the analysis of job descriptions which shows that three out of seven reviewed technician jobs did not demand a qualification (see Table 6).

**Table 6: Details of qualification requirements stated in sample of 48 job descriptions**

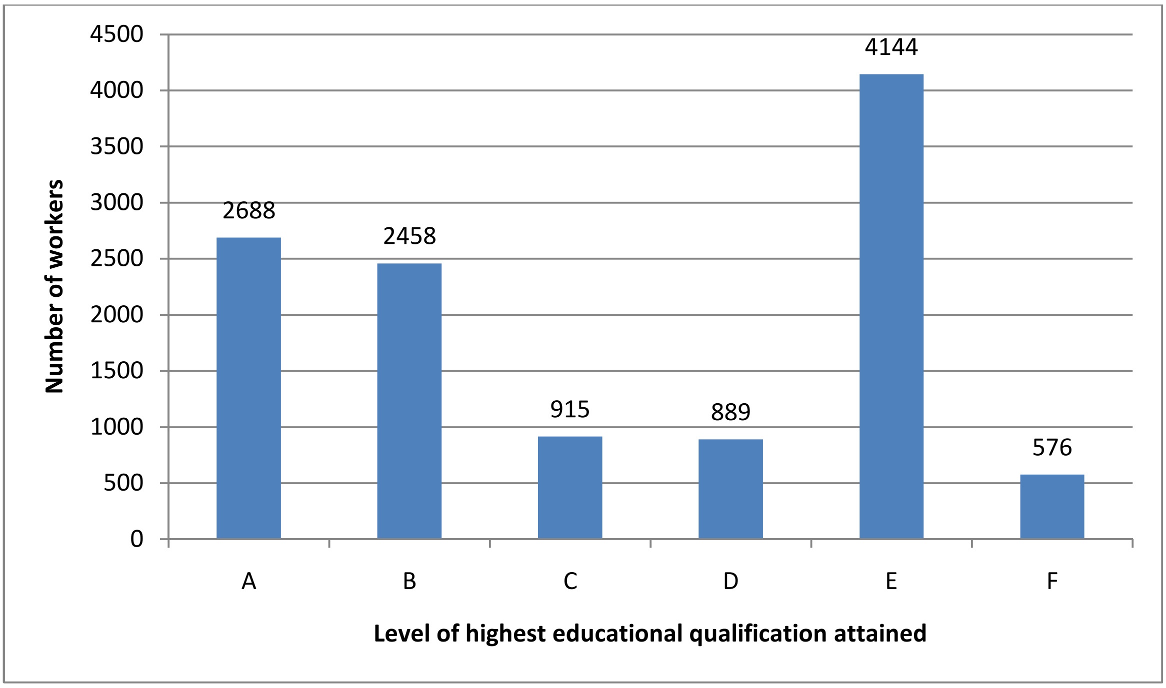
| Type of position | Essential qualification selection criteria | Desirable qualification selection criteria |
|---|---|---|
| Laboratory Assistant (9 positions) | Certificate IV in laboratory techniques or equivalent, 3 years experience in microbiology laboratory (1) | Certificate in medical laboratory techniques or equivalent, experience in a clinical laboratory |
| | Completion of year 12 or equivalent (1) | |
| | No requirements or not stated (7) | |
| Laboratory Technician (7 positions) | Certificate or Diploma in Applied Science (Medical Laboratory Science) or equivalent qualification (1) | |
| | Diploma of Laboratory Technology (Pathology Testing) or equivalent (3) | |
| | No requirements or not stated (3) | |
| Senior Technician (4 positions) | Bachelor of Applied Science(medical lab) or equivalent (1) | |
| | Degree in science or applied science or equivalent (1) | |
| | | Qualifications or training in manufacturing under cGMP conditions (1) |
| | No requirements or not stated (1) | |
| Junior Scientist (11 positions) | Relevant qualification (4) | |
| | Associate Diploma, Diploma or Advanced Diploma or equivalent (2) | |
| | Bachelor of Applied Science (Medical Laboratory Science) or equivalent qualification (4) | |
| | No requirements or not stated (1) | |
| Mid-Level | Associate Diploma, Diploma or | |

[30] Mavromaras et al. (2010) in particular point out the negative labour market outcomes of 'overskilling', including productivity and efficiency losses, and reduced job satisfaction.

| Type of position | Essential qualification selection criteria | Desirable qualification selection criteria |
|---|---|---|
| Scientist (9 positions) | Advanced Diploma in an eligible discipline (1) | |
| | Bachelor of Applied Science (Medical Laboratory Science) or equivalent qualification (2) | Postgraduate qualification in Applied Science or a related discipline and/or membership of a relevant professional organisation |
| | Bachelor of Applied Science or equivalent, tertiary qualifications in business management/ administration (1) | |
| | BSc in medical technology (1) | Masters in Microbiology |
| | Degree in science or applied science or equivalent with a major in Haematology, Member of Australian Institute of Medical Scientists or eligibility for full membership (1) | |
| | | Relevant qualification at a post graduate level |
| | Relevant Medical Science degree qualification (2) | |
| Senior Scientist (8 positions) | Bachelor of Applied Science (Medical Laboratory Science) or equivalent qualification (1) | Postgraduate qualification in Business or Health Administration or equivalent |
| | Relevant degree in Science, Applied Science or equivalent (1) | |
| | Degree in science or applied science or equivalent, with a major in Immuno-haematology or Haematology (2) | Higher qualifications such as MSc or Fellowship |
| | Post graduate qualification either Histology or Cytology and membership of professional organisations (1) | Current NATA Assessor for Anatomical Pathology |
| | Relevant degree in Science, Applied Science or equivalent (1) | Higher tertiary qualifications such as MSc. or PhD |
| | No requirements or not stated (2) | |

Figure 5 shows that just under half (48%) of the current technician / assistant employed workforce is unqualified (with a maximum of school certificate qualification; 2006 ABS Population Census). Perhaps more interesting though is that a significant proportion of this workforce (23%) possesses a degree qualification (although in what subject area is not known). This finding is supported by data from the Urbis survey (2011) which identified over 36% of laboratory technicians as having completed a Bachelor degree or higher, and over 24% of laboratory assistants with an equal level of achievement. Overall, the earlier contention that employers are willing to recruit new graduates into technician or even assistant positions seems to be validated.

**Figure 5: Distribution of the Medical Laboratory Technicians (ANZCO 311213) workforce category by highest qualification attained**




***Key to levels of qualification attained***

A = Bachelor Degree and above

B = Advanced Diploma and Diploma Level

C = Certificate IV

D = Certificate I to III

E = Year 12 or below/ No educational attainment/ Inadequately described

F = Not stated

***Source: ABS Population Census, 2006***

Despite the above noted tendency to place qualified scientists into designated technician roles (or perhaps because of this), the consultations provided evidence that an increasing number of employers (especially in the private sector) were replacing scientist's roles with technician positions (and in some cases assistants for technicians). This was argued to be a natural consequence of market forces requiring a reduction in staffing costs, and in any case a reasonable work re-design response to changing technology and laboratory processes[31]. This trend towards employment of technicians over scientists is illustrated (albeit imperfectly) in Figure 6 below, which shows a greater growth in the number of technicians than scientists over the last three census periods[32].

In any discussion of an increasing number / proportion of technicians in medical pathology laboratories, a question arises as to from where technicians are being recruited. Clearly, as noted earlier, a significant proportion is science graduates. It is

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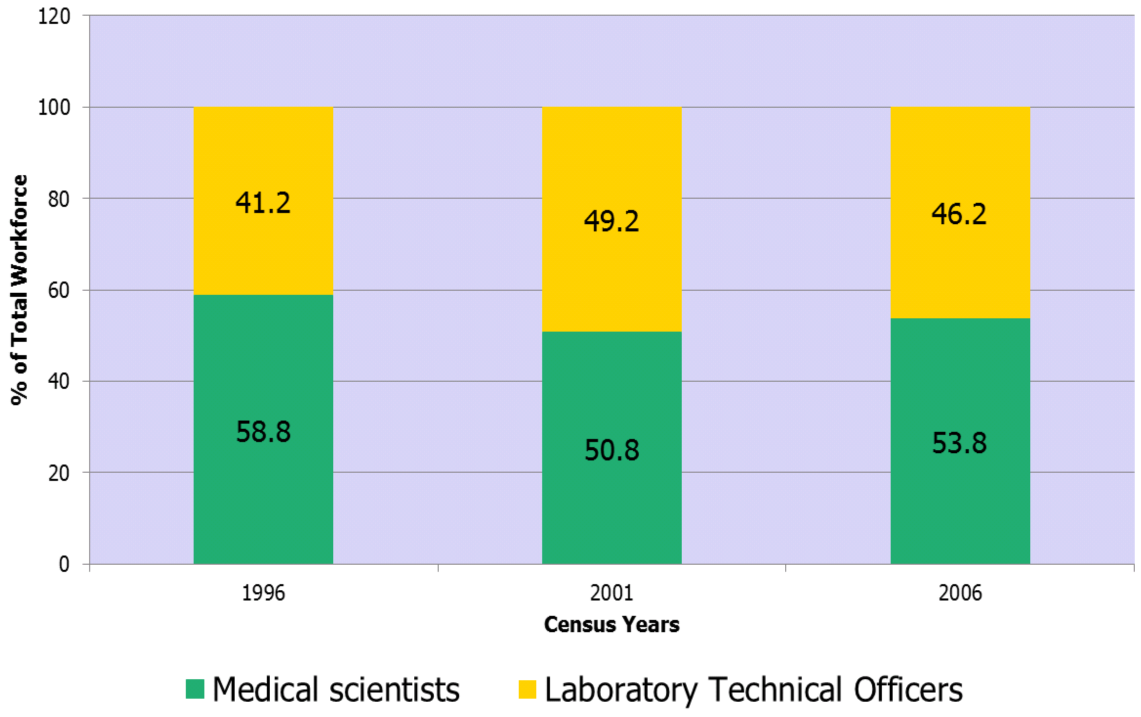
[31] Some employers for instance argued that there are too many scientists in many modern laboratories given the level of automation and changed processes of 'production' (see discussion later around Figure 7) and that there should be a higher proportion of both technicians and senior scientists.

[32] This data should be interpreted carefully. As noted previously ABS data is not considered to be accurate.

not clear that the vocational education and training (VET) sector is often supplying the medical pathology laboratory workforce, and when it is some stakeholders have expressed concern that training preparation for the roles in some jurisdictions has been unavailable and/or poorly structured. The current situation with VET training and relevant supply considerations are discussed in the Labour market considerations (Appendix B) in greater detail.

**Figure 6: Growth trends in the proportion (%) of Laboratory Technical Officers and Medical Scientist in the total medical pathology laboratory workforce**




***Source: ABS Population Census, 2006***

Despite the controversy about employment of new graduates and laboratory technicians (to which we will turn attention later), in labour market terms the most serious, or at least immediately pressing problem, seems to be with **senior scientists**. At almost every consultation in the project, concerns about insufficient candidates for advertised senior scientist roles were raised. By way of comparison, several case study employers noted an advertised junior scientist position might attract over 150 applicants (at least 50-100 of which would be 'genuine'), while an advertised senior scientist position might attract one or two candidates only. Some urgency has been instilled into considerations of this problem by the findings of the recent Pathology Workforce survey (Urbis, 2011) which show a significant number of senior scientists thinking of leaving the workforce:

> *"A significant number of senior scientists plan to reduce their working hours or leave the profession in the next five years. One fifth plan to reduce their working hours compared to two fifths who plan to leave the profession … This represents over half the number of senior scientists who either need to be replaced or whose reduced hours need to be made up, representing a significant recruitment challenge."*

'Intentions' data is a notoriously poor predictor of actual behaviour. However, in an almost exclusively salaried workforce like the medical scientists, the chances of the intentions being fulfilled are much higher.

In the next section, the aetiology of the senior scientist labour market problem is explored.

## Theme 4: Development of senior scientists

There are two main ways of considering the issue of senior scientists each of which relates to the way they are defined. The approaches are represented in the deliberations of the National Pathology Accreditation Advisory Council (NPAAC) concerning supervision of laboratories and in the many industrial arrangements overviewed previously.

The current definition of "senior scientist" for the purposes of quality accreditation, as recommended by NPAAC (2007) and endorsed under the national pathology accreditation framework, is a person:

> *"… who has had not less than 10 years full-time relevant laboratory experience and who possesses one of the following qualifications:*
>
> - *a Doctorate of Philosophy in a subject relevant to the field of pathology*
> - *a Fellowship of the Australasian Association of Clinical Biochemists*
> - *a Fellowship of the Australian Institute of Medical Scientists*
> - *a Fellowship of the Australian Society for Microbiology (medical/clinical microbiology)*
> - *a Fellowship of the Human Genetics Society of Australasia*
> - *a qualification that the Minister determines, pursuant to the definition of "scientist" in subsection 23DNA(4) of the Health Insurance Act 1973, to be equivalent to a qualification referred to in paragraph (a), (b) or (c) of this definition."*

The consultations indicated that the NPAAC definition is too restrictive to cover the broad sweep of senior roles undertaken by experienced scientists and would exclude many workers who would consider themselves (as would others) a senior scientist. However, the NPAAC definition of "senior scientist" is intended to cover the requirements of clinical aspects of laboratory supervision related to quality and safety of services for consumers. For this element of laboratory management, where scientists are working with pathologists to ensure the clinical effectiveness of pathology services, it seems appropriate to require advanced academic or equivalent professional qualifications.

The title "Senior Scientist" is used in many awards/industrial agreements in many jurisdictions in Australia where it does not necessarily have the same connotations as above. In these industrial agreements higher levels of scientist are recognised and described (Chief Scientist, Principal Medical Scientist, Senior Scientist II, Senior Scientist III, and so forth) not all of which would require the incumbent to hold a Fellowship or PhD as described in the Health Insurance Act. Rather, these titles are describing stages of progression within an employment structure and are not necessarily reflective of stages of progress within the 'profession'. The different pathways to senior status are discussed more in a later section.

However defined, the proportion of the medical scientist workforce who might be classified as senior scientists is small. Urbis (2011), based on a survey of employees, estimated the proportion of senior scientists at 12.6% of all scientists. Based on a survey of employers (which would presumably be adopting the definition of relevant industrial arrangements) the proportion reduces to 6.9% of all scientists. Analysis of the data collected through case studies for this project found the overall proportion of senior scientists (of all scientists) to be 11.2%, but this proportion ranged between employers from 2% to 21% (see Table 7). By way of comparison, the nursing workforce has a proportion of between 11.7% and 19.8% depending on how 'senior' is determined (Australian Institute of Health & Welfare, 2010)[33].

**Table 7: Comparison of case study employers* by skill mix proportions (%)**

| Senior scientists | Scientists | Lab technicians | Lab assistants | N = |
|---|---|---|---|---|
| 18% | 54% | 16% | 12% | 100 |
| 8% | 41% | 51% | 0% | 21 |
| 25% | 52% | 20% | 2% | 44 |
| 8% | 47% | 4% | 41% | 74 |
| 3% | 54% | 27% | 16% | 556 |
| 2% | 61% | 11% | 27% | 632 |
| 13% | 34% | 19% | 34% | 104 |
| 8% | 39% | 12% | 41% | 147 |
| 4% | 27% | 37% | 32% | 277 |
| 21% | 64% | 9% | 6% | 53 |
| 12% | 35% | 8% | 46% | 26 |
| 11% | 56% | 0% | 33% | 9 |
| 17% | 56% | 28% | 0% | 36 |
| 11.5% | 47.7% | 18.6% | 22.2% | 2216 |

* Not all case study staff numbers obtained

The comparatively low proportion of senior scientists within the total medical pathology laboratory scientist workforce hints at one element of the labour market problem discussed previously - that is, there are insufficient numbers of senior scientist positions to provide a reasonable incentive to scientists to invest in the pursuit of a senior scientist position. This cause of the problem is partly explored in the Pathology Workforce survey (Urbis, 2011), which makes a comparison of the qualification levels of scientists and senior scientists possible as shown in Table 8[34].

[33] This also includes enrolled nurses, thus a more comparative senior scientist proportion would need to be calculated including at least technicians but also assistants. If this entire workforce is used as the numerator, then the estimated proportion of senior scientists drops to 3.7%.

[34] Of course this begs the questions as to what would be the "right" proportion of senior scientists in both the clinical expert and management streams?

**Table 8**: **Comparative distribution of scientist and senior scientist workforces by highest qualification obtained**

| Highest qualification obtained | Workforce category* | |
|---|---|---|
| | Senior scientists | Scientists |
| Fellowship | 30.8% | 0.2% |
| Doctorate | 34.7% | 1.4% |
| Masters Degree | 15.6% | 14.1% |
| Undergraduate Science Degree | 15.0% | 70.3% |

*Note: figures do not add to 100% implying some scientists may hold none of the above qualifications

As might be expected, the senior scientist profile is much more replete with higher level qualifications. However there are less than 16% of current scientists in theory who could legitimately consider candidacy for a senior scientist role (indeed according to the NPAAC definition of a 'senior scientist', only 1.6%)[35]. The 'pool' of potential senior scientists is very small. There is a question, though, that might be raised as to whether the market could be expected to remedy this situation — essentially, will enough middle level scientists perceive a significant number of senior scientist vacancies will be available in the near future and prepare accordingly? The number of scientists doing Fellowship examinations / studies has dropped dramatically over the past 20 years – this undermines any immediate hope that the market will drive an appropriate resolution.

The various consultations arrived at a simple conclusion in regard to this labour market problem — the *investment cost* of preparing for a senior scientist role (monetary cost of completion of a relevant Master of Science course, estimated to be above $30 000, plus the social - and possibly financial - cost of time spent away from family and other social obligations) is not matched or sufficiently outweighed by the *return on the investment*. The return on investment is uncertain, first because it is dependent on a vacant position becoming available, and second because it is not determined to what level an individual might be able to progress. Using the NSW Health Professional and Medical Salaries (State) Award as an example, the immediate benefit of progressing to a 'senior' or 'chief' scientist position would be approximately $6,000 per annum, rising over time to a possible differential of just over $31,000[36]. Using these figures it would take an individual something like at least 5-6 years (depending on how their 'costs' were calculated) to break even on the investment. Realistically it might be much longer and an assessment of the worth of

[35] As noted earlier within some jurisdictions higher qualifications are not a necessary criteria for reclassification to senior scientist and other criteria such as research publications, grants, number of direct reports, etc. will have greater weight in the reclassification process.

[36] In practice the differential is less than this since promotion to year three of the Senior or Chief Hospital Scientist level is possible without obtaining additional qualifications.

the investment would have to consider how long the person intended to stay in the workforce.

In a more personal way, one individual scientist who provided written comment to the project stated the same as above as follows:

> *"Study leave is minimal so scientists wishing to further their knowledge do so at considerable financial expense as well as loss of personal time. Compounding the issue, the financial rewards for doing so are minimal as there are few senior positions, [and] the possibility to apply for an upgrading on merit (which is available to scientists in the public system) [is very limited and seemingly discretionary]. As things stand, only the very motivated and capable scientists undergo further education in spite of the limited career opportunities."*

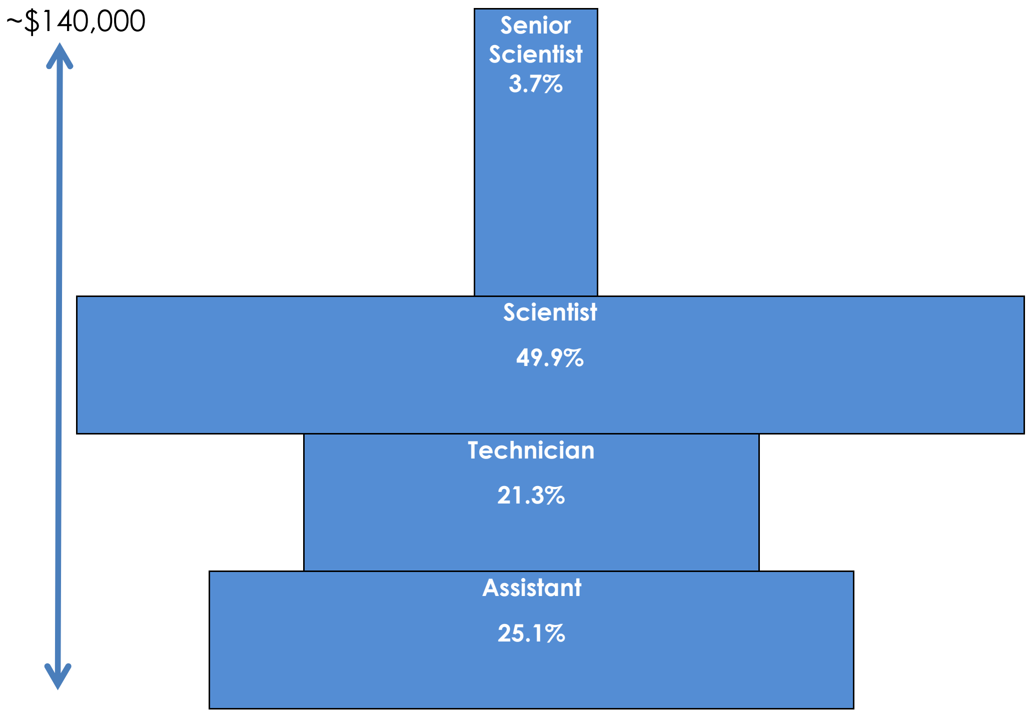
The consultations suggested that the ways of making this investment more attractive would be:

1. to decrease the cost of the investment through a) subsidising the financial costs (for instance through a 'registrar' post), b) making the training more integral to the existing workload (again, a registrar type post), and/or c) reducing the actual course costs (for instance through scholarships or HECS relief);
2. by being more generous with study leave provisions so that a balance could be achieved between work, study and family / social commitments. The case study data noted that, of the 17 employers surveyed, only one offered extended study leave; or
3. by increasing the number of senior scientist jobs, at even higher rates of pay, in a possibly elongated career framework.

In regard to this last point, and based on figures from the Pathology Workforce [employer] survey (Urbis, 2011), the workforce distribution currently looks like Figure 7, in both length (relative pay scale, again using the NSW Award) and proportion of workforce categories.

Several case study employers, if given the opportunity, would elongate this distribution, place more workers in the 'senior scientist' category, and pay for the elongation through reducing the 'bulge' of scientists in the middle of the distribution (and perhaps by increasing the proportion of technicians). This proposal provides initial and still somewhat crude thoughts for a future career framework.

**Figure 7: Scientific workforce in medical pathology laboratories distribution**




## *Theme 5: Wastage of experienced scientists*

The consultations noted that high turnover (much resulting in wastage) is believed to exist of medical scientists between 5 and 10 years out from commencement of practice. The criticality of this time period is thought to correlate with the fact that most industrial arrangements allow steady initial progression through pay scales until a 'glass ceiling' is reached around 5-7 years after commencement of practice. Progress beyond this ceiling into the next level is quite difficult, but facilitated in some industrial arrangements by provisions for 'upgrading on merit' or progression within slightly higher grades without further study requirements (although generally another 'ceiling' looms fairly soon within those higher grades). Making the jump beyond that still to 'senior scientist' levels is perceived as more like a 'hard barrier' as noted above. Accordingly, most staff structures are characterised by flat, 'bottom heavy' staff pyramids as shown above in Figure 7.

The limited scope for career progression due to the comparatively small number of senior scientist roles and the inability to progress individuals on merit or competency is believed to lead to the wastage of highly competent individuals from the workforce. The private sector can address this issue by having the flexibility within their budgets to 'create' roles when required in order to reward and retain highly competent individuals (one enterprising public sector case study laboratory was also paying selected personnel above awards wages). However, the consultations also discovered that a large amount of scientists may have already left the private sector for better paid positions within the public sector prior to reaching senior scientist levels.

The issue of wastage of experienced scientists and its cause was highlighted to the project through several written submissions. For instance:

> *"… workers become frustrated when the only opportunity to obtain a [higher paying] Hospital Scientist position is if a current position becomes vacant through retirement (or death) of others, someone leaving the profession, etc. These frustrated workers rather go into sales or technical support for pharmaceutical companies or change careers. Often those left are scientists of a lower quality."*

Not only is the 'ceiling' considered problematic but also the virtually automatic steps that workers take to arrive at the ceiling:

> *"A problem with natural progression from one level to the next based on years of employment alone is evident when there are (for example) two Hospital Scientists on the highest level and one shows great knowledge both in science and people management and the other person shows little initiative, the former should be able to progress their career further than the latter and both should not be at the same level."*

In this light, some stakeholders offered the opinion that there should be certain expectations of staff as they progress up the levels and they should not move unless those criteria are met. These criteria could be a standard test set out by the relevant body or a set of competencies (see Theme 7) against which actual skill and knowledge could be assessed. Introduction of a transparent way to determine a 'good' scientist at (say) level 8 of grade 1 from an inexperienced scientist (or one with poorly developed competencies) was thought by many to be appropriate.

Another cause of dissatisfaction identified by several long term scientists was that much of their current jobs had moved away from bench work to increasing administrative work. This has been related to processes of centralisation especially in the public sector, where they are now expected to be across all administration areas i.e. payroll, purchasing, linen etc. as well as manage the increasing paperwork demands of NATA to document quality-related processes. Many scientists believe there is a shifting away from their 'core' role which is seen as 'patient testing and consultant pathology'[37].

Centralisation has also removed the ability of staff to have input into the decision making process regarding the scope of services provided to the community. This translates to routine testing being removed from certain (normally branch) laboratories such as routine microbiology testing, a task which many staff enjoy. Apart from potential impacts on the community, for example timeliness and quality, this has resulted in a deskilling of the laboratory staff and a decrease in staff morale and motivation, especially in the more experienced categories.

Available quantitative evidence does not necessarily support the contention about wastage. On the contrary, according to the Pathology Workforce (employee) survey (Urbis, 2011) there is a large group of workers in the 6-20 years of employment demographic (just over 50% of the total scientist workforce) and there is not a

[37] Conversely there would be some scientists within the profession who would regard the opportunity to move into the "scientific manager" stream as a legitimate career path. This contribution to operations of complex pathology testing departments/organizations though is not recognized in many of the current Awards governing the employment of medical scientists.

greater proportion of those scientists stating an intention to leave the workforce, at least no more than several other workforce categories (including senior scientists, assistants and even pathologists). It is possible that after 10 years in the medical pathology laboratory science workforce the opportunities to go elsewhere and earn an equivalent remuneration are not that great. Thus, the problems identified through the consultations manifest not so much in higher occupational wastage rates but rather in lower productivity of poorly motivated workers.

## Theme 6: Rural service issues

The main thought dominating thinking of the rural[38] based medical pathology laboratory scientist workforce is centralisation of the industry. This phenomenon has been affecting both private and public sectors over the past two decades as ever increasing efficiency of service delivery has been sought. As noted earlier, centralisation has entailed relocating testing functions into fewer larger facilities in order to reap the benefits of specialisation (or departmentalisation). Functional or service centralisation processes have been accompanied by organisational aggregation.

Rural services have arguably been most impacted by these processes. Where once there was a number of small independent laboratories located all over Australia in rural areas, now, if the service has not been converted into a collection point then it will be most likely an 'outpost' of a much larger organisation whose major efforts and concerns will be in a large city. The two main effects on rural services have been:

- reduction in the amount and range of testing work performed. The latter issue is the most important, since effectively the only testing left in the rural branch services (even the larger ones) becomes the more routine, high volume request work which can be, and usually is, subject to highly automated processes. All other work is sent at best to a larger provincial laboratory but more likely to an urban centre. As one rural stakeholder noted "…Much of the microbiology work is sent to the city to be processed on large cost efficient machines; however this impacts on the turn around time of results[39]." This leads to 'deskilling' of the rural laboratory environment;

[38] Unlike many health workforces, the medical scientist workforce has very little distribution in remote areas, the consequence of the high minimal cost of capital equipment required for practice. Hence the non urban based component of the workforce is essentially, with some minorr exceptions, only located in 'rural' areas (according to the ARIA index of accessibility).

[39] This was a common refrain from rural stakeholders that services to rural people and rural medical practitioners were declining. Some results were claimed now to take a week to generate whereas in the past this might be 24 hour tests.

- as a consequence of the reduction in volume and complexity of work, it becomes harder to justify senior technician but especially senior scientist roles. This includes management roles since staffing numbers to support management effort is insufficient. Moreover, much management decision making is devolved to the centre, leaving local management roles largely only with supervisory and operational content[40]; and
- a deskilled service environment has adverse consequences for attracting scientists in particular and many rural stakeholders contributing to this project claimed this made the already difficult task of recruiting and training scientists even more difficult. One stakeholder wrote on this issue:

> *"Staff in rural and remote labs still learn all of the tasks and processes but then the opportunity to [use these skills] in practice comes so infrequently that staff forget how to do them in between occasions of being required to do so. Regional centres are being 'leached' of work that is imperative to maintenance of skill level – thus a cause and effect takes place, rural and remote labs cannot attract persons over [in competition with] the metro labs … are they creating the problem or reacting to it?".*

Ironically, many rural practitioners claimed their scientists are often multi skilled and competent across many areas (not just one speciality as is often the case with city based scientists) and on a daily basis interact more with patients and medical staff and provide clinical advice. This applies to Technical Officers as well (especially in NSW) who appear to have a role expectation similar to medical scientists. For instance, Technical Officers are expected to work on-call, perform cross matching, interpret QC, validate results and provide clinical feedback.

Thus several stakeholders offered the perspective that rural medical pathology laboratories were a good place for training people, but maybe not a good place to keep workforce in the longer term. This possibly has implications for thinking about career frameworks, indeed one rural stakeholder who submitted a written contribution to the project wanted to share their own career pathway:

> *"I achieved my Bachelor of Medical Science at Curtin University and subsequently gained employment as a multi-disciplinary Medical Scientist at a regional centre and public lab based at the public hospital. After working there for many years, I was offered a lecturing position at a TAFE and have since been a lecturer in the pathology units in the Cert III, IV and Diploma of Lab Technology.*
>
> *As a member of AIMS and liaising with PathWest and Curtin University, I have been aware of the difficulty of recruiting and maintaining Medical Scientists in rural areas, especially the remote north of WA. The Curtin course now has a large component of work placement which places students in some of the regional labs and encourages them to stay there.*

[40] An alternative view offered is that ccomplexity of testing does not necessarily equate with increased knowledge and competency. For example, the shortage of pathologists generally and in rural areas specifically provides opportunity for role extension for the medical scientist who by default will have greater input into consultation and interpretation with the patient management team. This would be regarded as an increase in work value and an increase in breadth of knowledge and as such would be recognized under a competency-based career structure and would be rewarded with the appropriate status.

> *As a TAFE lecturer, I can see a good pathway for candidates who live in rural or remote regions to be trained from a TAFE level into a university degree. These people whose lives are based in a rural town are more likely to stay and work there as a Medical Scientist than someone who comes from a big city and is willing to work in a rural area until they get more experience and then want to move back to the city (not unlike graduate teachers).*
>
> *I have been running a traineeship program at PathWest for Technical Assistants who do not have a qualification to achieve a Cert IV Lab Techniques, which could be used to gain entry into the Curtin degree course. It is hoped that the student would then be placed back in their home town for the work placement component of their degree course and ultimately end up back there as a Medical Scientist after graduating and completing their Bachelor degree."*

This quote highlights two points - firstly, the value of training *in situ* or as close as possible to where people are meant to practice, if the desire is to boost rural recruitment outcomes and secondly, the potential for technician roles to be a source of supply to science roles[41]. For reasons already discussed, this seems like a remote option in urban based services, but of much greater potential worth in rural areas.

Continuing the theme of rural practice as a training ground, stakeholders were aware of few trainee hospital scientist positions and queried where graduates from universities enter the workforce. They noted that years ago there were numerous postgraduate year 'graduate trainee' placements offered in rural hospitals and this was seen as an 'excellent opportunity' for training. It was suggested that re-investing in these positions would be a way of stimulating more interest in rural practice but also building a stronger workforce of more multi-skilled young scientists.

It was considered that graduate trainee positions might be best located within a 'network' of rural / provincial services rather than in a single laboratory. Similarly, as will be discussed later, constructing more rewarding career frameworks might be more feasibly achieved in a network of laboratory services where the scope and volume of work can more viably support some degree of specialisation and management differentiation.

## *Theme 7: The place of competencies*

It has been noted in earlier sections of this paper that there are ambiguous boundaries between technician and less experienced scientist levels of the medical pathology laboratory science workforce. This is manifest in stakeholder comments but more particularly in the behaviour of employers who routinely employ science graduates in technician roles and, when the circumstances are conducive, employ technicians to perform much of the recognised scientist role. In this instance the value of qualifications in supporting decisions is limited. Other examples of this include:

- judging the length of time required by a novice scientist to master particular skills or areas of practice; currently this is based on arbitrary and highly

[41] One stakeholder noted though there needs to be substantial incentive for technicians to take up the additional training required including time release to attend classes.

discretionary judgements of managers and may lead to quality risks (insufficient time to develop full competence) or significant inefficiency (continued training efforts long after competence has been achieved); and

- promotion of individuals into higher levels of practice (and generally accompanying higher levels of pay) based on judgements of merit. Many industrial arrangements have this provision at the nexus of transition from scientist to lower grades of senior scientist.

These are just some examples of where qualifications do not do a good job of discriminating between individuals or roles. A more fine grained measure is required in such circumstances. In other areas of health workforce where these same problems are encountered the use of competency standards are being advocated and used (e.g. Gadiel, D., Ridoutt, L., Lin, V., Shilton, T., Wise, M. and Bagnulo J. (2010). A similar claim is being made for use of competencies in the Australian medical pathology laboratory science workforce[42], and to that end much work has been undertaken to create and maintain a set of competency standards (Pathology Associations Council, 2009) with high levels of relevance and currency.

These competency standards are of a high quality and, after nearly a decade of development, have been tested repeatedly and found to be valid. They compare well in terms of coverage with competency standards for other Australian health workforces and with overseas standards (see for instance Beck and Doig , 2002). Most importantly, in approaching the task of role delineation, the development and introduction of competencies has improved the discussion, and allowed some distance to be developed from the more emotive discussion involving qualifications (Bell, Whitfield and Obbink, 1993; PAC, 2009; Badrick, 2010). This competency framework is also being considered for inclusion in the NPAAC supervision standards that are currently under revision.

In Table 9 below, a crude analysis of 48 job descriptions collected from case study employers is provided, based on the actual citing (within duty statements, task requirements, skills or knowledge statements) of the 13 main areas of competence described in the competency standards. The figures in the Table show the proportion (%) of the types of position that cited the nominated competence. Shaded boxes are those where greater than 50% of jobs in the 'type of position' category cited the competence area.

The analysis reveals, at least in formal job descriptions, that there is a lot of overlap at a gross competency level between roles, and there are few competencies the requirement for which allows good discrimination between types of worker. Of course the outcome of this analysis could well be different if taken to a more fine grained level of analysis (for instance elements of competency). Or it may easily be more a statement about the quality of job descriptions and the ease (or otherwise) of translating descriptions into competency requirements.

The scope for increasing the use of competencies is great. The most likely breakthrough area of utilisation would be in industrial arrangements, possibly in support of more innovative career structures. It seems that progression through job classification grades and levels could be more fairly calibrated (from the worker's perspective) and more efficiently achieved (from the employer's perspective) if

[42] AIMS-accredited undergraduate programs in Australia that include an extended professional practice year, measure student performance while on placement against the existing CBS document.

based on demonstrated competence rather than time served or even attainment of qualifications.

Rapid adoption of competency based processes should not be expected to occur without some guidance and support. While the poor quality of job descriptions in general is widely acknowledged, individual companies and organisations rarely have the time or resources to make revising them a priority. Similarly, restructuring an award or enterprise agreement based on competence rather than job titles requires effort and therefore involves cost, and neither the employer or employee representative parties to industrial arrangements will necessarily see the benefit of negotiation at this level. To facilitate the utilisation of competencies then, it would be advisable for exemplar documentation to be developed to assist employers in the following critical HR areas:

- industrial arrangement templates that use competencies to underpin objectively based career progression and promotion to higher graded roles;
- job description templates that clarify and define roles based on WORK to be performed and the competencies required to perform the work to an acceptable standard; and,
- development of a skills mix guidance template for a range of common work areas or broader laboratory type situations. Earlier the desirability of NATA requiring data to be collected by accredited laboratories and being in a position to substantiate the competence of their workforce was discussed (albeit from the perspective of understanding workforce size), a skills mix guide (or many guides for different work situations) might be an important aide to NATA.

**Table 9: Analysis of a collection of job descriptions by areas of competence required**

| Type of position | Areas of competence | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | A | B | C | D | E | F | G | H | I | J | K | L | M |
| Assistant | 88 | 0 | 33 | 33 | 44 | 33 | 67 | 0 | 0 | 88 | 33 | 44 | 11 |
| Technician | 100 | 14 | 100 | 57 | 71 | 43 | 29 | 14 | 14 | 100 | 43 | 43 | 43 |
| Senior Technician | 100 | 50 | 50 | 50 | 75 | 0 | 100 | 0 | 75 | 75 | 0 | 100 | 25 |
| Junior Scientist | 91 | 55 | 91 | 55 | 63 | 27 | 63 | 9 | 18 | 55 | 18 | 55 | 63 |
| Mid-Level Scientist | 44 | 44 | 100 | 33 | 44 | 44 | 67 | 33 | 55 | 55 | 44 | 67 | 100 |
| Senior Scientist | 38 | 50 | 88 | 75 | 50 | 100 | 38 | 63 | 38 | 75 | 75 | 63 | 88 |

***Key to competencies***

A = Preparation and analysis of clinical material

B = Correlation and validation of results of investigations

C = Knowledge of method(s) including analytical principles

D = Interpretation, reporting and issue of laboratory results

E = Maintenance of documentation, equipment, resources and stock

F = Maintenance and promotion of safe working practices

G = Continuing professional development

H = Professional accountability for test selection

I = Development and use of laboratory investigations

J = Liaison with health workers

K = Continuously improve the service

L = Contribute to improvement of practice

M = Train health workers and others

Away from the direct workplace it would be appropriate if curriculum development for relevant education and training courses (and especially for assessment of on-the-job 'bursary' type course components or other forms of clinical practice assessment) were more overtly competency based[43]. Similarly the processes for assessing overseas qualifications, currently the province of the Australian Institute of Medical Scientists might be more overtly based on the competency standards.

Analysing role requirements through competencies would be an objective way to resolve debates on staffing issues (particular when and where to employ technicians or scientists). One stakeholder noted:

> *"With the current cuts in pathology funding (through Medicare Australia etc.) employers will be looking at work being picked up at the technical level. Placing this technical workforce in the appropriate levels may be possible via competency based assessment by independent assessors (AIMS/AACB etc.) and is perhaps an area that could be further explored."*

Employers could assess skills mix requirements using the guidance template mentioned above. Some stakeholders expressed hope that:

> *"... one of the outcomes of this project would be a clear definition of the workforce at all levels, in short determining what is a Technical officer, what is a Medical Scientist, what is a Senior scientist, and so on, and have these definitions uniformly applied across all awards, accreditation requirements (NPAAC) and so on across ALL states."*

## Theme 8: Management & clinical pathways

There was much debate between stakeholder interest groups about career pathways for senior scientists. The lightning rod for debate is the limited pathways to senior scientist roles other than through a commitment to become a manager. For many workers this is unattractive or inappropriate given individual skills.

The debate seems to be strongest in the public sector and have its origins in a number of what some stakeholders (especially service managers) considered to be archaic industrial arrangements. Several awards, if strictly interpreted, allow progress to senior scientist positions only through demonstration of scientific skills (in the form of Masters or even doctorate level research theses). In some States, the effort to police the letter of the award intention is significant, with compliance to the academic requirements of appointees carefully studied.

The argument in support of these award provisions and the active efforts to enforce compliance is that these senior scientist positions are an important component of the narrative of medical pathology scientists and their special and unique role in the delivery of pathology laboratory services. The many professional associations and societies strongly support union actions in this regard.

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[43] A side note here is that VET courses to prepare laboratory assistants and technicians are already fully competency based. It would be valuable, if not already undertaken, for the medical science competency standard developers to be mapped to the competencies in the *MSL09 Laboratory Operations Training Package*.

Nevertheless, increasingly in public sector pathology laboratory services a stronger management ethos seems to be taking hold. Few senior scientist positions, no matter how the incumbent arrived at the position are free of management responsibilities. Indeed this is a source of concern, where senior scientists spend significant time and effort academically proving their worth for a position that most often requires a whole different skill set to be performed well. Accordingly, there is a still small but growing cadre of persons filling senior scientist roles whose greatest claim is to management skills and yet, because they have not the requisite academic qualifications, their rights to these roles are disputed. One stakeholder summed up the situation thus:

> *"An academic qualification does not automatically mean that one is qualified to take on a management role. There are people who are academically brilliant yet practically challenged. To have progression up the career structure based solely on academia is limiting and ignores the depth of experience and talent that some have achieved. There are also plenty of current examples of people with high qualifications in one specialist niche area of medical science who have control over a large pathology service covering all disciples and are therefore expected to drive the organisation forward with very little knowledge outside their own very isolated area of skill."*

In the private sector the debate is less intense, and the idea of senior scientists being managers is more fulsomely embraced. Indeed, the opposite might well apply in that only leadership and management skills may be valued and recognised to fulfil the duties of this role. Several private sector case study organisations emphasised that the pathway to higher paid jobs was *only* through accepting greater management responsibility.

This might be an exaggeration and be more a function of the size and complexity of the private sector laboratory and relative exposure to certain labour market circumstances, especially the availability of pathologists. Generally, where the issues of primary concern to the organisation are about providing services more efficiently (driven by financial rather than cost effectiveness thinking) and where the type of services are of less complexity (highly automated), then the emphasis will be on senior scientists performing management roles. Where services are more complex in nature and pathologist labour is scarce, then organisations emphasise more the scientific (academic) skills of senior scientists.

Generally speaking though, private sector stakeholders were in favour of adding a management/leadership component to current medical laboratory science courses. This they felt was appropriate for supporting the technical skill components of the course and thus providing more rounded and prepared graduates. There was support expressed for a 'science manager' role, where the direction of specialisation would be in the management of science laboratory operations, and the appropriate 'academic' qualification to obtain would be a master of business administration.

Clearly, from the perspective of career frameworks, there must be allowance for at least two different pathways of career progress into senior scientist roles: 1) through highly developed scientific and clinical expertise (see next section) and 2) through equally highly developed management expertise. One stakeholder's comments seemingly cover both options:

> *"... recognition of higher qualifications of medical scientists by government through NPAAC and thus NATA, to the extent that some supervision of*

> *pathology laboratories can be carried out by scientists meeting the appropriate criteria in the absence of pathologist supervision, is seen as appropriate. This is currently the case in the NPAAC document on supervision. However, it could be expanded to give more incentive for scientists to study for a fellowship and to provide an expanded career pathway."*

Figure 4 in Theme 2, provides an illustrative career framework based on specialisation for the two pathways and illustrates that the progression of specialist scientist managers seemingly flows better from a generalist or multi skilled scientist role rather than a clinical expertise pathway. In fact, management could be agreed to be a form of specialisation for senior scientists, the most appropriate credentialing for which could be debated.

## *Theme 9: Clinical scientist roles*

Notwithstanding the apparent need for dual career pathways for senior scientists to become an expert scientist or a manager (or both), it seems that most scientists envision reaching the upper echelons of their profession as a specialist in their scientific endeavours and not as a manager. This aspirational vision would see the pathology senior scientist working, and being acknowledged, at the same level as pathology medical practitioners.

In Australia senior scientists currently work under a range of job titles. In the public sector, 'principal scientist' and 'chief scientist' titles are common and usually entail a significant management responsibility. The term 'senior scientist' more often implies a person in charge of a specialist area of practice, and while it might include a management role would also be expected to provide scientific advice at a high level. None of these titles conveys a sense of equivalence to pathologists, although by dint of personal achievement some incumbent senior scientists may be recognised within their peers (including clinicians) as providing an equal if not greater contribution to patient care. Numerous examples within the case study organisations were identified of such senior scientists playing a leading role in the pathology laboratory's contribution to patient care, and being the 'go to' person for clinicians seeking advice on interpretation of test results. The examples provided related to the disciplines of microbiology and molecular genetics but this is probably not a comprehensive picture of the scope of this recognition in practice.

Overseas, this situation is being addressed through the development of a range of roles and job titles (and of course appropriate job descriptions) that better promote the potential or effective contribution of medical scientists at the highest level of achievement. These include occupational titles such as Clinical Laboratory Scientist or clinical doctorate in laboratory sciences in the USA (Doig, 2005) and clinical scientist or Consultant Clinical Scientist in the UK (RCP, 2005). The job descriptions behind these titles emphasise clinical leadership and being an integral part of the clinical care team. For instance, Piller (2006) notes that the Clinical Laboratory Scientist role in the USA would:

> *"... function as the liaison between the patient's medical care team ... and the clinical laboratory, and as such would not only be involved in interpreting and communicating laboratory results but would also facilitate appropriate testing and test preparation."*

Although these positions do not formally exist yet in Australia, various professional associations (including the AACB) have conceptualised and begun to advocate for such roles. A recent document (AACB, 2008) describes a 'Senior Clinical Scientist (Laboratory Manager/Principal Scientist)' as follows:

> *"Scientific staff with very highly developed and advanced clinical and scientific and/or management expertise with responsibility for decision making and accountability, providing leadership across a number of areas/disciplines, bringing strategic direction, innovation and influence through practice research and education and carrying responsibility similar to consultant medical staff. They will have attained high level relevant postgraduate qualifications and appropriate professional awards and qualifications (Fellowship and vocational evidence). This group may require another level of recognition from the professional associations."*

Several stakeholders noted that the supply and demand for *pathologists* must be taken into consideration when examining career pathways for scientists. A discussion of the scientific workforce in pathology cannot be separated from a discussion of the role of the senior scientist or clinical scientist in the current environment, or their role in performing new clinical roles as consultants in the future. It was pointed out that progress by scientists even into informal roles of clinical leadership has been most significant in those areas of pathology laboratory science where there are pronounced shortages of pathologists (e.g. chemical pathology) or emerging ('greenfield') areas of practice (e.g. molecular genetics) where senior scientist roles have not had to evolve within the shadow of pathologists — indeed, scientists have been able to relate more directly with treating physicians. One stakeholder offered the following written comments to the project:

> *"Support for clinical senior scientist roles is highest in certain discipline areas, mostly where the number of pathologists is small and accordingly their influence less. Thus molecular genetics, microbiology are promising areas. Clinical and haematology areas are also promising because they are quite large and proportionally the number of pathologists small, and many scientists already in senior roles, albeit with a management role."*

The area where pathologist numbers are strongest is in anatomical pathology. Noticeably in this area the role of medical scientist is perceived to be the most circumscribed. However even in this area there are circumstances where pathologists are considered to be in undersupply and therefore the opportunity for medical scientists to create enhanced practice roles exists. In Canada and parts of the USA a 'pathologist's assistant' role has emerged in areas of significant pathologist shortage. The role is described as follows:

> *"The Pathologists' Assistant assumes major responsibility for the initial examination and dissection of all surgically removed tissues and to a variable extent, for the dissection of bodies during post-mortem examination."* [44]

Some of the tasks they perform include:

- describe and dissect surgical specimens;
- standardise dissection techniques;
- photograph and X-Ray specimens;
- summarise medical histories;

[44] See University of Manitoba course notes at the following web address: http://umanitoba.ca/faculties/medicine/units/pathology/practicum.html

- assist in research of projects; and
- supervise pathology residents and laboratory students.

When presented to a focus group of cytologists during this project, the pathologist's assistant role (or something possibly more aptly named for the Australian context) was well received and believed to be within reach for those scientists with extensive experience in histology. It was noted that courses to develop competence in preparing histology samples have already been established.

Similarly the UK model of the advanced practitioner role for highly qualified cytologists to take over the reporting of Pap smears from pathologists was also raised.

There is a noticeable ambivalence in the relationship between medical pathologists and the medical pathology science workforces. On the one hand the important role pathologists (through the Royal College of Pathologists Australasia) can play in formalising recognition for the clinical scientist position through College Fellowship processes (such as in the UK) is acknowledged. On the other hand, consultation input has suggested that some pathologists also appear to play a role in controlling and limiting medical scientist career structures through their influence over operational and political processes.

From the perspective of career frameworks, there was little if any dissent in regard to the construction of very senior scientist roles. However some comments supplied to the project by stakeholders, especially through the senior scientist focus group, are appropriate to consider:

> *"Consultant pathology can carve its own niche' and can have the relevant status the only thing lacking would be the way to get there. Scientists cannot be expected to 'go off and do it on their own backs'. If this is the only option available there will continue to be a limited number of senior scientists."*

> *"The UK model offered is noted to be driven by Government; the UK model also has an attached training program which enables individuals to progress through it. Scientists in the UK can sit the pathology exam."*

> *"There is a need to make the effort required in gaining very senior scientist status worth it. Having a scientific registrar would go a long way towards it. A successful model like this will need pushing from several different directions."*

> *"The daily work requirements of hospital scientist's means that they fulfil key roles in pathology laboratories and are considered suitable to be directors of pathology laboratories, however the professional role of hospital scientists are seen by stakeholders of the scientific workforce as being undermined with the view of many employers that automation does not require a highly educated workforce- a dangerous assumption for the well being of patients. This view is held by those who have not run an automated analyser. All automated analysers can generate results even with no reagents on board. It is the person loading and checking the results produced that must have the expertise to recognise the relevance of the results, laboratories with under qualified staff will not be aware of the clinical significance of the results."*

There are clear pointers in these comments for conceptualising career frameworks.

## Selected examples of overseas job descriptions

Set out below are three examples of overseas job descriptions:

### Pathologist Assistant, Canada

**Job Description:**

The successful candidate will be responsible for performing duties not limited to but including: gross description, dissection and dictation of surgical pathology specimens, photography/photomicrography and, assisting Pathologist in performing autopsies.

**Qualifications:**

- graduate of a recognised program for Medical Laboratory Technology and be registered with CMLTO; or BSc (Honours) with certification from a recognised Pathologist Assistant training program;
- experience with Pathology Photography;
- excellent interpersonal skills;
- commitment to quality and patient safety;
- recent work experience in a Histology laboratory;
- working knowledge of Microsoft Office applications; and
- preference will be govern to applicants with previous pathologist assistant experience or recent certification from a recognised training program.

### Pathologist Assistant – Anatomic Pathology, Canada

The Pathologist Assistant will be responsible for:

- providing strong subject expertise for the medically delegated grossing procedures and technical services in the Surgical Pathology laboratory;
- working effectively with medical staff, management, peers, and internal and external users to ensure quality patient care services are maintained;
- participate actively in opportunities to improve services through; use of synoptic templates, identifying, evaluating and implementing technological enhancements and workflow analysis using LEAN principles;
- adheres to standardised practices in daily performance of duties as part of the total quality management system;
- must be proficient in grossing the most complex specimens, frozen sectioning, digital image capture and analysis of radiological findings; and
- active participation at internal and external meetings and committee work is required.

**Skills and Qualifications:**

- advanced degree (Pathologist Assistant) preferred;
- minimum 3 years experience as a PA required (may include ed. term for PA degree);
- demonstrated grossing ability with the most complex specimens;
- demonstrated ability to provide quality frozen sections under strict timelines;

- strong theoretical and working knowledge of good lab practice required;
- demonstrated leadership potential; and
- demonstrated knowledge and use of LEAN principles.

## Clinical Laboratory Scientist, USA

**Summary of Responsibilities**

Reporting to the Executive Medical Director, PHSA Labs, and/or to the Director, Pathology & Laboratory Medicine, C&W; the Clinical Laboratory Scientist carries responsibilities related to patient care, laboratory operations, education and research, according to professional standards, practice guidelines, and codes of ethics for health professionals.

**Scope and Complexity**

The Clinical Laboratory Scientist:

- provides consultative expertise and guidance to physicians throughout all stages of patient care (screening, diagnosis and management of disease);
- may assume laboratory management responsibilities, including acting as a Laboratory Associate Director or Laboratory Director, Program Director and/or Site Head;
- provides direction and leadership, in part through participation in committees at the levels of C&W, PHSA and national or international professional societies;
- directs, supervises and/or performs development, validation and implementation of novel assays and lab methodologies;
- provides supervision, training and clinical education for medical residents, subspecialty Fellows, medical undergraduates, other health professionals, technologists, student technologists, graduate students and/or postdoctoral research Fellows; and
- performs a wide range of related academic activities (as part of the hospital's commitment to UBC).

**Duties/Accountabilities**

A Clinical Laboratory Scientist may be required to perform all or any of the following, as appropriate:

- reviews and interprets laboratory test results, and issues reports to physicians;
- provides consultations for physicians regarding interpretation of laboratory results, including their diagnostic or medical significance, and provides advice regarding any necessary follow up investigations;
- advises physicians regarding the appropriate choice of laboratory tests and utilisation of laboratory services;
- oversees the selection, design, development and implementation of new or improved diagnostic assays and relevant technologies or instrumentation, and writes the related SOPs;

- evaluates and monitors current laboratory tests as required to maintain timely and accurate diagnostic capacity, and guides technologists in troubleshooting and resolving technical problems which may arise;
- provides leadership in quality control and quality management, including assessing the necessity and applicability of various external proficiency schemes;
- is on-call as required by the Department;
- participates in clinical rounds and teaching rounds for medical residents, technologists, and other professional staff;
- provides direct supervision and training for specialty Fellows within the clinical laboratory;
- provides teaching and supervision for UBC undergraduate and graduate students;
- maintains up-to-date knowledge in his/her specialty field of clinical practice;
- conducts clinically-relevant research in his/her field of expertise, and disseminates results through presentation of work at local, national or international meetings and by publication in academic journals;
- is knowledgeable of, and abides by, the hospital's Rules and Bylaws as they apply to Medical Staff; and
- performs other related duties as assigned.

**Qualifications**

A level of education, training, and experience equivalent to a high level of expertise in a specialised area of clinical laboratory medicine. This will usually require all of the following:

- a Doctorate of Philosophy (PhD) in a relevant field, following appropriate predoctoral education and training;
- postdoctoral research Fellowship training and experience; and
- formal clinical Fellowship training with examination leading to Board certification, for example Fellowship of the Canadian College of Medical Geneticists (subspecialty in biochemical genetics, molecular genetics or cytogenetics) or Fellowship of the Canadian Association of Clinical Biochemists.

# Section 7: Principles of a career framework model

## *Principles*

The NSW Pathology Workforce Forum(held in April 2008) highlighted serious supply problems emerging with the laboratory scientific workforce and advocated, to resolve perceived retention problems, defining a better career framework which might include re-establishing traineeships, reviewing scientific award structures and redesigning work to clusters so they can manage their workforce within an agreed budget without additional bureaucratic processes. Similar concerns had been expressed overseas (e.g. Johnston and Milne, 1999) some years before.

The consultations undertaken for the current project were almost universally in support of improving career frameworks, although an understanding of the purposes of such change and the general direction it should take were not as equally shared.

It is the consultant's view that any career framework for the medical pathology laboratory science workforce (and there may be more than one to accommodate the different labour market and organisational structural contexts) should satisfy the following **principles**:

- **Principle 1**: The career framework should be comprehensive – by this it is meant that all components of the workforce (at least laboratory assistants, laboratory technicians, medical scientists and senior scientists) should be included within the framework. This seems obvious, but currently many industrial arrangements [deliberately] segregate the workforce categories, at best resulting in poor articulation between categories of workforce, at worst setting workforce categories into a form of 'competition'.
- **Principle 2**: Introduce competency based processes to support career framework structures — there are four major elements or stages in a framework where judgement on capability is required. These are:
    - delineation of different workforce categories,
    - transition from education to work or between workforce categories,
    - progression through pay levels within a single job classification (or grade), and,
    - promotion to higher levels of work / positions.

  All of these processes are able to be established on a more objective footing by being calibrated against competencies instead of qualifications. In regard to each of these four processes there exist bodies of work that form an immediate starting point from which limited additional effort should be required:

    - delineation of workforce categories (see PAC, 2008);
    - transition from education to work — the competency standards for laboratory technicians and for medical scientists form the standards against which assessment of an effective transition can be measured. Work on the competency standards for medical scientists foreshadowed by Badrick (2010) in specialist areas of practice would

form the basis for assessment of successful transition in these areas (from novice to competent);

- progression beyond initial competent practitioner level (currently achieved by simply keeping one's job) could be instead based on demonstration of achievement of competence along a set pathway (which could be determined by the employer or through an enterprise agreement or award);
- promotion could be based on a broader perspective of competence that acknowledges larger steps in proficiency and capability (that are likely to be an accumulation of smaller competency gains). A New Zealand Career Framework produced by the Ministry of Health and District Health Boards NZ Workforce Group (2007) offers a template as follows (some proficiency levels have been omitted):

**Table 10: NZ Career Framework template**

| Career stage | Broad competencies | Type of workforce |
|---|---|---|
| Foundation | Jobs with supervision and limited responsibility. Limited or no formal educational requirements and instead on-the-job training only. | Laboratory assistant roles. |
| Support | Some responsibility and possibly limited decision-making under direction.<br><br>Ideally some formal education, through the VET system | From the more capable and possibly qualified assistants through to technicians and even senior technicians |
| Transition | Moving to decision making roles; moving from direct to indirect supervision | From senior technician roles to competent laboratory scientist. From science graduate to competent laboratory scientist |
| Proficient | Moderate to high complexity decision making; may be coordinating others | From competent scientist to preparation for senior scientist status |
| Advanced | Advanced decision making roles; may include leadership responsibilities; role development in depth and/or breadth.<br><br>May require further qualifications | From preparing for senior scientist to senior scientist in management or specialist teaching or research role |
| Expert | High complexity decision making; independent roles; likely to include leadership and resources responsibilities; expertise in an advanced area | From senior scientist to clinical scientist with recognised input to patient care meetings |

| Career stage | Broad competencies | Type of workforce |
|---|---|---|
| | May require some examination process, for instance to obtain Fellowship | |

- **Principle 3**: The articulation of career pathways should be clear — in all human resource management affairs, especially where incentives are implied (including progression and promotion), the processes must be absolutely transparent and not subject to discretionary judgements; and,
- **Principle 4**: Learning opportunities should be built into the career framework — ideally, for both employer and worker, learning opportunities that are developed and supported on the job are the most efficient and effective.

The findings from the consultations during this project largely support and add flesh to the 'bones' of the above principles. The issues below are the major concerns associated with career framework change identified from the 'themes' detailed in Section 6:

- there is a need for at least **two pathways** within a career framework – 1) a pathway that allows continued development of expertise as a scientist (probably through research in assay development or applied research into new assay implementation) of, and 2) a pathway that builds and utilises management competencies;
- there are currently very messy arrangements associated with the transition from education to work, both for technician and novice scientist roles. As noted previously, **graduate trainee positions** (while still in existence in theory in many industrial arrangements) in practice in most jurisdictions have effectively disappeared[45]. Compared with many other health professions the result is quite unstructured and very divergent pathways into practice and towards minimum levels of proficiency. The employment of new graduates again, that is according to past practice, in graduate trainee positions was strongly advocated[46].

  At the same time, **apprenticeship or traineeship** positions to support the training of laboratory technicians through the largely on-the-job training process, are as equally rare as graduate trainee positions, not unexpectedly given the propensity of many employers to replace technicians altogether with willing science graduates. Again, especially for those few labour markets

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[45] It was pointed out by some stakeholders that some AIMS accredited courses have a significant professional practice component embedded in their four year course structure, and that this effectively amounts to a *de facto* traineeship. The best example of this is in Victoria where the RMIT course requires year three students to spend an entire year working within a medical pathology laboratory. This is referred to in Victoria as the "bursary year", and is supported by employers who pay the student $15,000 during the year.

[46] One stakeholder offered the opinion that it may be easier to [re-]establish work-based training with students (in accredited course) rather than expect laboratories to take on a fulltime [trainee] employee. Certainly the capacity to mandate such processes would seem stronger through curriculum changes to accredited courses, however most industrial arrangements have graduate trainee provisions, they are simply not used. The exception is in QLD where the new award is fostering graduate traineeships.

where graduate scientists are difficult to recruit (e.g. rural areas), stakeholders favoured the structured training to workforce transition process embodied in an apprenticeship / traineeship arrangement;

- the **progression of scientists** from novice status to proficient practitioner and on to more expert status is highly problematic and determined more by chance than design, with little structured support for the process and limited application of appropriate incentives. Progress is almost guaranteed through early years of employment irrespective of actual progress towards greater competence. Satisfactory progress is hence reliant mostly on the professional commitment and attitudes of young medical scientists rather than a conducive, structured and efficient environment for learning and a set of incentives to reach requisite proficiency levels as soon as possible. It is likely therefore that individuals move from novice to proficient practitioner status at greatly varying rates, which is only partly to do with individual capabilities and much more to do with the differing employment / learning environments. Stakeholders have advised that progress from novice to proficient practitioner status should be directed and 'mapped' against identified competencies, and subsequent pay rises, promotions and work allocation, all made consequent to assessed levels of competence.

  More concerning to most stakeholders than progress from novice to proficient practitioner status, is the **transition from proficient to expert practitioner** level. It was detailed earlier at length that incentives to make this progression are not just lacking - rather, there are disincentives to medical scientists taking this journey. The result is a shrinking pool of competent scientists being prepared for senior scientist or advanced roles. Stakeholders have advocated the introduction of a **registrar type training program**. Similar to apprenticeship and graduate traineeship roles, the registrar posts would involve mostly on-the-job training opportunities, supplemented possibly by structured course work through a relevant postgraduate course of study. One radical suggestion from a consulted stakeholder was that a mechanism already exists to take medically-trained persons with little or no pathology laboratory background or competencies into a pathology training program — what is required is to open this training to suitably experienced and competent medical scientists; and

- not surprisingly there is significant stakeholder support for 'lengthening' the career pathway of medical scientists by introducing **extended practice roles**. Such roles already exist in practice — for instance a private practice case study had a senior scientist effectively substituting a pathologist in a clinical pathology setting while a senior scientist geneticist in a public pathology laboratory case study was the primary contact for clinicians in that hospital. Yet these roles are not formally recognised in awards / agreements or even in organisational structures, and survive on the basis of the indispensability of the individual concerned. Nevertheless these roles offer a template for formally constructing advanced and extended medical science practitioner roles to be placed in industrial agreements and organisational career frameworks. A number of extended practice roles have been detailed overseas and they can add to the development process. As many stakeholders pointed out, the health service contexts in the UK, Canada and the USA are very different to those pertaining in Australia so a direct transplant of ideas from those countries may not be appropriate. It is unlikely, though, that some aspects of these enhanced practice roles could not be considered for the Australian context.

## *Principles to practice*

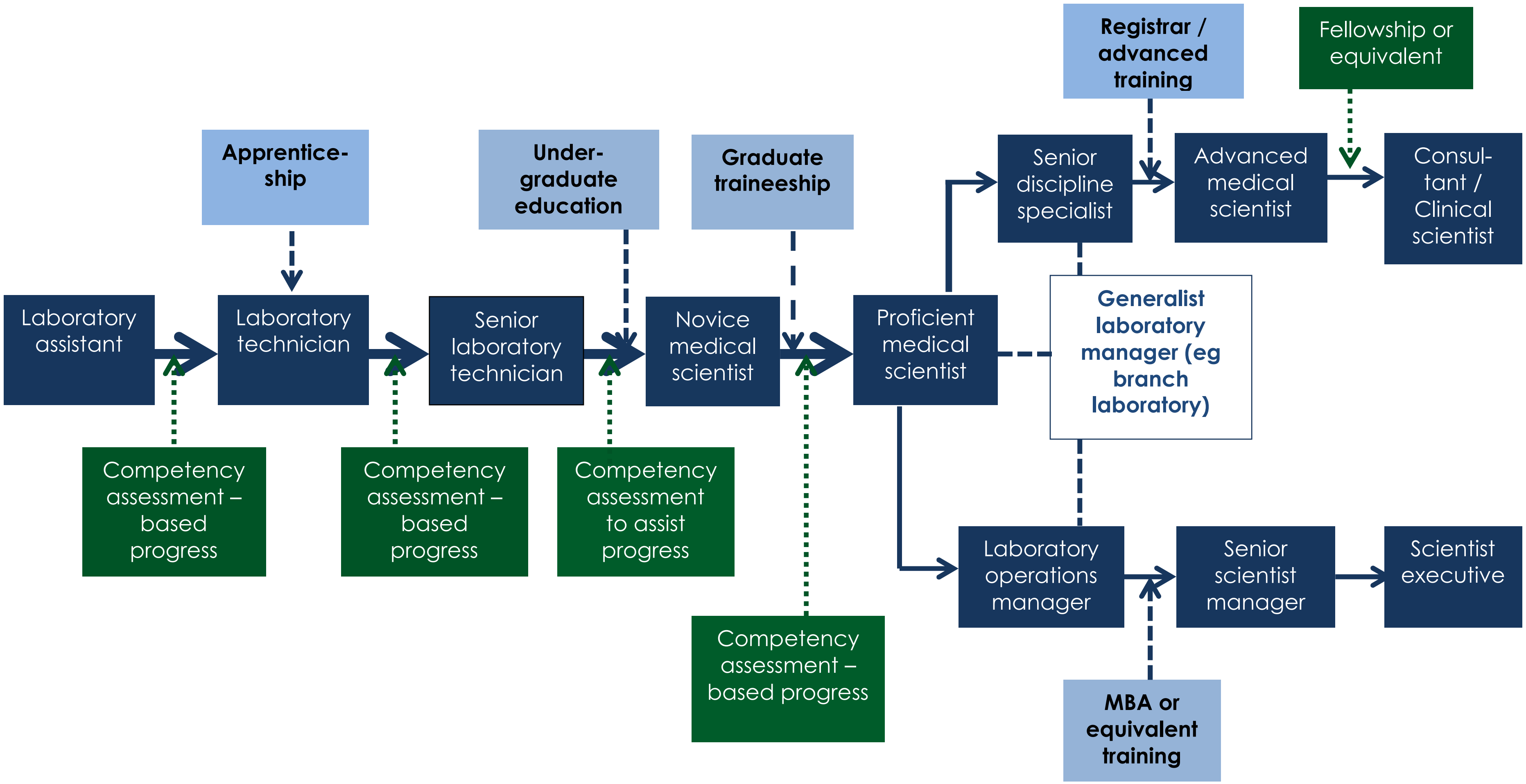
As noted before, and despite entreaties by many stakeholders for uniformity across jurisdictions and service sectors, it is unlikely that a single career framework would be appropriate to fit all the different circumstances in various medical pathology laboratory science labour markets.

Nevertheless, a single draft career framework model has been developed and is presented in Figure 8. It includes all the viable ideas that have been made available to the project through either the consultations or the literature, and adheres to the principles laid out earlier in this section. In particular, it is comprehensive, it allows for progress on the basis of assessed competence, it has hopefully clearly articulated pathways and it has built-in, formal learning opportunities.

How this structure might be used is open to debate, although ideally it would inform:

- the construction of all future industrial arrangements;
- the thinking of employers, both public and private, in drafting organisational structures and attempting to create optimal career pathways for their staff, including management competency development;
- policy and program development by various government agencies and Health Workforce Australia, in particular to inform investment in apprenticeships, graduate traineeships and registrar training efforts; and
- changes in NPAAC clinical supervision standards, with a view to making the requirements for *labour* quality more comprehensive, transparent and on a proper objective footing. This will almost certainly imply adoption of a competency based approach rather than a qualifications basis for setting standards and is consistent with the direction toward competency assessment flagged by NPAAC in their recent consultation process.

**Figure 8**: **Outline of possible career framework for the scientific workforce in medical pathology laboratories**



# Section 8: Discussion and next steps

In the previous Section broad principles for an Australian medical pathology scientist career framework that could improve a range of workforce key performance measures were outlined. In summary, these were:

- ***comprehensiveness*** – all components of the workforce (at least laboratory assistants, laboratory technicians, medical scientists and senior scientists) should be included within the framework;
- ***competency based processes to support career framework structures and judgements*** — more objective and transparent decision making around work allocation to staff categories, transition from education to work, progression through pay levels and promotion to higher levels of work / positions through use of competency standards;
- ***clear articulation of career pathways*** — the processes of progression and promotion must be absolutely transparent and not subject to discretionary judgements; and
- ***ample learning opportunities*** — structured learning experiences gained on the job are the most efficient and effective.

A study of career frameworks in several overseas countries, including Canada, New Zealand, the USA and especially the United Kingdom confirms that implementation of these principles is not outrageous and is eminently achievable. Elements of these principles having been incorporated into recently introduced industrial arrangements for the medical pathology scientist workforce in Australia (Queensland and Western Australia; see Section 5) provides further evidence of the validity and sense of the principles.

Nevertheless, no matter how persuasive the arguments mounted here and elsewhere for change to career frameworks, there remain several real obstacles to broader progress on implementation. These include:

- resistance to changing industrial arrangements. There are many vested interests on both the employer and employee sides of the industrial relations setting that would prefer the status quo and work to retain the plethora of varied arrangements;
- labour market circumstances. For instance employers are likely to be more motivated in regard to looming problems of a shortage of senior scientists (which could potentially threaten operational capabilities) than in regard to high turnover of 5-10 year experienced scientists or technician roles being inappropriately filled by graduates (which results in more indirect, hidden costs to the employer and more direct cost to workers);
- cost constraints. In very tight operating conditions in both the private and public sector laboratories, but especially in the bulk billing private sector[47], there is some doubt that investment will be made in discretionary areas of funding such as training. Dedicated training positions may need third party subsidisation; and
- key differences between the public and private sectors. The same cost imperatives described above particularly affecting the private sector could

[47] See Evans, M. '*Dr Bateman's primary concern*.' Sydney Morning Herald, Monday 30th May, 2011.

dominate workforce decision making and drive the search for non workforce solutions (that is substitution of capital for labour).

To overcome these and other barriers, a powerful reason to change and seek new career frameworks is necessary. Some of the outcomes and benefits of investing in and adopting innovative career frameworks based on the principles enunciated earlier are outlined in Table 11 below. These benefits need to be highlighted for employers through relevant forums (e.g. NCOPP and AAPP) and directly to employers through business case studies of attempted career framework change (for instance as with the changes being pursued by PathWest in Western Australia).

**Table 11: Outcomes and benefits of adopting innovative career frameworks**

| **Outcomes** | **Benefits** |
|---|---|
| More uniformly skilled workforce, with all workers forced to obtain minimum competency standards | Higher productivity from pathology laboratory services |
| Closer relationship between the demand of the pathology laboratory work and the type of labour (competencies) actually deployed | Efficient use of labour, probably reduced (or re-distributed) cost od labour |
| More efficiency in deployment of the employer training investment with training effort being directed by competency standards and structured training arrangements / positions | Reduced cost of training to achieve the same or better levels of workforce competency. Less time required to obtain proficient workers |
| Increased availability of supply for senior scientist positions | Higher quality candidates to fill senior scientist positions as they become vacant or are created |
| Reduced loss of highly skilled scientists 8-10 years after graduation and commencement of work | Retained levels of productivity |
| Increased capacity of laboratory services to interface with clinical services as medical pathologist labour is augmented by high quality extended capability scientists | Less bottlenecks in production and delays in reporting. Potential reduction in cost depending on skill mix arrangements adopted |

To proceed further from this Final Project Report, and begin to actualise the career framework vision it offers for the medical pathology scientist workforce, requires several fairly immediate actions, followed by some longer term strategic actions. The following actions, broadly nominated in an order of potential commencement, are suggested.

## Making better use of competency standards

As noted previously, much work has been undertaken to create and maintain a set of competency standards for the scientific workforce in medical pathology laboratories by the Pathology Associations Council (see Theme 7). These competency standards have been tested repeatedly and not found wanting. They represent an under-utilised resource for improving the development, management and assessment of the medical science workforce. The following actions provide pathways for use of the competency standards.

**Action 1**: **Review current industrial arrangements** – as part of this study a preliminary examination of relevant industrial arrangements (awards and enterprise agreements) was undertaken, primarily to understand current Australian approaches to career frameworks, the level and type of variation, and to identify any patterns in the structure of industrial arrangements.

A more comprehensive audit of individual industrial arrangements would be appropriate to assess each arrangement against the principles outlined earlier that would underpin an innovative career framework and to identify elements of current arrangements that could or should be more widely incorporated into awards and agreements.

The review would be followed by the development of a *competency based template for industrial arrangements* that could be used by industrial relations parties to guide new award or agreement negotiations.

**Action 2: Supporting the wider use of competencies within the workforce** – in addition to formal industrial arrangements, development of other exemplar documentation could assist employers to use competency standards much more widely to guide or underpin a range human resources practices. This could include the following areas:

- templates that use competencies to underpin objective based career progression and promotion to higher graded roles;
- job description templates that clarify and define roles based on WORK to be performed and the competencies required to perform the work to an acceptable standard; and
- development of a skills mix guidance template for a range of common work areas or broader laboratory type situations. A skills mix guide (or many guides for different work situations) might be an important aide to NATA.

## Gaining a thorough understanding of the labour market in conjunction with HWA

A greater understanding of workforce size and other supply and demand variables in order to undertake labour market analysis is required. Some useful work may be completed prior to enlisting the support of Health Workforce Australia (HWA) to develop this understanding. Initially some data clarification steps could be taken to seek a remedy for the most compelling obstacles to labour market analysis (Action 3) to pave the way for HWA to explore a more complete methodology for understanding demand (Action 4) and then to conduct a traditional labour market analysis (Action 5).

**Action 3: Explore and assess the feasibility of different approaches to build current data on workforce numbers and skill mix** - As noted in the separate report describing the workforce (see Appendix B), data crucial for the conduct of medical pathology laboratory workforce planning is unavailable or untrustworthy. Arguably, since it affects all other workforce calculations and projections, the most critical data problem is the estimate of workforce size. In this study wildly varying estimates of the workforce size have been presented, none of which at this time promotes great confidence. It is suggested that the following actions be undertaken:

- since another Population Census is close (this year) work with ABS to ensure the coding of persons who fit legitimately within the boundaries of the medical pathology laboratory scientist workforce is essential. It is assumed that work on the ANZSCO codes (and descriptors) themselves might be too late, however if this was possible then an even better result might be conjured from the Census data;
- a feasibility study of Medicare Australia [again] collecting data on the types of laboratory staff employed in medical pathology laboratories on the *Application for approval of premises as an accredited pathology laboratory (Section 23 DN, Health Insurance Act, 1973)* form. A practicable approach to processing data collected by Medicare Australia into information needs to be developed; and
- NATA could be approached to collect (or ensure employers collect) data on the types of laboratory staff employed in medical pathology laboratories during their accreditation processes. Again the feasibility of this course of action needs to be assessed and realistic processes for it to happen designed and provided to NATA to implement.

**Action 4: Build data on service / labour demand** —The other problem area for data is in relation to labour demand. Secondary data sources such as Medicare Benefits Schedule (MBS) data as a measure of trends in demand for private practice labour can be explored in more detail, notwithstanding this source being challenged by stakeholders for a range of reasons ('coning' practices, private billing, unreported non MBS tests, etc.). Similarly, public sector utilisation data can be collected, and despite the current lack of consolidated service utilisation data from the public sector, this seems not to be a significant problem. Some interesting studies have been undertaken around growth in demand at least for MBS item services (e.g. Britt, 2008), however these studies are complicated by the rapidly changing nature of the testing environment itself, making relationships between service volume and labour requirements difficult to draw, especially into the future.

Ideally secondary data sources would only be used to provide a 'support' picture for a more precise understanding of labour demand generated from the capture of primary data. The latter data would be generated by 'ground up' collection of data from an intelligent sample of medical pathology laboratory services. Since there are only approximately 130 employers in Australia, a thorough case study approach to a sample of carefully selected (representative) employer cases, based on the need to extrapolate the data to the entire industry, would make sense. This approach would generate estimates of demand that could be tested against estimates derived from secondary data, but more importantly would generate a more realistic sense of the future based on the likely decisions of many employers within the market.

**Action 5**: **Undertake labour market analysis** — Again for this project much of the ground work for a formal and traditional workforce planning exercise was completed, the results of which are reported in Appendix B. In Section 6 Theme 3 of this Final Project Report some qualitative analysis of the labour market was detailed, with views expressed on the possible state of various labour market segments.

Ideally, projected labour market analysis would be undertaken on the market segments (e.g. public / private / not for profit; urban / rural) and a national picture developed by aggregating the segments. The rapidly changing and uncertain technology environment lends itself to 'future search' methodologies.

## *Improve structured training and clinical practice*

Apart from entry level (undergraduate) training into medical laboratory scientist roles, which is largely (though not exclusively) governed by AIMS accreditation processes, training for other roles in the medical pathology laboratory science workforce is often unstructured and informal. There are several points in the proposed career framework model (see Figure 8) where more highly structured and formal, on and off-the-job and competency based training is suggested.

**Action 6**: **Support structured training for senior scientists** — The most critical area of investment in structured training proposed in the short term is preparation for advanced practice (senior scientist), a registrar type training post. While such a training post does not yet exist in Australia (although in WA a Masters level postgraduate course has been constructed through a partnership between PathWest and the University of WA that is claimed to be very close to a registrar post), appropriate models to copy have been well established in the UK and North America.

It seems unlikely that industry (especially the private sector) in the first instance would provide financial support for registrar positions, and so significant government subsidy for such positions seems inevitable for them to eventuate. State and Territory Governments might see the wisdom of this course of action similar to the thinking behind the WA Government initiative — the vast majority of registrar posts for advanced medical training are currently so supported.

Additionally (or alternatively), the Commonwealth Government and / or HWA may be interested to support developments in this area as an extension of a broader role in support of expanding clinical practice training for a range of health professions (a COAG initiative being implemented through HWA). Clearly also, the ambitions of HWA in health workforce innovation and reform, in particular to develop health workforce models to support new models of healthcare delivery, can be rapidly actualised in the medical pathology laboratory services area through a comparatively modest investment in a reasonable number of registrar posts.

**Action 7: Clinical practice for new graduate scientists** — In cases where the undergraduate medical laboratory science course includes a significant 'built in' practical component, for example like the RMIT course, there is a seemingly good relationship between trainees and employment. However where courses have limited and a widely considered insufficient practical component, it is considered advantageous to employ graduates initially in a 'graduate trainee' program.

Third party support of 'graduate trainee' programs would be contentious. For many health professions there is a long tradition of support for 'graduate trainee' processes (e.g. internships for medical practitioners, traineeships for nurses and physiotherapists, preceptorships for pharmacists, etc.). A precedent for a similar such intervention for medical pathology laboratory scientists has recently been established in QLD Health. However it could be argued that these positions and programs have always been the responsibility of employers, since they are the immediate beneficiaries, and they have supported them in the past.

It would seem valuable to explore further the way medical laboratory science undergraduate courses are likely to evolve in the future and the extent to which the RMIT professional practice year model will copied by other AIMS accredited course providers, thus arguably obviating the need for traineeship posts. If this type of course evolution though is not likely, ways of introducing more structured and uniform (and equitable) *education to work transition* processes across the labour market segments might need to be canvassed.

Investment in structured training of the professional workforce, particularly at the senior scientist level, will have a powerful effect on the career framework for the medical science workforce. In pursuit of reform at the 'top end' of the career path, it might be easy to neglect the shortcomings in training at the assistant and technician level. And yet, for the future quality of medical pathology laboratory services one could argue investment at this level is equally if not of greater importance.

**Action 8: Training of technicians** — Apprenticeships and traineeships for aspiring laboratory technicians and assistants, which result in VET qualifications from largely on-the-job training processes, are strongly favoured by employers in some quarters. This is especially so in rural areas where identifying and training the workforce *locally* is perceived to alleviate workforce shortages.

There is a range of VET courses specifically designed to prepare workers for support level roles in laboratories, although not specifically for medical pathology laboratories. Investigation of the NCVER graduate outcomes data for these courses could provide a better understanding of the actual, current market share of graduates from appropriate VET courses / qualifications that enter the medical laboratory workforce. It is anticipated that the actual 'market share' from these course for medical laboratories is in fact low and attempts could be made to talk with the VET sector and pathology laboratory employers to increase their uptake by offering apprenticeships and traineeships. An advantage of this is that training would then automatically become more specific to the pathology laboratory setting as well as increasing the supply from this source.

Fortuitously funding for these apprenticeships might be possible from the education and training system, but a strong case would need to be developed and each State Training Authority approached (possibly with the same business case).

No doubt other actions could be envisaged, but the above actions should begin to shift medical pathology laboratory employers and other stakeholders at an accelerating rate towards adopting and implementing new career framework models that act to inspire, encourage and invigorate a future generation of medical pathology laboratory assistants, technicians and scientists.

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# Appendix A: Information Paper

## Index to Information Paper

# Introduction

A highly trained and skilled workforce is essential to the provision of quality pathology[48] services and the health care services that rely on this workforce. Michael Legg & Associates (2008) estimate that 70% of all medical treatments are based on a pathology diagnosis:

> *"It is the diagnostic skills of pathologists and their laboratory-based scientific colleagues that allow patients to know if they are pregnant, anaemic, diabetic, at risk of heart disease or if their lump is cancerous."*

It is widely thought that the pathology workforce (discussed below) is now in a serious shortage situation, a circumstance that has been evolving for some time (AMWAC, 2003). As a consequence future pathology service delivery is under question, evidenced in the warning from Michael Legg & Associates:

> *"… it is clear that there is … a real problem with workforce shortages in pathology and … available projections infer a further and significant impact on service quality and timeliness if urgent action is not taken."*

To date there has been little information available about the scientific workforce in medical pathology laboratories. At the National Workshop on Patient Safety and Quality in Pathology, convened by the Department of Health and Ageing and held in November 2007, workforce shortages (pathologists, scientists, technicians and health informaticians) was identified as the number one priority issue as impacting on the safety and quality of the pathology system and by implication, patient safety. It was agreed that the issue needed further consideration and so the current project arose from the concerns expressed at the Workshop.

The primary objective of this project, the *Career Structures and Pathways for the Scientific Workforce in Medical Pathology Laboratories*, is to provide an analysis of current and future workforce supply and requirements for the medical pathology scientific workforce. The study will examine the appropriateness and adequacy of current supply strategies and investigate options to promote improved retention outcomes especially through career pathways development for the scientific workforce.

This **Information Paper** attempts to set the foundations for achievement of the above objectives by:

- first defining the workforce boundaries, a prerequisite action to any workforce study but a surprisingly difficult task, especially for the workforce in question; and
- second, exploring the way medical pathology laboratory work and the workforce is currently organised or could be organised. In regard to the latter, variation in Australia and models of workforce organisation in selected overseas jurisdictions will be examined.

The Information Paper is intended not to prescribe or predetermine future discussion in any particular direction, but rather stimulate thinking processes and inform subsequent consultations around what is a feasible workforce to study and what are

[48] Pathology is the study and diagnosis of disease. The word pathology is from the Greek 'pathos' which is "feeling, suffering"; and 'logia' which is to study. Pathology is a specialty within medicine utilised to inform the diagnosis, monitoring and treatment of disease.

some of the ways workforce effectiveness can be enhanced. There is no agenda underlying the Paper to provide benefit to any interests other than patients who rely on quality medical pathology laboratory services to optimise their health outcomes.

The Information Paper will be distributed to individuals and organisations who will participate in extensive consultations around Australia during March and April, 2011. In the future stages of this project the findings of consultants will be used to refine reporting on career frameworks and estimates on workforce supply and demand variables will be introduced and factors that influence supply and demand outcomes canvassed and assessed.

# Definition of the workforce

## *Overview & approach*

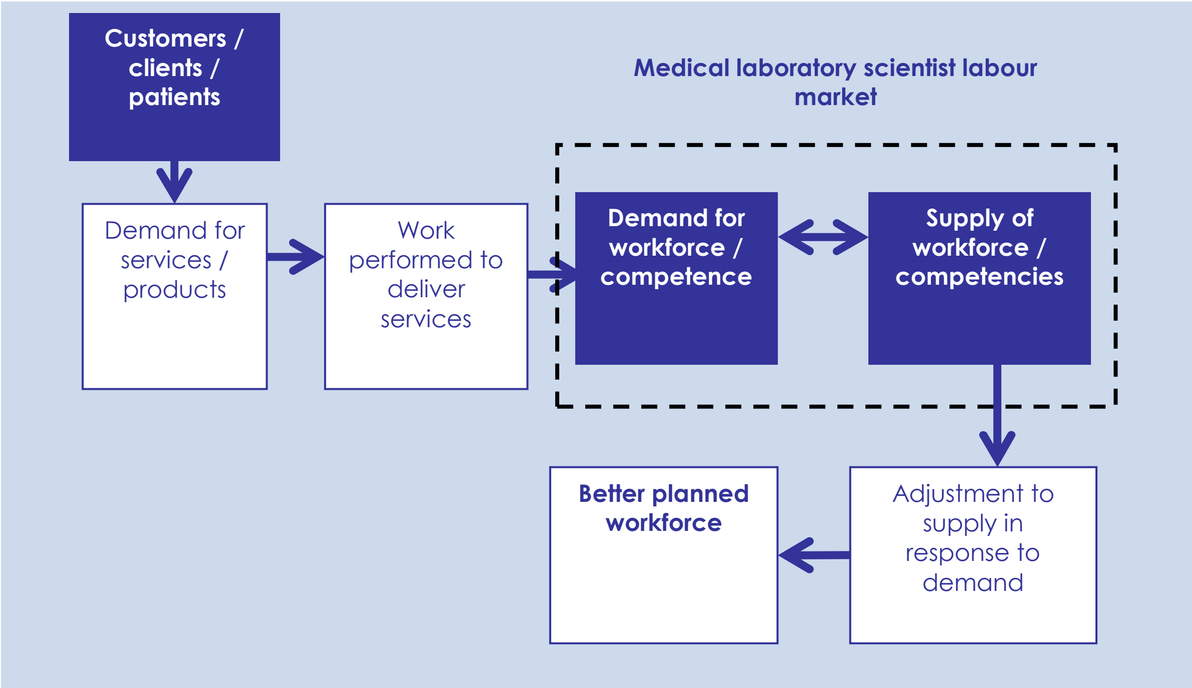
In order for any effort to enumerate a workforce to be successful, clarity is first required on what is being counted. Crudely stated, determinations must be made on who is 'in' and who is 'out' of the workforce. For many health workforces these boundaries are relatively simply and easily set by registration requirements, and only those who can be registered are 'in'[49]. In some cases where registration is not required the relationship between minimum qualifications for employment (rigidly enforced by professional and industrial associations) and the workforce are very strong and act like *de facto* registration requirements. For example the speech pathology workforce can be fairly neatly defined as people employed with a relevant speech pathology qualification.

The scientific workforce in medical pathology laboratories is not required to be registered and there are only broad guidelines and general conventions that govern employment decisions. The workforce is characterised by multiple job titles and multiple skill levels. Any attempt to draw conclusive boundaries will be deemed arbitrary at best … and yet that is just what this study must and will attempt.

Attempts to define the workforce and determine workforce boundaries, indeed to explore any workforce aspect (including demand and supply), are governed by a fundamental model or conceptualisation of workforce planning. A broad overview of the proposed approach is provided in Figure 9. The clear starting point for considering workforce issues is to look at what services need to be provided (or indeed what consumers of services, or third party payers such as the Government on their behalf, are demanding). This defines the WORK that must be done and therefore the labour or workforce that is required to perform that work at requisite quality standards.

[49] This too can be at times a deceptively precise definition when taking into account persons who could be registered but are not and working in 'non clinical' roles such as academia or public policy.

**Figure 9: Workforce considerations start with the demand for services**




## The work defined

One way to establish the boundaries of the 'scientific workforce in medical pathology laboratories' workforce therefore, would be to simply include all those workforce types that perform work within **medical pathology laboratories**. A more precise although potentially narrow way of defining the work might be to include only Pathology services covered under Category 6 of the Medical Benefits Schedule (MBS). Category 6 in the Medicare Benefits Schedule Book (2010) comprises the following broad sub headings:

P1 – Haematology
P2 – Chemical
P3 – Microbiology
P4 – Immunology
P5 – Tissue Pathology
P6 – Cytology
P7 – Genetics
P8 – Infertility and Pregnancy tests
P9 – Simple basic pathology

While Medicare (and therefore MBS items) is not relevant to pathology services provided by the public sector, we can nevertheless assume that the same type of work (and therefore similar workforce) would be required for public and private sector pathology services. That is, the broad MBS Pathology services groupings could apply to both settings.

In addition to the medical pathology laboratory services area there are other service areas that might employ a 'medical laboratory science' workforce such as the **research laboratory facilities** (universities, hospitals or private laboratories) who are conducting biomedical research and development to advance knowledge of life processes and of other living organisms that affect human health, including viruses, bacteria, and other infectious agents. The processes in these facilities would seem to be very similar to those in medical pathology laboratories.

For the purposes of the *Career Structures and Pathways for the Scientific Workforce in Medical Pathology Laboratories* project then, the boundaries set to describe the workforce could include all personnel involved in the processes (work) of researching, testing, evaluating and reporting clinical specimens or samples to identify, study and treat human disease.

## *The workforce performing the work*

Most, if not all medical pathology laboratories, have a variety of occupational categories that actually undertake the work in the laboratory. Michael Legg and Associates (2008) list all the following occupational forms as contributors to the production of pathology tests and results in a 'typical' laboratory:

- Specialist pathologists;
- Medical laboratory scientists;
- Health informaticians;
- Technical officers or medical laboratory technicians;
- Laboratory assistants;
- Collectors and nurses;
- Pathology couriers;
- Clerical staff and others directly involved in testing; and
- Management and support services.

One could argue that all of the occupations listed above comprise the scientific workforce in medical pathology laboratories. Clearly this definition, while in some ways delivering unambiguous workforce boundaries, in other ways is unsatisfying since the significantly mixed competence workforce would not allow easy analysis at a macro or whole of workforce level.

What makes better sense is to study those parts of the medical laboratory science workforce that (a) contribute in the most critical way to the outcomes of the work, (b) are the most closely related and potentially interchangeable forms of labour, and (c) are the most difficult forms of workforce to develop. The Department of Health and Ageing and the Project Reference Group have essentially designated the following workforce categories as fitting the above criteria:

- Specialist pathologists – medical graduates with an additional five years specialist study and training to become expert in the use of laboratory tests to diagnose and treat disease. All pathologists have the role of interpreting the laboratory findings in a clinical context.
- Medical laboratory scientists – generally graduates (although many of the older scientists have honed their skills on the job from lesser initial qualifications) with specific training in medical laboratory science and experience in testing in at least one of the disciplines of pathology.
- Technical officers or medical laboratory technicians – are workers with two years' post-high school training to the Certificate IV or Associate Diploma levels. Although they work under the direction of a medical laboratory scientist, they are able to do most routine work in the laboratory.

- Laboratory assistants – are workers with no formal training other than that provided within the laboratory to meet specific needs.

From the above list, the specialist pathologists are excluded since they have been studied elsewhere (e.g. AMWAC, 2003) and are considered separately to this study as they belong to the broader medical specialist workforce[50]. Therefore the boundaries determined for this study of scientific workforce in medical pathology laboratories require a focus on:

- Senior medical laboratory scientists (2.23% of pathology workforce[51]);
- Medical laboratory scientists (30.19% of total pathology workforce);
- Medical laboratory technicians (12.87% of total pathology workforce); and
- Laboratory assistants (15.09% of total pathology workforce).

As will be seen in subsequent sections of this paper, the above occupational titles are not free from controversy. Although these occupational terms are widely used and understood in Australia, other occupational terms are used interchangeably, especially overseas. For instance the classification 'laboratory assistant' has no currency in the Australian and New Zealand Standard Occupation Classification[52] (ANZSCO) classification system; the occupation simply does not exist. At the other end of the skills spectrum, a range of terms are used instead of 'senior scientist', particularly in the United Kingdom and the USA.

# Segmenting the workforce

As well as drawing the boundaries to the workforce it is important to look at the internal workforce segments. Like most workforces, much energy is devoted to the process of segmentation in various ways ostensibly for the purposes of allowing specialisation and for delineating roles (and thus providing a logical basis for a number of human resource management processes). Once segments are created, a number of professional associations and societies are then generally formed to harden and clarify the lines between different segments. This has certainly been the case with the scientific workforce in medical pathology laboratories. Segmentation (in the form especially of 'specialisation') encourages and facilitates knowledge generation, but it also can create inefficiencies in work allocation and labour

[50] One could easily argue the other way that the medical pathologist workforce cannot be considered in isolation especially from medical scientists, and especially when attempting to understand and estimate workforce demand. Boundaries are inevitably arbitrary though and ultimately determined on varying forms of logic. In any case, even though specialist pathologists are excluded from this study's definition of the scientific workforce in medical pathology laboratories, it will be important to understand the role of pathologist as it impacts on the supply of and demand for the workforce that is defined for this project. Recent pathologist workforce studies have identified a severe shortage of pathologists in Australia. This shortage is driving work that in the past may have been performed by a pathologist into the role of scientists. For instance, the bulk of chemical tests are now analysed and reported independent of pathologists and even in anatomical pathology increasing amounts of the 'work up' of tissue samples is being undertaken by scientists. This has a flow on effect to other parts of the medical laboratory science workforce.

[51] This data obtained from the employer data of the National Pathology Workforce Survey, 2009

[52] Australian Bureau of Statistics publication number 1220.0, 2009

deployment. Segmentation is the antithesis of effective workforce planning, since it places limits on the freedom for labour to move.

There are two main ways the scientific workforce in medical pathology laboratories is segmented:

- by level of skill; and
- by specific area of work. This relates largely to the testing techniques applied to different types of diseases and conditions, and as a consequence the type of work can be quite 'specialised', especially in larger pathology laboratories.

## Segmenting the workforce by level of skill

As noted already, the scientific workforce in medical pathology laboratories includes workers ranging from ANZCO skill level 2 (senior scientists, medical laboratory scientists) to ANZCO skill level 4 (laboratory assistants) with medical laboratory technicians in between. The various segments defined by skill level are discussed below.

### Medical laboratory scientist

The ANZSCO description of the medical laboratory scientist occupation (code number 234611) is provided in the associated box on the following page. There is no registration or similar requirements in Australia for medical laboratory scientists; however some level of regulation is applied at least in respect to medical laboratory scientists employed in private pathology laboratories where payment from Medicare is sought for services delivered. *The Health Insurance Act 1973* clarifies the educational background required of medical laboratory scientists as follows:

***"Scientist** means a person who possesses one of the following qualifications:*

a. *a degree in science or applied science with subjects relevant to the field of pathology awarded after not less than three years full-time study, or an equivalent period of part-time study, at a university in Australia, that provides for direct entry or following examination to a professional class of membership of the Australasian Association of Clinical Biochemists, Australian Institute of Medical Scientists, Australian Society for Microbiology, Australian Society of Cytology, Human Genetics Society of Australasia*
b. *an associate qualification conferred by the Australian Institute of Medical Technologists before 1 December 1973*
c. *a qualification that the Minister determines, pursuant to the definition of "scientist" in subsection 23DNA(4) of the Health Insurance Act 1973, to be equivalent to a qualification referred to in paragraph (a) or (b) of this definition.*

The term 'medical laboratory scientist' is widely used and understood in Australia. In the USA and Canada the occupational title 'medical technologist' (see for instance Harmening, Castlebury and Lunz, 1995) is widely employed and more recently the term 'clinical laboratory scientist' has become popular (see for instance Beck and Doig, 2002).

These occupational titles are considered to be synonymous with the medical laboratory scientist term used in Australia and describe workers with very similar if not the same work roles. In New Zealand the preferred occupational title appears to be 'medical laboratory scientist' (Legge, 2008) and the role thus described is the same as an Australian medical laboratory scientist.

In the United Kingdom, within a system that is in a state of flux (which is discussed more later), the emerging [and seemingly equivalent] occupational title is that of 'healthcare science practitioner' (UK Health Departments, 2008). There is some uncertainty around this call since the lines between different types of scientific workforce in medical pathology laboratories have become [deliberately] blurred as the intention to create more seamless career paths (Department of Health, 2005) has been enacted.

The need to properly position these different occupational titles viz a viz the Australian context will become apparent later when alternative career pathways are considered.

MEDICAL LABORATORY SCIENTISTS conduct medical laboratory tests to assist in the diagnosis, treatment and prevention of disease.

**Indicative Skill Level:**
Most occupations in this unit group have a level of skill commensurate with a bachelor degree or higher qualification. In some instances relevant experience and/or on-the-job training may be required in addition to the formal qualification (ANZSCO Skill Level 1).

**Tasks Include:**

- preparing tissue sections for microscopic examination
- examining and analysing samples to study the effects of microbial infections
- analysing samples of body tissue and fluids to develop techniques to aid in the diagnosis and treatment of diseases
- advising Medical Practitioners on the interpretation of tests and methods for use in the diagnosis and treatment of disease
- setting up the steps and rules of laboratory medical testing
- operating and maintaining laboratory equipment
- maintaining laboratory quality assurance and safety standards
- preparing scientific papers and reports

## Senior medical laboratory scientist

ANZSCO does not provide a separate occupational title code for a senior medical laboratory scientist. However, the term is increasingly used in the literature (e.g. PAC, 2009), in a number of Australian awards and other industrial agreements, and in a number of overseas jurisdictions (by a range of similar names, as outlined below). This role / occupation is also specifically recognised by the *Health Insurance Act 1973* in relation to the accreditation standards that apply for the supervision of pathology laboratories that are incorporated into the legislation as part of the arrangements for assurance of quality of care in relation to Medicare-funded pathology services. The current (2007) definition of "senior scientist" for the purposes of the accreditation framework, as recommended by the National Pathology Accreditation Advisory Council, is noted below:

> ***Senior scientist** means a scientist who has had not less than 10 years full-time relevant laboratory experience and who possesses one of the following qualifications:*
>
> *a. a Doctorate of Philosophy in a subject relevant to the field of pathology*
> *b. a Fellowship of the Australasian Association of Clinical Biochemists*
> *c. a Fellowship of the Australian Institute of Medical Scientists*
> *d. a Fellowship of the Australian Society for Microbiology (medical/clinical microbiology)*
> *e. a Fellowship of the Human Genetics Society of Australasia*
> *f. a qualification that the Minister determines, pursuant to the definition of "scientist" in subsection 23DNA(4) of the Health Insurance Act 1973, to be equivalent to a qualification referred to in paragraph (a), (b) or (c) of this definition.*

This definition reflects a common emphasis (nationally and internationally) for these types of positions on a requirement for relevant postgraduate study, qualifications and experience, with the qualifications gained either through an academic institution or through an appropriate professional association. Michael Legg & Associates (2008) observed that:

> *"Senior scientists often have additional post graduate qualifications from universities and/or their scientific societies. There are areas of pathology where scientists take a stronger leadership role than others – these are generally in the clinical (as opposed to anatomical) disciplines and the scientist can be the most expert in the team, especially in emerging areas such as genetics. Senior scientists provide much of the supervision and quality management in laboratories and are often recruited into laboratory management positions."*

Of course this 'rule' is not always observed. The title "Senior Scientist" is used in many awards/industrial agreements in many jurisdictions in Australia where it has a completely different set of educational and experiential requirements. In these industrial agreements higher levels of scientist are recognised and described (Chief Scientist, Principal Medical Scientist, Senior Scientist II, Senior Scientist III, and so forth) not all of which would require the incumbent to hold a Fellowship or PhD as described in the *Health Insurance Act*. Rather, these titles are describing stages of progression within an employment structure and are not necessarily reflective of stages within the profession.

The term "senior scientist" is also commonly associated with clinical specialisation and high levels of expert knowledge in comparatively narrow areas of practice. The word 'clinical' is being increasingly used in Australia in conjunction with senior scientist descriptions (AACB, Badrick, 2008) in keeping with overseas trends. In the USA educators promote a 'clinical doctorate of laboratory science' (Doig, 2005) which NAACLS (2006) describe as a "*… terminal practice degree for the Clinical Laboratory Science profession*". In the USA the 'clinical' term is justified by a vision of the clinical laboratory scientist (with a doctorate qualification) being involved directly in patient care, interfacing with the patient's medical care team, attending ward rounds in hospital settings (Piller, 2006). A related occupational title used both in the USA and Canada is that of 'pathology assistant', the role of which seems to focus on pathology specimen processing and as such they mostly support anatomical pathologists. It is not clear what level of qualification is required but it seems a masters level degree is generally considered appropriate and that these positions are often filled by people with base level medical qualifications (Dufour, 2007).

In the United Kingdom the proxy to a doctorate qualification is achieved through obtaining membership of the Royal College of Pathologists (RCP) for which they need to have sat and passed "… *an examination identical to or very closely related to the examination [of the RCP] sat by specialist registrars*" (Beastall, 2005). A similar form of recognition has opened through the Royal College of Pathologists of Australasia but without conferring the same level of status as in the UK.

As well as the term 'clinical' in occupational titles, in several countries the boundaries of medical laboratory science practice are being extended by including also the term 'consultant' in the occupational title. For instance Legge (2009) discusses the introduction to New Zealand of a 'Clinical Consultant Scientist' noting that such a role already exists in the USA and the UK and that the role "… *has not created significant issues in either the skill base or the interface between medicine and patient care*."

## Medical laboratory technician

A medical laboratory technician is an individual who has generally completed a two year Certificate IV or Diploma qualification after completing high school at a tertiary level education institution. PAC (2009) defines a medical laboratory technician as any "… *staff with VET qualifications and includes all staff currently classified as technical officers, Technician etc.*" The medical laboratory scientist supervises and directs the medical laboratory technician to perform most routine work in the laboratory. The definition provided by ANZSCO is provided in the associated box.

A key element of the description relates to skill level, where it is noted that "… *at least three years of relevant*

MEDICAL LABORATORY TECHNICIANS (CODE 311213) perform routine medical laboratory tests and operate diagnostic laboratory equipment under the supervision of Medical Laboratory Scientists and Pathologists.

**Indicative Skill Level:**

Advanced Diploma or Diploma (ANZSCO Skill Level 2). At least three years of relevant experience may substitute for the formal qualifications listed above. In some instances relevant experience and/or on-the-job training may be required in addition to the formal qualification.

**Tasks Include:**

- taking, collecting and labelling blood, urine and other samples from patients
- preparing and staining slides and tissue sections for blood and histological examination
- performing diagnostic tests on tissues and body fluids and analysing the chemical constituents of blood, urine, faeces and tissues
- testing for diseases by looking for the presence of antibodies and the products of immune response in samples

*experience"* can 'qualify' a worker for the medical laboratory technician role in lieu of actual VET qualifications. Anecdotally it is widely understood that many medical laboratory technician level workers are unqualified, having been 'grandfathered' into the role from earlier times or having had learning on the job and demonstrated competence recognised. Accordingly, drawing a distinct line between the qualified and unqualified to identify medical laboratory technicians and assistants respectively is potentially misleading (nevertheless see Figure 10 below which attempts just such a segregation).

The line between medical laboratory technicians and scientists however is much clearer, with scientists requiring an appropriate undergraduate qualification to be afforded the occupational title[53]. In several jurisdictions in the USA and Canada, in the United Kingdom and in New Zealand, the distinction between medical laboratory technicians and scientists is formalised through registration and licensing arrangements, a measure which has been frequently sought here in Australia as well (e.g. PAC, 2009).

## Laboratory assistant

A laboratory assistant does not usually have any particular training other than that acquired in the laboratory. Michael Legg & Associates (2008) identify that they:

> *"… perform many of the non-analytical tasks within the laboratory that involve specimen handling including reception, preparation and transport within the laboratory. They may load analysers but do not release results."*

Oddly, given the quite distinct way they are perceived in the medical pathology laboratory industry, laboratory assistants are not separately classified under ANZSCO but are rather coded and counted with medical laboratory technicians (see above description for ANZSCO code 311213). Laboratory assistants are generally considered by the industry to be either unqualified[54] or at best possessing a lower level vocational education and training qualification (a Certificate III or less) whereas medical laboratory technicians are normally understood to have a suitable vocational training qualification (Certificate IV, Diploma, Advanced Diploma). The relevant vocational education and training qualifications underpinning workers classified under ANZSCO code 311213 are described briefly in Table 12.

[53] Even here though, the water can be muddy. Again anecdotally it has been reported that a proportion of scientists in Australian pathology laboratories are not appropriately qualified and have been recognised (and paid) as scientists on the basis of experience, demonstrated competence and actual work performance.

[54] Indeed a discussion paper prepared by the Pathology Associations Council defines laboratory assistants as "all staff without formal qualifications" (Pathology Associations Council (PAC),2009).

**Table 12: Description of relevant courses from the MSL09Training Package for medical science technicians and laboratory assistants**

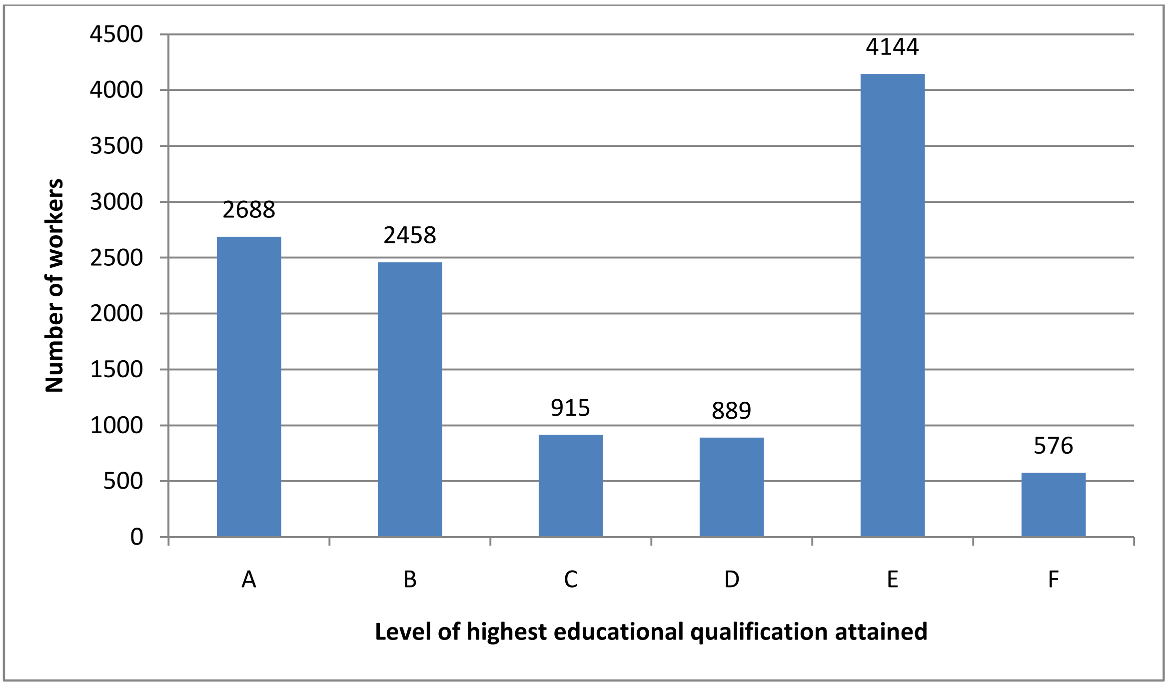
| Qualification | Code | Name | Description (taken from the Training Package) |
|---|---|---|---|
| Advanced Diploma | MSL60109 | Advanced Diploma of Laboratory Operations | This qualification covers the skills and knowledge required to apply specialist technical skills or to supervise laboratory operations within a work area or project team.<br>The Advanced Diploma of Laboratory Operations offers training in the coordination of day-to-day laboratory operations. Employment outcomes targeted by this qualification include laboratory supervisors, laboratory technical officers and similar personnel. |
| Diploma | MSL50109 | Diploma of Laboratory Technology | The Diploma of Laboratory Technology offers broad or specialised technical training in a range of laboratory technologies. Employment outcomes targeted by this qualification include technical officers, laboratory technicians, analysts and similar personnel.<br>A laboratory technician who works in a pathology laboratory may perform a range of tests on body tissues and fluids to measure quantities such as:<br>• the amount of biological substances, (for example, cholesterol or creatine)<br>• biological function (for example, clotting)<br>• the presence of drugs (for example, heparin or alcohol).<br>They may also prepare cultures, stained tissue sections and thin films to count and classify cells, bacteria and parasites. |
| Certificate IV | MSL40109 | Certificate IV in Laboratory Techniques | The Certificate IV in Laboratory Techniques offers technical training in laboratory techniques across a range of industries. Employment outcomes targeted by this qualification include laboratory technicians, instrument operators and similar personnel.<br>Laboratory technicians undertake a wide range of sampling and testing that requires the application of a broad range of technical skills and |

| Qualification | Code | Name | Description (taken from the Training Package) |
|---|---|---|---|
| | | | some scientific knowledge. |
| Certificate III | MSL30109 | Certificate III in Laboratory Skills | The Certificate III in Laboratory Skills offers entry level technical training in laboratory skills across a range of industries. Employment outcomes targeted by this qualification include laboratory technicians, instrument operators and similar personnel. A laboratory technician in a pathology laboratory may receive and prepare tissue samples. |

*Source: National Training Information System, 2010*

Figure 10 segregates the persons coded under the 311213 ANZSCO occupational category at the 2006 Population Census by skill level (highest qualification achieved) of the worker.

**Figure 10: Distribution of the Medical Laboratory Technicians (ANZCO 311213) workforce category by highest qualification attained**




***Key to levels of qualification attained***

A = Bachelor Degree and above

B = Advanced Diploma and Diploma Level

C = Certificate IV

D = Certificate I to III

E = Year 12 or below/ No educational attainment/ inadequately described

F = Not stated

***Source: ABS Population Census, 2006***

If all Certificate IV and above workers are assumed to be *medical laboratory technicians*, then there were 6061 medical laboratory technicians at the last Census.

A further 5033 workers were laboratory *assistants*[55], with a further 576 unknown (but likely distributed similar to the other workers). This implies 54.6% of the category are 'technicians', and 45.4% are 'assistants'.

## Overview

The many occupational titles introduced in the previous sections could cause some confusion given the different ways of labelling what appear to be the same occupations. In subsequent sections the closeness or otherwise of the different occupational titles to each other, in terms of competency requirements and actual role performed, will be explored in more detail. An initial summary though of how the different occupational titles broadly relate is provided in Table 13 below.

**Table 13: Comparative broad summary of laboratory science occupational titles between international jurisdictions**

| Level of skill | Occupational titles by jurisdiction | | |
|---|---|---|---|
| | **Australia / NZ** | **United Kingdom** | **USA / Canada** |
| ***Highest level*** ↑ | Clinical consultant scientist[56] | Consultant healthcare scientist | Clinical doctorate in laboratory science |
| | Senior medical laboratory scientist | Advanced healthcare scientist | Pathologist assistant |
| ↓ | Medical laboratory scientist | Healthcare scientist practitioner | Medical laboratory technologist / Clinical laboratory scientist |
| | Laboratory science technician | Associate healthcare scientist | Clinical laboratory technician |
| ***Lowest level*** | Laboratory assistant | Assistant healthcare scientist | Laboratory assistant |

In later reports of this project consultancy the active workforce size will be studied closely. In this Information Paper an initial understanding only of the order of magnitude of the scientific workforce in medical pathology laboratories in Australia is canvassed. It is generally considered that the most reliable count of any workforce, if the workforce is properly classified with an ANZCO code, is that provided by the Population Census each five years.

Unfortunately, as noted previously, each of the occupational titles identified as appropriate to Australia in Table 13 does not have a separate ANZSCO code. In fact, medical laboratory scientists and senior medical laboratory scientists are all counted under a single code – Medical Laboratory Scientists (234611). Similarly, medical laboratory technicians and laboratory assistants are all counted under a

[55] Of course use of qualifications as a level of skill measure is not fool proof. A worker with limited or no qualifications might be employed as a technician if the manager considers their competence (obtained possibly on the job) to be appropriate. Alternatively, a worker may possess an irrelevant undergraduate degree (say a Bachelor of Arts) and be working as an assistant.

[56] Note that this occupational title in Australasia has only been mooted and does not officially exist. In the other jurisdictions the titles identified actually exist and have persons employed (although few in number) against the titles.

single code; Medical Laboratory Technicians (311213). The ABS 2006 Population Census data determined the size of these two workforces to be as follows:

- Medical Laboratory Scientists (234611) 13,369 persons employed for at least 1 hour in the week preceding the Census; and
- Medical Laboratory Technicians (311213) 11,676 persons employed for at least 1 hour in the week preceding the Census.

## Segmenting the workforce by work areas

Larger medical pathology laboratories are broken up into 'departments' that reflect efficient ways to organise work (generally around different testing processes), which eventually translate into discrete knowledge domains. Medical laboratory scientists 'specialise' accordingly. The major disciplines according to Michael Legg & Associates (2008) include:

- Histopathology: examining organs, tissue and cells to decide if a disease is present and what effect it could have on the patient e.g. whether a breast lump is cancerous or not;
- Cytopathology: the examination of small samples of cells to identify abnormalities, usually from a smear (e.g. a pap smear for cervical cancer), brushing technique (to collect skin cells) or fine needle aspiration (from a cyst);
- Microbiology: the study of bacteria, fungi, parasites and viruses to examine, diagnose, treat and prevent the spread of infection. Outbreaks of food poisoning, meningitis or a virulent strain of flu would be investigated by a microbiology or virology laboratory;
- Haematology: the study of blood cells in order to identify any abnormalities. Haematologists diagnose and treat a variety of blood disorders including anaemia, haemophilia and blood cancers, including leukaemia;
- Immunopathology: focuses on disorders of the immune system and the body's ability to resist invasion by foreign organisms. Immunologists play a key role in transplants and diseases like HIV-AIDS;
- Blood Banking (Transfusion Medicine): combines haematology and immunology disciplines for testing compatibility and quality of donated blood;
- Chemical Pathology: the study of body fluids such as blood, urine, saliva or spinal fluid to detect abnormalities and make a diagnosis e.g. diabetes, high cholesterol and nutritional disorders;
- Toxicology: the study of the effect of different substances on people, animals and the environment. Toxicologists can diagnose poisoning and help devise a treatment; and
- Genetics and Cytogenetics: the examination of chromosomal and genetic abnormalities. This covers a range of issues such as prenatal diagnosis (e.g. Down's syndrome), predictive testing for cancers and reactions to certain drugs.

These areas of specialisation fall into two broad areas of ***clinical pathology*** that refers to chemical pathology, haematology, microbiology, blood banking and genetics/cytogenetics and ***anatomical pathology*** which is used to group histopathology, cytopathology and post mortem investigation. Within these broad groupings cross-skilling is reportedly considerable in many laboratories. The blurring of the lines between chemistry and haematology is said to be especially strong.

Graduates entering the profession and who are employed by medium to large laboratories will generally be employed into one of the "departments". Generally speaking they will go on to develop a career within the discipline. In so doing and in order to advance within the industrial relations framework (classification progression) they will tend to specialise further (e.g. electron microscopy, mass spectrometry, toxicology, virology, blood banking/transfusion, etc). For those who have come through a broader education program (such as the AIMS accredited degrees) this progression will be at the expense of prior learning and training (that is, other skills will be under or even unutilised). For some individuals who have specialised, movement within the discipline may be possible but movement between disciplines is highly unlikely.

Graduates entering the profession and who are employed in small general laboratories, particularly those in rural and regional centres, will be exposed to all disciplines to a greater or lesser degree, depending on how workloads are managed. There will be increasing emphasis on developing a broad range of competencies and diagnostic skills across a number of the disciplines (Clinical Chemistry, Haematology, Microbiology) and including a number of the sub-specialties as well. These individuals are generally multi-skilled and may be involved more directly in patient care through reporting and the provision of clinical advice. Unfortunately it is often the case within the Awards/Agreements that these levels of broad knowledge and competence are not recognised as criteria for classification progression. The result is that these medical laboratory scientists will eventually seek positions in larger laboratories where they can either manage staff or specialise in order to progress through the grades. For these scientists, movement between disciplines is possible.

# Work organisation in Australian medical pathology laboratories

## *Influence of work organisation*

The way work is designed and allocated to individual workers and classes of workforce within a medical pathology laboratory is not neutral in regard to workforce supply or demand. Work organisation models can potentially impact on the quantity and quality of workforce demand and hence the availability, nature and productivity of workforce supply. Some models of workforce organisation will better serve the purpose of providing appropriate levels of incentive to workers with ambition and talent, and therefore would increase the likelihood of workers staying in the workforce, and thereby increase total supply. Other work organisation models might act to more efficiently allocate work to 'the right person for the job'. Invariably this will translate into lower demand for workforce or a capacity to have the same workforce achieving more work, at least in the short term.

In recent years industry stakeholders have begun to voice more concerns about the way work is organised. These concerns have been prompted by:

- an unfolding shortage of pathologists (worldwide), the result of claimed inadequate training rates, and the need accordingly to supplement pathologist labour;
- a perceived increase in wastage from the profession of young medical pathology scientists, the result of current career pathways not offering adequate professional or financial incentive to younger workers; and
- movements in the use of different forms of labour at the individual pathology laboratory level (including so termed 'labour substitution') uninformed by an understanding of quality and patient safety implications.

There are fundamentally similar ways of organising the work of medical pathology laboratories around the world but increasing experimentation and innovation in the use of various components of the workforce by individual laboratories / employers is slowly forging discernably different workforce models. In the United States for instance, Harmening, Castleberry and Lunz (1995) have noted how in some laboratories Medical Laboratory Technicians:

> "*… have gone from being assistants in the lab to doing more complex testing… In some rural areas, Medical Laboratory Technicians are now responsible for high-complexity testing and may enter supervisory positions after gaining some experience. In urban areas [though], Medical Laboratory Technicians [still] more likely are doing bench testing and are not in supervisory positions*."

The primary driver is the market, and new models are being shaped by substitution of technology for labour, increased specialisation of labour to optimise use of new technology, substitution of less skilled forms of labour for more skilled (to reduce costs) and division of work processes to separate high and low volume testing effort. Hewett (2008) offers a similar perspective suggesting the future of Medical Laboratory Science will be determined by:

> "*… two major influences, the science and the environmental systems … The science will be driven by clinical need and financial necessity, the systems and processes within the environment by regulation and social need*."

As the changes in organisation of work become more profound and prevalent, formal structures that support workforce development and facilitate workforce supply and deployment are attempting to play catch up. There has been a proliferation worldwide of new courses attempting to supply a new demand for highly skilled medical pathology laboratory science workforce (clinical doctorates, etc.). Equally efforts are being made to develop new job classifications, modified industrial relations strategies and revised career pathways. In subsequent sections the way work is currently organised in Australia and the way work organisation in medical pathology laboratories is evolving in Australia and overseas will be explored.

## *Current situation in Australia*

Later in this consultancy project, primary data are planned to be collected from case studies of a number of employers to more precisely understand the variation in workforce models being applied across Australia. For this Information Paper a preliminary, more generalised, understanding is formed from available and relevant documents and secondary data.

In theory industrial relations instruments — awards and enterprise agreements — provide an immediate insight into the way the workforce is structured. There are many awards (approximately 13) and agreements (currently 62) registered with Fair Work Australia[57] related to the employment of workers in medical pathology laboratories. Coverage in these instruments varies across jurisdictions (some have national coverage while others are state or territory bound), by employer (some cover many employers; others are limited to covering a single employer), by sector (generally only the public or private sector is covered but not both) and by type of worker (some instruments cover all or most laboratory workers while others cover only a single class of worker, for instance medical laboratory scientists). Some 'modern' awards coverage is not restricted to the medical pathology laboratory environment and instead covers many areas of the health industry, for instance the *Health Professionals and Support Services Award 2010* which includes both 'medical laboratory technicians' and 'medical scientists' amongst over 30 other health professions and paraprofessional categories.

Analysing this body of awards and agreements allows several generalisations to be formed to which there are obviously some exceptions. However, if the more common elements are the initial focus then it can be noted:

- Public sector awards and agreements suggest a strong demarcation between professional (scientific) and paraprofessional (technician) workers. Separate awards and agreements generally cover these types of employees, with medical laboratory scientists having their own instrument (for instance the *Hospital Scientists [State] Award* in NSW) while medical laboratory technicians and assistants tend to be included with other forms of 'support' staff. The definitions adopted in these instruments especially to describe medical scientific labour are quite rigid and tend to preclude easy flow of workforce from one category to another. For instance in the above mentioned award a 'Hospital Scientist' means:

  > *"… an employee who has acquired the Diploma in Medical Technology of the Australian Institute of Medical Technologists (before 1974) or who has obtained a degree in science from an approved university or college of advanced education requiring a minimum of three years full-time study or such qualifications as the employer deems equivalent."*

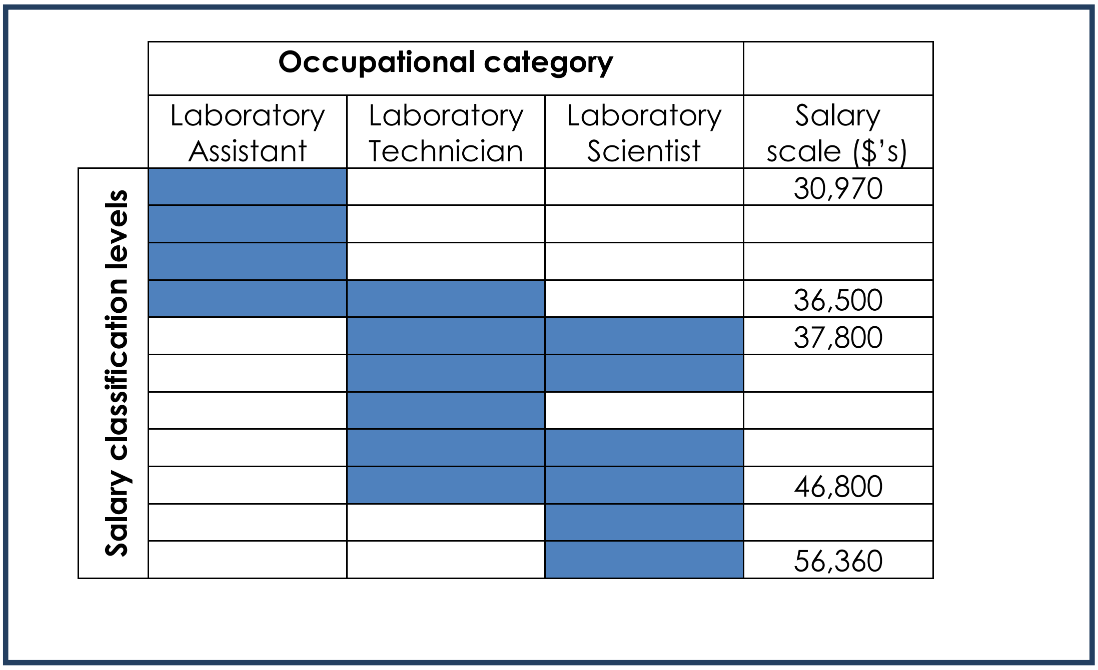
  Public sector awards hence force employers to make a clear decision between medical laboratory scientists or technicians. For workers, career pathways from lower skilled medical pathology laboratory occupations are punctuated by hurdles which cannot be surmounted without significant study.

[57] Fair Work Australia is the national workplace relations tribunal. It replaced the Australian Industrial Relations Commission amongst other bodies in January 2010. From 1 January 2010, state referrals of industrial relations powers to the Commonwealth have created a situation in which all private sector employment is now covered by the national industrial relations system established by the Fair Work Act 2009 (Cth). Public sector employment is still covered by State and Territory Commissions.

- Private sector awards tend to be more comprehensive on the one hand and cover most workers within the medical pathology laboratory setting, but on the other hand rarely include other settings or forms of worker. For instance the *Pathology (Private Practices) Award – State 2003* (for Queensland) relates exclusively to [private] pathology laboratories but covers 'Services assistant', 'Courier Driver', 'Tradesperson', 'Pathology Specimen Collector', 'Administrative Assistant', 'Laboratory Assistant', 'Laboratory Support Officer', 'Laboratory Technician', 'Laboratory Scientist' and 'Information Technology Officer'. The private sector instruments therefore tend to reflect more the way the workforce is organised in medical pathology laboratories (minus of course the pathologists). Moreover, while still providing barriers to more comprehensive career pathways including progression from less to more skilled roles within the laboratory, just by placing the different occupations together suggests the possibilities. In most private sector arrangements also there is a stronger emphasis on competence for progression and some allowance for employers to make 'equivalence' judgements in regard to types of qualification and experience and qualification.
- Public sector awards generally cover all workers across the jurisdiction encompassing all the employers (although in most jurisdictions in the public sector now that is very few). Private sector instruments tend to more frequently be enterprise agreements and therefore cover a single employer.
- The number of classifications within awards and agreements (grades, levels, salary points, etc.) are generally greater for medical laboratory scientists than for medical laboratory technicians. The number of levels for medical laboratory technicians can vary from as few as three (with several salary points within each level) to as many as six. Most medical laboratory scientist determinations allow for at least five levels, but generally have additional 'trainee' and higher level opportunities, the latter associated with management roles. The career path for laboratory assistants tends to be restrictive.
- Within and between all related awards and agreements there is significant overlap in salaries between different classes of medical pathology laboratory workforce, implying an overlap in competence and actual work allocation. For instance, *Pathology (Private Practices) Award – State 2003* (for Queensland) broad salary points for major classification levels for each of the occupations laboratory assistant, laboratory technician and laboratory scientist are shown in Figure 11 below[58].

[58] The dollar figures provided are for 2008 implementation and should be taken as indicative only of the relativities between occupational categories.

**Figure 11: Comparison of salary levels between related medical pathology laboratory occupational categories**

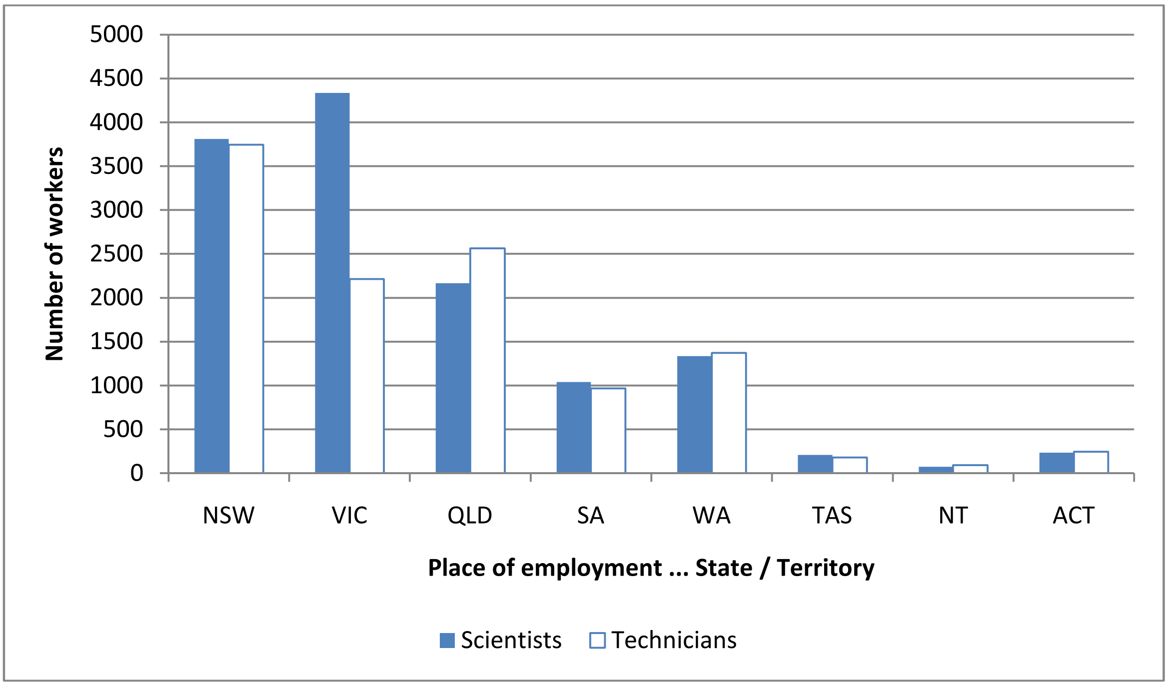



In a recent public sector agreement (*South Australian Government Wages Parity [Salaried] Enterprise Agreement 2010*) the overlap is more pronounced, with the technical salary scale ranging from $19,000 to just over $81,000 and the scientist scale ranging from $52,000 to just over $115,000 (this does not include management levels).

Industrial relations instruments are meant to reflect the way work is organised and workforces structured in the real workplace. In practice though, awards and agreements generally lag workplace practice, at least more innovative practice. In such cases, and more generally too, the industrial relations instruments can act as a tool to reinforce the status quo in work organisation. Certainly within public sector pathology services, it is frequently argued that advancement through the grades or levels of an industrial agreement is more weighted to research activity (publications, grants, etc.), esoteric testing (super-specialisation), and / or management responsibilities than to diagnostic skills and abilities. These criteria for progression are not always easily associated with higher quality direct patient care.

Some insight into work organisation is obtained from observing how the medical laboratory scientist and technician workforces are distributed between the States and territories as shown in Figure 12.

**Figure 12: Distribution of the medical laboratory science workforce by State or Territory and by type of workforce category**




*Source: ABS Population Census, 2006*

The distribution of the workforce roughly accords with what might be expected on the basis of respective State and Territory population size. The more interesting aspect though, is the variation between States and Territories in the workforce balance between medical laboratory scientists and technicians. In this regard Victoria is the standout. While the number of medical laboratory scientists as a proportion of the total medical laboratory science workforce varies in other states between a low of 45.2% (Northern Territory) to a high of 53.7% (Tasmania) with the others all slightly higher or lower than 50%, the proportion in Victoria is 66.2%. Why this State should have such a professionalised medical laboratory science workforce is not obvious. Anecdotally an opinion was offered that the employee association has a stronger presence in Victoria and it uses relevant awards and agreements to hold employers to higher levels of scientist appointment.

## Role delineation in Australia

Despite the relative inflexibility of awards and agreements, as noted previously employers are responding to business, labour market and 'science' context drivers as innovatively as they can. There are a number of ways in which laboratories might have adjusted their workforce in order to meet increasing service delivery requirements (within cost parameters) in the short term, and most of these approaches anecdotally seem to have been adopted by at least some employers over the last decade. These include:

- increasing the role of medical laboratory scientists to assume more responsibility for making clinical judgements on tests results, especially in the area of chemical pathology. Some awards allow for this 'extended' practice to be remunerated, for instance the *South Australian Government Wages*

*Parity (Salaried) Enterprise Agreement 2010* includes a 'scientific excellence' category in each of its top four classification levels. Of course nothing precludes an employer, especially in the private sector, paying above award wages. While 'senior scientist' classifications have achieved recognition professionally and through the MBS, this classification appears poorly recognised in industrial relations instruments;

- substituting scientist roles with technicians in order to allow scientists to assume higher skilled duties or to reduce the total cost of wages. A recent study of public sector pathology services in WA for instance found the current workforce is made up of just under 57% technicians and assistants, but recruitment trends over the last two years have favoured technicians and assistants closer to 4 to 1 (Kelly and Dolva, 2008). More generally, employers could be providing on the job training to bridge the gap in skills required. Employers are generally no great respecters of qualifications except at the point of entry to an organisation (see Selby Smith and Ridoutt, 2007) and the overlap in pay scales between technicians and scientists in most awards / agreements provides scope for rewarding technicians for higher skilled work. Related processes could be the use of 'unaccredited' scientists, persons with relevant overseas qualifications not assessed and credentialed by the Australian Institute of Medical Scientists (AIMS) or the employment of science graduates from courses unaccredited by AIMS; and
- of course any movements of scientists and technicians to higher skilled work requires consequent increases in the capacity of laboratory assistants through limited technical training to upskill them within the laboratory in order to conduct the majority of routine work.

The aggregated consequences of these many small actions by employers has led to a need to review and clarify the roles of different classes of worker within the medical pathology laboratory workforce, to provide some objectivity to decision making. What types of labour substitution make sense from a business and workforce deployment perspective, and also from a patient safety and a quality control perspective? In approaching the task of role delineation, the development and introduction of competencies has improved the discussion, and allowed some distance to be developed from the more emotive discussion involving qualifications.

The scientific workforce in medical pathology laboratories, through its relevant professional associations, has developed and agreed upon a set of competency standards for scientific work in pathology laboratories (Bell, Whitfield and Obbink, 1993; PAC, 2009; Badrick, 2010). Whilst written specifically for medical laboratory scientists, the competency standards describe the competencies and tasks required by laboratory teams and therefore include all staff within the laboratory dependent on their training, relevant skill level and experience. Similar competency sets have been constructed in the USA (Harmening et al, 1995), the United Kingdom (Health Professions Council, 2007) and New Zealand (Medical Laboratory Science Board, 2006).

PAC (2009) undertook a comprehensive review of the competency standards for medical laboratory scientists to delineate more clearly the roles of laboratory assistants, technicians, scientists and clinical scientists. This detailed work is too difficult to reproduce in this paper; however a humble effort to summarise this work is provided in Table 14.

**Table 14: Summary of competency requirement differences between broad occupational classifications within the scientific workforce in medical pathology laboratories**

| Competency | Laboratory Assistant and above | Technician and above | Scientist and above |
|---|---|---|---|
| **Technical Skills** Preparation and analysis of clinical materials | Appropriate sample collection procedures, specimen suitability, process specimens using appropriate lab techniques | | |
| | Investigates problems with specimen collection, performs some non-automated and specialised lab procedures | | |
| | | | Determines when 'backup' methods must be initiated |
| **Knowledge base** Correlation and validation of results of investigations using knowledge of method(s), including analytical principles and clinical information | Recognises and refers implausible results | | |
| | Understands the basic physiology of laboratory results and theory of laboratory procedures, differentiates technical, instrumental and or physiologic causes for unexpected test results | | |
| | | | Identifies technical, instrumental and or physiologic causes of unexpected test results, develops solutions based on patient diagnosis and instrument performance |
| **Analytical/decision making** Interpretation, reporting and issue of laboratory results | Observes principles of data security/patient confidentiality, recognises significant results and alerts appropriate staff | | |
| | | Interprets results using clinical information and limitations of test, ensures abnormal or critical results are communicated, performs analytical and decision making functions with direct supervision | |
| | | | Works with Pathologists to establish critical-level values, interacts with other health care workers to solve problems and interpret patient laboratory results |
| **Resource maintenance** Maintenance of | Maintains inventory and supplies, ensures proper functioning of laboratory equipment. | | |

| Competency | Laboratory Assistant and above | Technician and above | Scientist and above |
|---|---|---|---|
| documentation, equipment resources and stock | | Ensures safety protocols for equipment are maintained, writes 'how to perform' procedure guidelines | |
| | | | Assists in preparation of job descriptions. |
| **Safety** Maintenance and promotion of safe working practices | Prepares & labels reagents, familiar with safety documentation and use of safety equipment. | | |
| | | Maintains inventory of hazardous reagents including MSDS, notifies appropriate personnel with concerns or improvement suggestions, aware of hazards caused by interaction of some substances. | |
| | | | Enforces safety regulations and develops safety and waste management procedures. |
| **Professional development** Continuing professional development and maintenance of contemporary knowledge and skills | Participates in departmental education | | |
| | | Responsible for own goals for professional development, reviews scientific and technical literature and case studies | |
| | | | Develops and utilises research skills. |
| **Accountability** Professional accountability for Medical Science practice including test selection, development and use of laboratory investigations. | Maintains ethical standards, identifies unprofessional conducts and reports breaches. | | |
| | | Considers ethics within laboratory environment relating to data, events or relationships | |
| | | | Applies problem solving and critical thinking patterns to make independent professional judgements, supervises laboratory personnel, evaluates new methodologies |
| **Communication** Liaison with health workers and others to continuously improve the service | Documents issues and performs quality assurance relevant to laboratory role. | | |
| | | Suggests costs effective laboratory procedures or protocol, appropriate communication established with external and internal suppliers. | |

| Competency | Laboratory Assistant and above | Technician and above | Scientist and above |
|---|---|---|---|
| | | | Monitors quality assurance, identifies and suggests standards of practice, implements changes in response to technology and laboratory procedures, participates in relevant committees |
| **Research and development** Contribute to advancement of knowledge and improvement of laboratory practice. | | Identifies issues and communicates research ideas, accesses information related to a project. | Evaluates new methodologies, collects and analyses data and contributes to interpretation of results, prepares reports submits for peer review. |

The work undertaken by PAC reveals a logical progression of work and skill requirements demanded at each occupational level. Progress is distinguished by decreasing levels of routine and procedural work and increasing requirement for first principle analysis and independent decision making, essentially what one might expect from more professional levels of work. The roles of scientists and clinical scientists are delineated by work requirements involving communication with other health professionals and having to deal with more abnormal and non-routine events and by skill requirements for higher order problem solving, research and development, especially around new tests, and establishing and maintaining quality standards. Naturally, scientists are held to higher levels of accountability. Harmenning et al (1995), having undertaken a similar exercise in the USA comparing medical technicians and technologists (scientists), concluded similar to above:

> *"… the greatest amount of overlap between the MT [medical technologist] and MLT [medical laboratory technician] occurs in the technical oriented categories: technical skills, knowledge base, and judgement / analytical decision making. As responsibilities increase in complexity, autonomy, and authority, the differentiation between the MT and the MLT increases…"*

# Alternative workforce models & career pathways

## *Career structure principles*

The NSW Pathology Workforce Forum, held in April 2008, highlighted serious supply problems emerging with the laboratory scientific workforce and advocated considering re-establishing traineeships, reviewing scientific award structures and defining a better career structure. It also suggested opportunities for workforce and service redesign suggesting that delegation of work to clusters so they can manage their workforce within an agreed budget without additional bureaucratic processes.

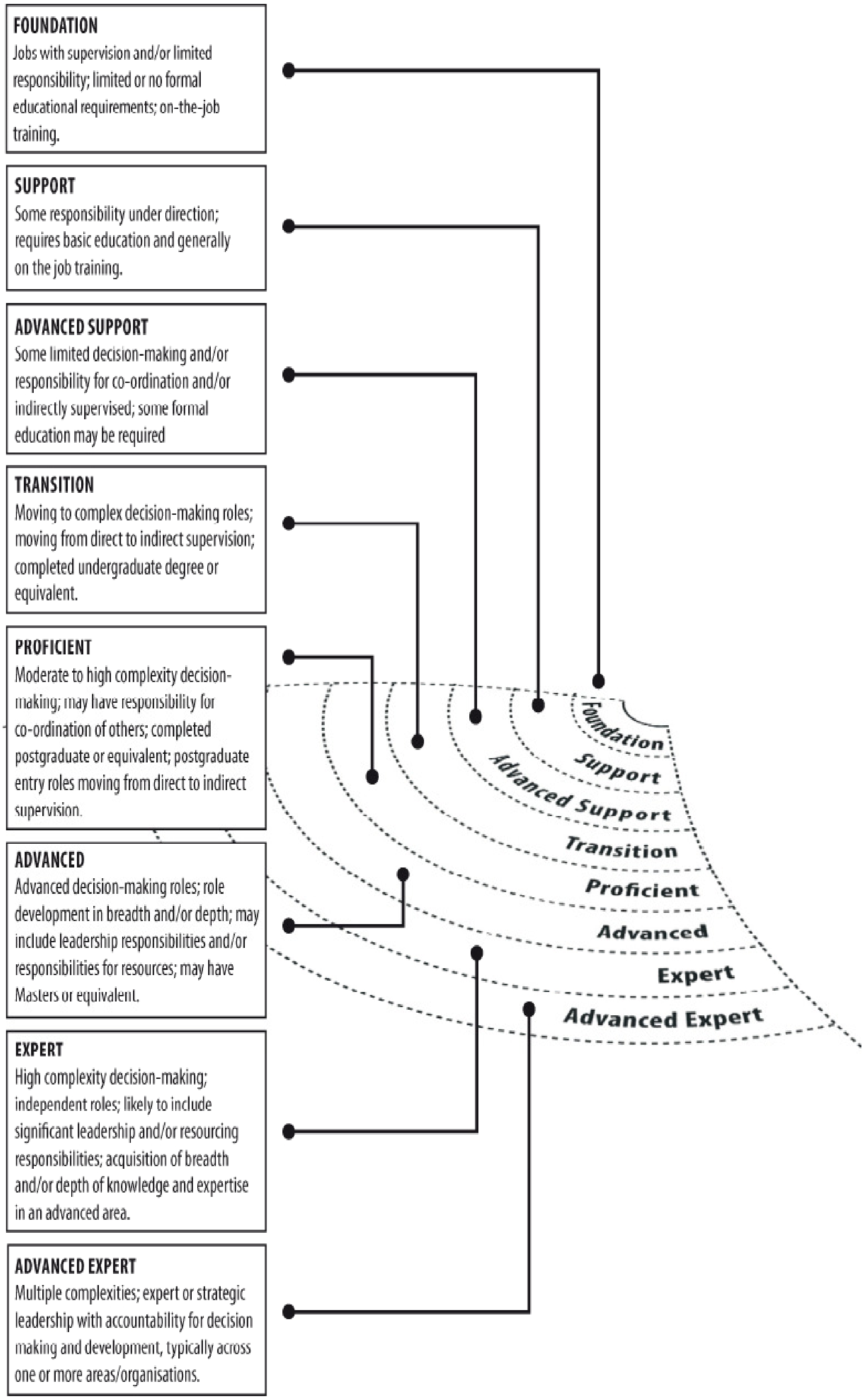
Similar concerns have been expressed overseas (e.g. Johnston and Milne, 1999) some years before.

An important starting point in regard to any discussion of career path structures is to look at the foundation principles. New Zealand has attempted to lay appropriate foundations for career structures by developing a generic career framework for progression within the diversity of all health and disability occupations (Ministry of Health and District Health Boards NZ Workforce Group, 2007). The objective of the NZ Career Framework is stated as:

> *"... to provide for the consistent development of a flexible health workforce. The Career Framework will provide for specific career pathways for different occupations and scopes of practice in the health sector while recognising overlapping roles and competencies. Understanding the similarities and differences between roles within and across workforce groups will assist workforce planning. The career pathways described by the Career Framework will enable stronger branding of health careers, thus improving recruitment and retention in the sector."*

Whilst not specifically for the medical laboratory scientist workforce, the NZ Career Framework is flexible enough to allow for the workforce to be described by competency, by service area and by occupational group. The approach to career progression promoted by the Framework is along a beginner to expert pathway as described in Figure 13. The stages in the Framework, from the 'foundation' level to 'advanced expert' level, are differentiated by the job, skill, educational qualification and /or the type of training requirements.

**Figure 13: Levels within the New Zealand Career Framework with descriptors**




*Source: Ministry of Health and District Health Boards NZ Workforce Group, 2007*

A similar approach to career pathways has been adopted in the United Kingdom, where workforce concerns have driven a very structured approach to career design with an attempt to satisfy clear objectives. At the turn of the last century the National Health Service recognised the need to build their existing workforce to higher levels of capacity and attract significantly more people into the service through very appealing and rewarding career opportunities.

They developed a concept of 'skills escalator', a concept encompassing career pathways and progression, appropriate means for progressing (job evaluation), adequate support to grow, and proper reward for growth . Simply stated it embodied a structure to allow any individual worker to get on or off the career path 'escalator' whenever they chose, but to be encouraged to stay on as long as possible. In introducing the concept the Department of Health (2001) stated:

> "*We want to open up opportunities for people who join NHS organisations at relatively low skill levels to progress their skills through investment in training and development to professional levels and beyond, by moving up a skills escalator. We recognise that not every staff member will want to progress in this way and we will ... respect their wishes, but equally we want to ensure that such opportunities are genuinely attainable for those who wish to develop their careers ...*"

Like the New Zealand Career Framework, the UK skills escalator concept allows for a number of graduated steps from 'job roles requiring few skills and less experience' to 'consultant' roles.

The benefits too of the structured career framework promoted by the UK are enhanced recruitment, an increased number of entry points to a career (which in theory boosts numbers entering the career / occupation), greater opportunity to catch persons who might otherwise miss out and greater engagement and loyalty of the existing workforce. We will return later to the UK developments to see how the skills escalator concept has been applied to the medical pathology laboratory workforce.

## *Overseas directions in career structures*

The most popular approach to reviewing and modifying career pathways within the scientific workforce in medical pathology laboratories overseas has been to seek to 'extend' pathways for the professional component of the workforce (see for instance Legge, 2008 and 2009). This is not an unusual phenomenon; the professional component of any health workforce is normally the best organised and generally the most ambitious and therefore the most likely to push boundaries.

The flag bearer overseas for extended practice has been certain States in the USA and Canada. As noted earlier, there has been a push in the USA for the development of laboratory scientists into the domain of clinicians, gradually supplementing (or augmenting) the supply of pathologist labour. The USA in particular has a history of substitution for medical practitioner labour having developed the nurse practitioner and the physician assistant (Legge, 2008). In the USA occupational titles such as clinical laboratory scientist or clinical doctorate in laboratory sciences (Diog, 2005) and in Canada the pathologist assistant (Dufour, 2007) have emerged while in the UK the terms clinical scientist or consultant clinical scientist have been promoted (RCP, 2005).

Piller (2006) describes the role as being part of the clinical care team on hospital floors, in the clinical outpatient setting and in the laboratory and notes that the role would:

> *"... function as the liaison between the patient's medical care team ... and the clinical laboratory, and as such would not only be involved in interpreting and communicating laboratory results but would also facilitate appropriate testing and test preparation."*

This description is typical of the North American literature which emphasises the engagement of this type of medical scientist with the clinical team and with a patient centred focus. In contrast, the UK focus for extended practice tends to emphasise high level management and the direction of laboratory services and the introduction of new or extended specialist services (Legge, 2008). For instance the RCP (2005) identify the following specific competencies for consultant level clinical scientists:

- provide clinical leadership for an area of service;
- be accountable for that service within a healthcare provider organisation;
- set the strategic direction of that service within the Framework of the needs identified by national priorities, established standards of practice and the needs of the local organisation;
- establish and be responsible for the standards of practice, in accordance with recognised criteria, within the service for which he/she is responsible;
- procure the technology and other services needed to provide an effective service;
- direct the clinical research of the team(s) with which he/she is directly associated;
- ensure that the clinical governance needs of the organisation are met in regard to the service for which the individual may be responsible; and
- contribute to strategic planning of the organisation in which his/her service resides or which it serves.

Legge (2009) has also suggested that 'extension' could be both vertical (through more of a management path) and horizontal (through greater knowledge specialisation). He argued that specialisation in particular could be around 'process' (for instance cut-up, bone marrows, cytology) leading to an occupational title of 'advanced practitioner' (similar perhaps to the Canadian pathologist's assistant), or around 'discipline' (for instance immunology, haematology) leading to a 'clinical scientist' role.

Regardless of the role envisaged, the emphasis in all cases has been on pursuing appropriate higher studies / qualifications to both justify the extended practice claim (in the face of potential opposition from the pathologist fraternity, Piller, 2006) and to properly prepare individuals for the role. Typical of this direction is the National Accrediting Agency for Clinical Laboratory Sciences (NAACLS) in the USA which argues a clinical doctorate needs to expand the knowledge based gained at undergraduate level and develop additional skills such as (NAACLS, 2006):

> *"... patient assessment, management of laboratory data, patient / family counselling skills, and participation in policy setting bodies [and] ethics committees ..."*

Of course the advance of any health profession into territory once the exclusive domain of medical practitioners is never without some challenge, a point referred to by many (e.g. Legge, 2009) and justified mostly on the grounds of quality and safety of clinical care (although Fritsma, 2005, also raises the issue of financial viability of clinical doctorate laboratory scientists in the USA with current billing and insurance practices). Legge (2009) however, re-interpreting UK data on the work distribution of pathologists and consultant clinical scientists, argues that the roles are compatible affording pathologists more time for patient care while the scientists assume more management responsibility. He concludes:

> *"The concept of the Consultant Clinical Scientist is now well established in the UK and the USA and has not created significant issues in either the skill base or the interface between medicine and patient care."*

## *Emerging Australian directions*

In Australia the trend being put into practice in North America and that advocated in New Zealand (Legge, 2008, 2009) has been reflected. Thinking on career pathways has largely been on 'scientist' careers and seeking ways to justify, support and facilitate extended scientist roles. The most articulate expression of the Australian position has been that offered by the Australian Association of Clinical Biochemists (AACB) and described in a paper authored by Badrick (2008). In the 'Career Framework' proposed by AACB there are six classifications or levels / grades of scientist *viz*.:

- trainee scientist;
- scientist;
- pre-specialist scientist in training;
- specialist scientist;
- clinical scientist; and
- laboratory manager.

Badrick (2008) notes that the "*actual titles are not critical, but the **phases** of career are important*" (emphasis added). The actual career pathway proposed by AACB with more detailed descriptions of the skill and qualification requirements of each career or occupational classification is provided in Annexure A. Like the overseas literature, the AACB envisions progression through the 'phases' of the career pathway on the basis of attainment of increasingly higher levels of recognised skill in the form of certification of on the job learning (such as through a supervised internship), attainment of relevant qualifications (e.g. a masters degree), passing a test (for instance for association membership or Fellowship of the RCPA).

The stated aims for the career framework or structure proposed by the AACB include:

- a career framework encompassing all disciplines and employment groups within the workforce based on roles and function and linked to transferable skills and competences;
- identified pathways for progression, supported by learning and development;
- flexibility to support local service delivery, and the expansion and extension of current roles;

- improved opportunities for learning and professional development, supporting recruitment and retention into healthcare science disciplines, and removing the barriers to career progression;
- an education and training framework based on a range of academic, vocational and professional qualifications/awards to recognise underpinning knowledge and skill acquisition relevant to functions being undertaken; and
- preservation of the science base within the profession such that career progression will not only be on the basis of increased management and financial responsibilities but also on specialised scientific service provision and Research and Development roles.

One of the few systematic reviews of workforce undertaken in Australia at PathWest, the public sector pathology laboratory service provider in WA, resulted in recommendations to support a broader view of career frameworks and work organisation (Kelly and Dolva, 2008). There the emphasis has been on reducing staff turnover by improving career progress potential and by increasing the number of training positions, both for medical laboratory scientists *and* technicians. An interesting recommendation has been to "… *Up-skill 10 university qualified Laboratory Technicians and Technical Assistants per year with further training to undertake some Medical Scientist functions*."

# A more complete career structure

The career structures promoted overseas, especially in North America, and in Australasia, all of which focus almost exclusively on the *scientist* component of the scientific workforce in medical pathology laboratories, do not satisfy fully the principles of career structures introduced in an earlier section. In many ways, for instance the AACB aims above, they do not even satisfy fully the aspirations for which they were designed.

The most complete and compelling career structure model for the scientific workforce in medical pathology laboratories has been developed and implemented in the UK. There, a career framework has been developed specifically for healthcare scientists which provides an important reference for this project. The career framework is built on the "… *concept of skills escalation and offering flexible career opportunities to meet workforce service and individual needs*" (Department of Health, 2005). The framework aims to:

- introduce an integrated career framework encompassing all disciplines and employment groups within the workforce based on roles and function and linked to transferable skills and competencies;
- clearly identify pathways for progression and transfer, supported by learning and development providing enhanced opportunities; and
- provide national consistency and maximum flexibility to support local service delivery, the expansion and extension of current roles; and the emergence of new roles.

The UK healthcare scientist career framework originally created nine levels or grades around three major categories of workforce in line with the broader National Career

Framework for Health. The three major categories proposed were Healthcare Science Assistants, Health Scientist Practitioners and Healthcare Scientists with the roles defined as:

- Healthcare Science Assistant - entry level, undertakes a range of tasks and protocol based roles, access learning and development programs and qualifications to move to practitioner training programme;
- Healthcare Scientist Practitioner - works within a discipline or related disciplines or in a range of healthcare settings to deliver and report a range of tests, investigations and interventions on patients, samples or equipment. Provide therapeutic interventions in patient-facing roles, some of which may be specialist. Further develop into more senior roles of practice and management and training and education; and
- Healthcare Scientist - has clinical and specialist expertise underpinned by theoretical knowledge and experience and will:
    - undertake complex scientific and clinical roles, including those working directly with patients;
    - analyse, interpret and compare investigative and clinical options;
    - make judgements involving complicated facts or situations which impact on patients;
    - be involved in innovation and improvement;
    - potentially participate in research and development; and
    - be involved in the education of trainees and other learners in the workplace."

Later work on the UK model reported in Department of Health, Social Services and Public Safety (DHSSPS) (2008) modified the three levels based on extensive consultation and clarified both the roles at different levels and the means for progressing from one level to the next. The important changes included the introduction of a Healthcare Science Associate level classification between assistants and practitioners, thus creating a category akin to the medical laboratory technician role in Australia. This improved the career path for those who did not want to enter training for professional level practice, as well as reducing the potential 'gap' between assistant and practitioner level requirements. As a consequence also those associate level workers who had excelled at that level through extensive on-the-job skills development could make the jump to practitioner level without having to restart their career by undertaking an undergraduate degree. As well as a degree for entry / progression to Health Science Practitioner level, associates could demonstrate (UK Departments of Health, 2010):

> *"… achievement of equivalence of Health Science Practitioner standards of proficiency in prior knowledge, skills, experience and learning, which may have included the requirement for some additional education and training."*

There are several important differences between what has been proposed and is being implemented in the UK as a career framework or structure for the scientific workforce in medical pathology laboratories and what has been proposed or enacted elsewhere (including Australia):

4. the UK approach is ***comprehensive*** and the Framework attempts to encompass all forms of scientific workforce in medical pathology laboratories

that could and essentially do overlap in role and function and therefore augment (or substitute) for each other in the labour market;

5. the UK approach facilitates the casting of a ***broader*** (recruitment) net when considering the building of supply capacity of the scientific workforce in medical pathology laboratories. As per the aspirations of the 'skills escalator' discussed earlier, recruitment into the scientific workforce in medical pathology laboratories can be at multiple points, all of which are potentially attractive since they offer immediate career progression and long term significant prospects; and
6. the UK approach genuinely attempts to create reasonable ***articulation*** between different categories of scientific workforce in medical pathology laboratories. This is done through a culture change of open encouragement for progression, a clear and transparent pathway, considerable recognition of prior learning through various means (including on-the-job learning), clearly defined educational processes to manage hurdles and support for training and education to those who are genuinely interested in progressing.

In Australia it can be argued that a career structure similar to that which prevails in the UK already exists. In a sense this is the case at an informal and essentially enterprise level where individual managers may be making human resource / professional development decisions that approximate the intentions and outcomes of the UK model. However, the situation in Australia is really one where progression is clunky at best, articulation between levels is poor and challenging, and career progress is inconsistently promoted. This has significant implications for workforce planning since it reduces the capacity to attract new supply, makes the workforce inflexible and movement between work levels, processes and disciplines difficult, and reduces the number and power of potential responses to changes in labour market conditions, especially changes in the quantity and quality of demand.

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# Annexure A: Career structure proposed by AACB (Badrick, 2008)

| RELEVANT UNDERGRADUATE QUALIFICATION |
|---|
| **Trainee Medical Scientist Intern**<br><br>First step of a scientists' career. The medical scientist enters this phase after achieving an appropriate qualification in science or applied science as defined by NPAAC. There will then be a period of defined training lasting between 12-24 months, depending on the degree of experiential training contained in the undergraduate course, during which the trainee will be exposed to and learn the basic techniques of their discipline. The training will be in an appropriate laboratory and delivered by appropriate trainers. In some disciplines, may be working independently, usually as part of a team with practice appropriate for statutory regulation. At the end of the training period and with successful completion of workbooks and supervisors reports, the trainee would be Certified. |
| CERTIFICATION FOLLOWING AN INTERNSHIP PROCESS |
| **Medical Scientist and Senior Medical Scientist**<br><br>Medical Scientists performing a range of complex clinical or technical procedures, accountable for their own actions and for staff that they direct or supervise. Most frequently are regulated practitioners in first jobs prior to specialisation or taking on more senior responsibilities. Will be studying for or have attained a relevant vocational degree or equivalent vocational/professional qualifications or awards (or though other evidence of vocational achievement) appropriate to the role being undertaken.<br><br>Progression to the next step requires the candidate to be accepted into an appropriate training scheme for a membership type qualification or a masters degree in a specialisation. Some medical scientists in regional laboratories or other general sites may not progress to a higher level, but continue to move up a first band of salary. All would require evidence of CPD to maintain certification. |
| ACCEPTED INTO SPECIALIST TRAINING |
| **Medical Scientist in Charge (Pre-specialist Scientist in Training**<br><br>Staff with a higher degree of autonomy and responsibility performing a complex clinical/scientific/technical role and/or manages and supervises a team. Specialist healthcare scientists will include clinical scientists in first post registration jobs who fulfil a complex clinical and scientific role. They will be studying for, or have attained a relevant postgraduate qualification or equivalent level vocational/professional qualifications and awards (or through other evidence of vocational achievement) appropriate to the role being undertaken. Progression to the next level requires acceptance into a Fellowship Training scheme. These scientists may fulfil management, expert or training roles |
| MEMBERSHIP or MASTERS |
| **Scientific Registrar (Specialist Scientist)**<br><br>Experienced clinical/scientific/technical professionals who have developed their skills and theoretical knowledge to a very high standard, performing a highly complex role and continually developing clinical, scientific and technical practice within a defined field and/or having management responsibilities for a |

section/small department. They will have their own caseload or work area responsibilities or will be studying for Fellowship or high level postgraduate qualification or equivalent level vocational/professional qualification and awards (or through other evidence of vocational achievement) appropriate to the role being undertaken. This requires Part I and Part II examinations.

The training for Fellowship will be conducted in appropriate training facilities and delivered as part of an approved training scheme. Candidates will be supported for part of this training period.

FELLOWSHIP

**Senior Clinical Scientist (Laboratory Manager/Principal Scientist)**

Scientific staff with very highly developed and advanced clinical and scientific and/or management expertise with responsibility for decision making and accountability, providing leadership across a number of areas/disciplines, bringing strategic direction, innovation and influence through practice research and education and carrying responsibility similar to consultant medical staff. They will have attained high level relevant postgraduate qualifications and appropriate professional awards and qualifications (Fellowship and vocational evidence). This group may require another level of recognition from the professional associations.

**Clinical Scientist – General, Managing or Expert**

Scientific staff working at very high level of clinical and scientific expertise within an area/discipline/s, bringing strategic direction, innovation and highly developed and specialised skills and/or having responsibility and accountability for the management and planning of services/departments or initiating or leading formal research activities. They will have attained high level post graduate qualifications (at masters or doctorate level) and equivalent level vocational/professional qualifications and awards (or through other evidence of vocational achievement) appropriate to the role being undertaken.

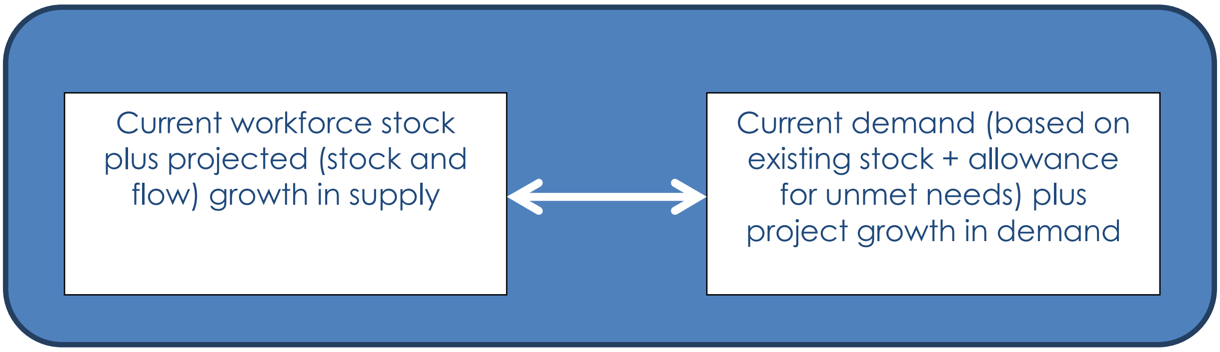
# Appendix B: Labour market considerations

## Index to Labour market considerations

# Introduction

A classical approach to workforce planning models independently investigate the growth in total supply and demand of a particular workforce from an agreed initial assessment of the current 'stock' or workforce size at a particular point in time. The approach is summarised simplistically in Figure 14. The agreed starting point or initial 'stock' estimate is usually the estimate of workforce size around which a consensus can be most closely approached, and is often that taken from a Population Census.

**Figure 14: Simple conceptualisation of classic workforce planning approach**




This will not be a classical workforce planning effort, and rather more descriptive than analytical. Any attempt to establish the context of the current and probable future labour market, its various segments, and the implications for career framework/s is largely based on subjective interpretation of existing data. The reason is that too many gaps exist in the data required to undertake a classical analysis of the medical pathology laboratories scientific workforce.

Where possible in this description of the workforce the more critical gaps in data will be identified and explored.

Without doubt the most critical data required for workforce analysis / modelling is an estimate of **workforce size**. If this is wrong then all other workforce variable estimates become distorted. A major impediment to obtaining an acceptable estimate for workforce size is being able to define the boundaries of the workforce to be estimated.

# Medical scientific workforce boundaries

Most workforces the subject of workforce planning effort are naturally bounded by some form of regulation (e.g. registered health professions, licenced trades), qualification (e.g. speech pathologists) or work setting (e.g. schools and teachers).

The medical pathology laboratories scientific workforce is not required to be registered and there are only broad guidelines and general conventions that govern employment decision. The workforce is characterised by multiple job titles and multiple skill levels and there are no minimum qualification requirements for employment enforced by the professional or industrial associations or workforce.

Perhaps the most appealing way to look at the boundaries of the workforce included in this study is to identify the work setting / work (and therefore the workforce required to conduct this work) — that is the **'pathology' work** covered through the Medical Benefits Schedule (MBS). The Medicare Benefits Schedule Book (2010) identifies all pathology services under Category 6, and further groups pathology services under the following broad sub headings:

P1 – Haematology
P2 – Chemical
P3 – Microbiology
P4 – Immunology
P5 – Tissue Pathology
P6 – Cytology
P7 – Genetics
P8 – Infertility and Pregnancy tests[59]
P9 – Simple basic pathology

Other areas where members of the medical scientific workforce can be found is in **research laboratory facilities** (universities, hospitals or private laboratories) who are conducting biomedical research and development to advance knowledge of life processes and of other living organisms that affect human health, including viruses, bacteria, and other infectious agents. The processes in these facilities would seem to be very similar to those in medical pathology laboratories[60].

For the purposes of this study the boundaries for the *Scientists in Medical Pathology Laboratories* is assumed to be all non medical laboratory personnel involved in the processes of researching, testing, evaluating and reporting clinical specimens or samples to identify, study and treat human disease. This includes the following four scientific occupational groups[61]:

- Senior medical scientists;
- Medical scientists;
- Laboratory technicians; and
- Laboratory assistants.

[59] Some professional groups (e.g. the Fertility Society of Australia) argue that much of the work associated with 'infertility and pregnancy tests', except perhaps for those tests related to sperm viability, are not 'pathology' in as much as they are not seeking to identify pathogens.

[60] Indeed, many employers consulted saw these types of laboratories as important sources of recruitment into medical pathology laboratories. Prospective employees are willing recruits because the short term, fixed contract nature of much of the research laboratory employment provides uncertainty around future income.

[61] For reasons elaborated upon in the Final Project Report, medical pathologists are NOT included in this workforce.

# Workforce size

Having defined the boundaries it then becomes possible to consider workforce size. The above four groups are coded and counted in the Population Census under two Australian and New Zealand Standard Classification of Occupations (ANZSCO) codes.

These are:

- ***Medical Laboratory Scientists*** (Code 234611) described as persons who conduct medical laboratory tests to assist in the diagnosis, treatment and prevention of disease and whose primary tasks include preparing tissue sections for microscopic examination, examining and analysing samples to study the effects of microbial infections, analysing samples of body tissue and fluids to develop techniques to aid in the diagnosis and treatment of diseases, advising medical practitioners on the interpretation of tests and methods for use in the diagnosis and treatment of disease, setting up the steps and rules of laboratory medical testing, operating and maintaining laboratory equipment, maintaining laboratory quality assurance and safety standards, and preparing scientific papers and reports; and,
- ***Medical Laboratory Technicians*** (Code 311213) described as persons who perform routine medical laboratory tests and operates diagnostic laboratory equipment under the supervision of medical laboratory scientists and pathologists. Their primary tasks are taking, collecting and labelling blood, urine and other samples from patients, preparing and staining slides and tissue sections for blood and histological examination, performing diagnostic tests on tissues and body fluids and analysing the chemical constituents of blood, urine, faeces and tissues, and testing for diseases by looking for the presence of antibodies and the products of immune response in samples.

The first code includes senior medical scientists and medical scientists while the second code covers medical technicians and laboratory assistants.

The ABS 2006 Population Census data determined the size of these two workforces to be as follows:

- Medical Laboratory Scientists (234611) 13,369 persons employed for at least 1 hour in the week preceding the Census; and
- Medical Laboratory Technicians (311213) 11,676 persons employed for at least 1 hour in the week preceding the Census.

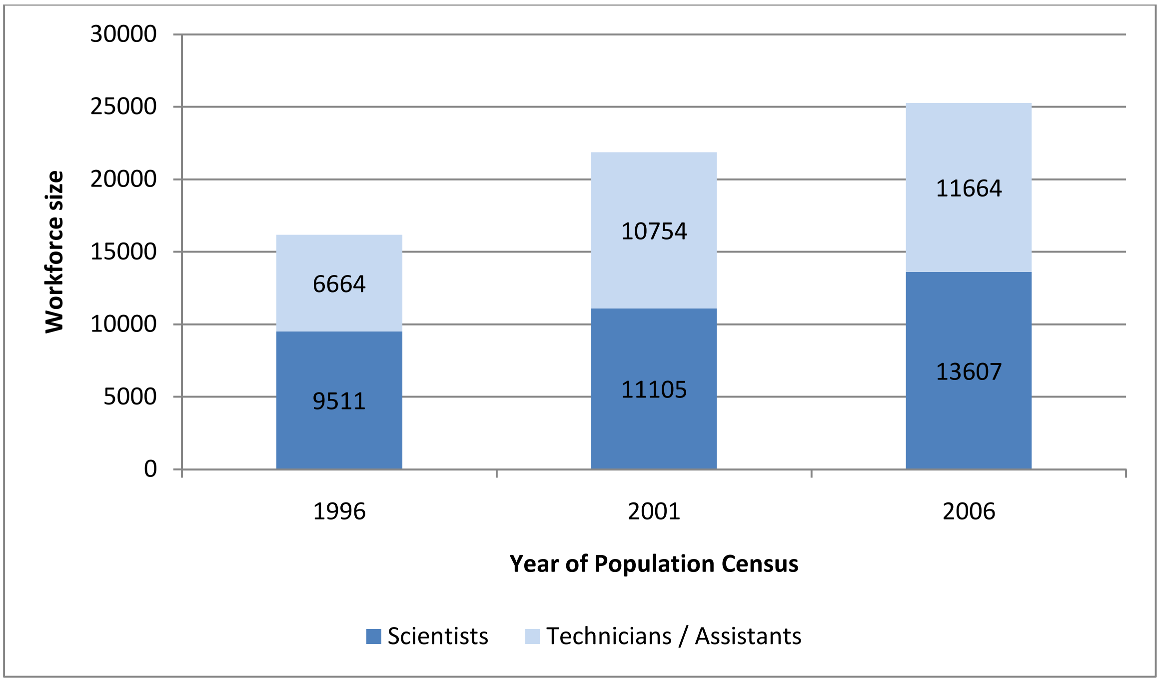
The total medical pathology scientist workforce so derived is 25,045. An alternative and more recent attempt to estimate workforce size was by Urbis (2011) based on a survey of a sample of medical pathology employers. Urbis stated that their employer survey:

> *" … provided an outline of the number and relative proportions of the various workforce groupings employed to conduct their pathology service provision… responses demonstrated that the workforce profiles of pathology organisations vary according to their size. Therefore, any reasonable attempt to estimate the overall size of the Australian pathology workforce would need to take into account the likely profile of pathology provider organisations".*

Extrapolating from the sample population size provided an estimated workforce size of 21,565 for the medical pathology scientific workforce (as defined above) — a difference with the ABS Population Census estimate of nearly 3,500 (13.9%).

Stakeholders consulted seemed more likely to see the Urbis (2011) estimate as credible (or at least closer to the real workforce size). They indicated that the Census figures presented (at focus groups) had limited face validity. They especially questioned growth in worker numbers between the 1996 and 2006 Census collections (see Figure 15), which found an overall growth in the medical pathology science workforce of 56.2%. The common perception was instead that workload had increased but that worker numbers had at best remained static. The compound growth rate of 4.6% per annum derived from the ABS Census data for the medical science workforce is quite high in workforce supply terms; a growth of around 2-3% per annum is considered normal.

**Figure 15: Size of medical pathology scientific workforce by year of Population Census and by type of occupation**




Stakeholders consulted argued that Census data could include those classified as scientists who are working in allied areas such as quality, specimen collection management, IT, Trials etc. One stakeholder argued that a substantial number of graduates with science degrees work in health but outside of the conventional pathology laboratories such as respiratory labs, sleep labs, cardiology, perfusion, neurosciences, LIMS support (electronic medical records), clinical trial management, scientific purchasing and supply, laboratory OH&S, laboratory QC/QA, and laboratory human resources. Such people may maintain "competencies" through ongoing participation in specific continuing education activities, and self-report as medical scientists, but they are not actually working at the laboratory bench.

This begs the question as to how best to obtain an accurate and widely credible estimate for workforce size, especially since such an estimate is pivotal to any attempt to project supply and demand for this workforce. The Urbis (2011) survey approach for estimating workforce size, though a laudable attempt, is extrapolating from too small a survey response rate (likely to be a problem with any survey effort) to provide a widely acceptable workforce size estimate.

Three possible (not mutually exclusive) approaches were canvassed by stakeholders:

***The 2011 Population Census***: a Census count is planned for August 2011, and this will ultimately provide another point in the series of workforce size estimates from ABS. Considerable debate surrounded the potential of ABS to obtain more credible estimates from the 'self-report' Census data, perhaps through more effort on the coding function and by analysing data through cross tabulations of occupation, industry and workplace to reduce the chance of inappropriate inclusions in the medical pathology science workforce. Negotiations could be undertaken with ABS;

***Increased collection of workforce data by NATA***: NPAAC is responsible for the development and maintenance of standards and guidelines for pathology laboratories. Audits against these standards and guidelines are conducted by the National Association of Testing Authorities, Australia (NATA). Currently Australian Standard 15189-2009 ('Medical Laboratories – Particular requirements for quality and competence') determines NATA's audit processes in respect to staff. Clause 5 of these standards requires managers to maintain records on ALL personnel including their job description, qualifications, experience and competence. In regard to the latter the standard requires … "*the competency of each person to perform assigned tasks shall be assessed following training and periodically thereafter*."

Personal communication with NATA identified that no records are gathered or retained by them on actual staffing numbers or staff skills mix, and certainly not on competence assessments. It was suggested by stakeholders that NATA could require employers to provide this data, if not annually then at least in conjunction with the Population Census data gathering in order to provide a comparable estimate of workforce size (presumably also to establish some industry norms on staffing numbers and composition against which to crudely assess, in the first instance, staffing quality);

***Collection of workforce data by Medicare Australia***: Section 16A (2)(b) of the Health Insurance Act 1973 requires a pathology service to be provided in an 'Accredited Pathology Laboratory' in order to be eligible for Medicare benefit payments. Application for accreditation implies submission of job descriptions, staffing and organisation structure and details on senior medical and scientist personnel. According to stakeholders with some insight this data used to be collected at the time of new approval and subsequently on a regular basis but was never collated. There is uncertainty now as to the status of data collection requirements and the collation and storage situation. It is a potentially appropriate means of collecting staffing data on a regular basis (most other forms of related accreditation, for instance Approved Pathology Practitioner [APP] and Approved Pathology Authority [APA], are required to renew their status annually).

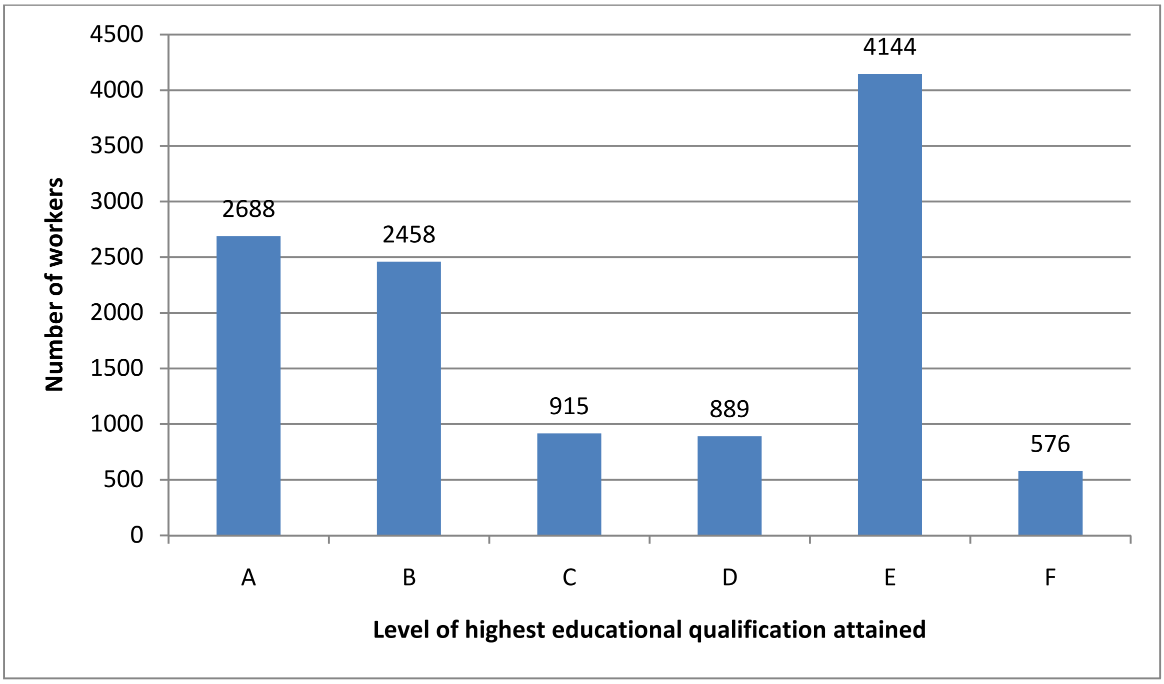
A small piece of exploratory research to assess the feasibility of using one or more of these approaches and scoping the costs (and relative advantages and disadvantages) would be beneficial.

# Distribution of the workforce

## *Distribution by skill level*

As noted previously, the 'medical laboratory scientist' category (234611) includes scientists and senior scientists (a level of skill commensurate with a bachelor degree or higher qualification — ANZSCO Skill Level 1) and the medical laboratory technician category (311213) includes both technicians (ANZCO skill level 3) and laboratory assistants (generally ANZCO skill level 4). Figure 16 segregates the latter category by skill level (highest qualification achieved) of the worker.

**Figure 16: Distribution of the Medical Laboratory Technicians (ANZCO 311213) workforce category by highest qualification attained**




***Key to levels of qualification attained***

A = Bachelor Degree and above

B = Advanced Diploma and Diploma Level

C = Certificate IV

D = Certificate I to III

E = Year 12 or below/ No educational attainment/ Inadequately described

F = Not stated

***Source: ABS Population Census, 2006***

If all Certificate IV and above workers are assumed to be technicians, then there were 6,061 medical laboratory technicians at the last Census. A further 5,033 workers were laboratory assistants, with a further 576 unknown (but likely distributed similar to the other workers). This provides for a distribution of the scientific workforce in medical pathology laboratories as follows — Medical Laboratory Scientists (54.6%), Medical Laboratory Technicians (24.8%), Laboratory Assistants (20.6%).

Compared with the typical laboratory profile of full time equivalents for the same categories described by Legg & Associates (2008) the scientist proportion is very similar (56.7%) but the other two categories quite different (10.8% and 32.4% respectively). The Urbis (2011) survey estimated the distribution to be:

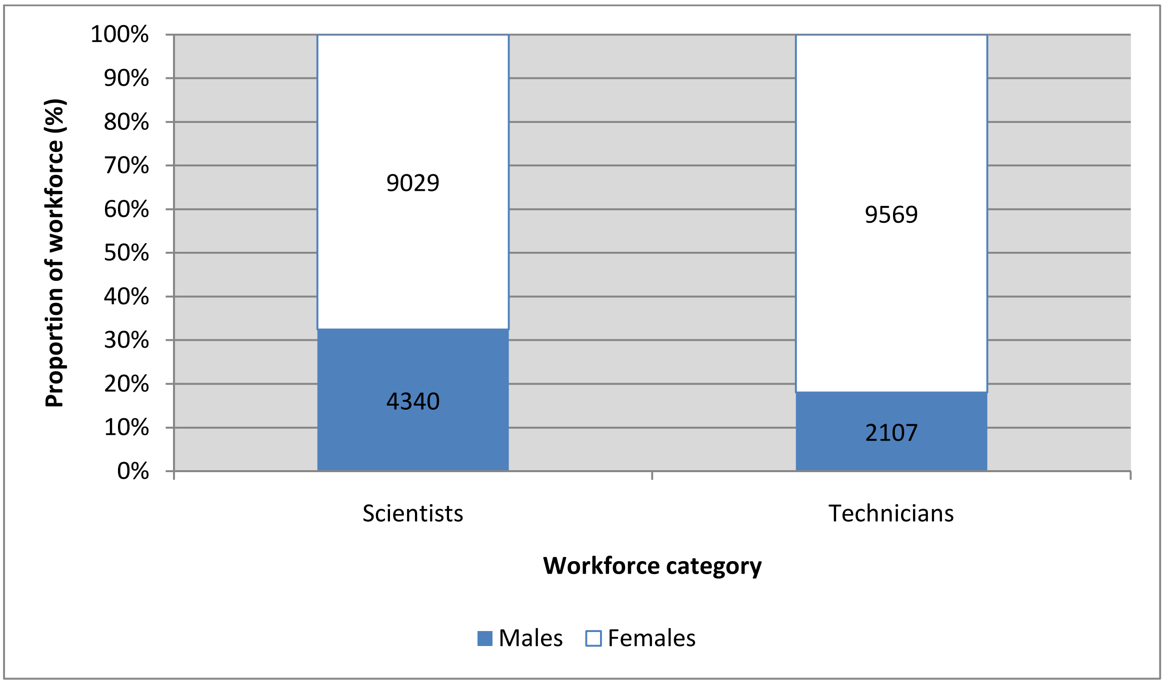
| | |
|---|---|
| Senior scientists | 3.7% |
| Scientists | 50.0% |
| Laboratory technicians | 21.3% |
| Laboratory assistants | 25.0%. |

The consultations reported that employment practice trends were favouring an increasing percentage of technicians being substituted for scientists, and assistants for technicians. This was associated with increasing pressure to reduce staffing (and other) costs within medical pathology laboratories in order to remain profitable. ABS Population Census data gathered for the census years 1996 to 2006 show a slowly decreasing proportion of scientists within the total medical pathology workforce although the data provides for an inconsistent trend and appears problematic at a face validity level. This area of workforce needs more investigation.

## *Distribution by gender*

The medical laboratory science workforce is fairly dominated by female workers as shown in Figure 17. This statement holds true for both the medical laboratory scientist and technician workforces, although the proportion of female workers in the technician workforce (81.9%) is higher than that in the scientist workforce (67.5%).

**Figure 17: Distribution of the medical laboratory science workforce by gender**

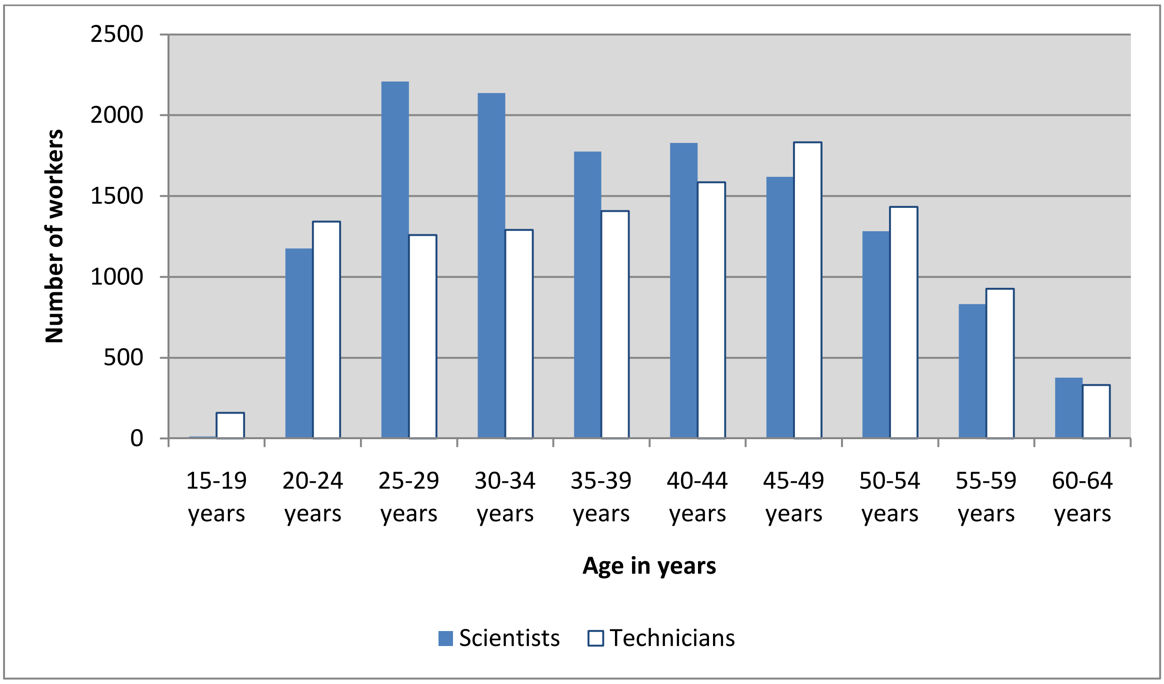



***Source: ABS Population Census, 2006***

## *Age distribution*

The medical laboratory science workforce is comparatively quite young with just over 41% of the total number of scientists being under 35 years old (see Figure 18). The technician workforce has only about 35% of its number under 35 years old. Nevertheless, compared with many other health workforces it too is comparatively young[62].

**Figure 18: Distribution of the medical laboratory science workforce by age categories**




***Source: ABS Population Census, 2006***

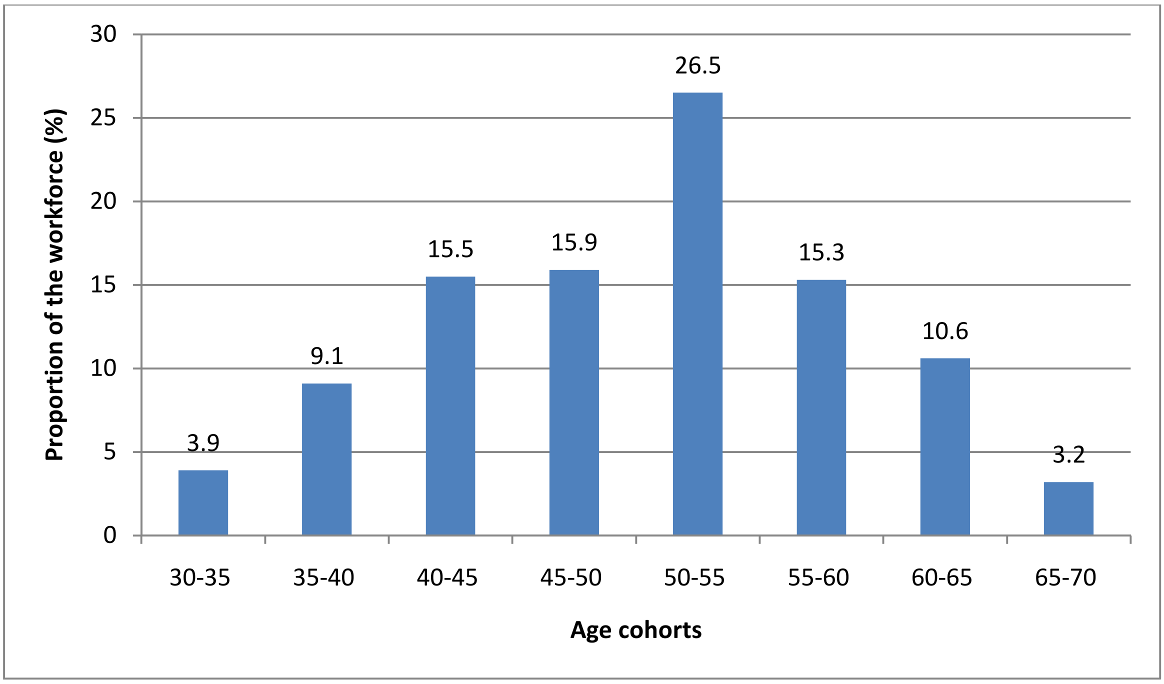
The Urbis (2011) survey similarly found the proportion of scientists under 40 to be 43.4%, but conversely found the proportion of laboratory technicians and laboratory assistants under 40 to be 47.5% and 61.9% respectively.

A survey undertaken by the National Pathology Accreditation Advisory Council (NPAAC) in 2007 of Accredited Pathology Laboratories in Australia requested a count of Full Time Equivalents (FTEs) practising senior scientists (defined here as workers with greater than 10 years relevant experience and / or who hold a PhD or Fellowship in a related discipline).

As would be expected their age profile is quite different to the total medical laboratory scientist workforce (see Figure 19). Only 3.9% of senior scientists were found to be under 35 years old (the Urbis survey identified only 1.5%). Even 45 years olds only make up less than one third of the senior scientist workforce, giving support to the popular opinion that breaking into the ranks of senior scientists requires considerable patience.

[62] For instance there are 15% of the male and 30% of the female medical workforce under 35 years old.

**Figure 19: Proportional distribution of the senior medical laboratory science workforce by age categories**



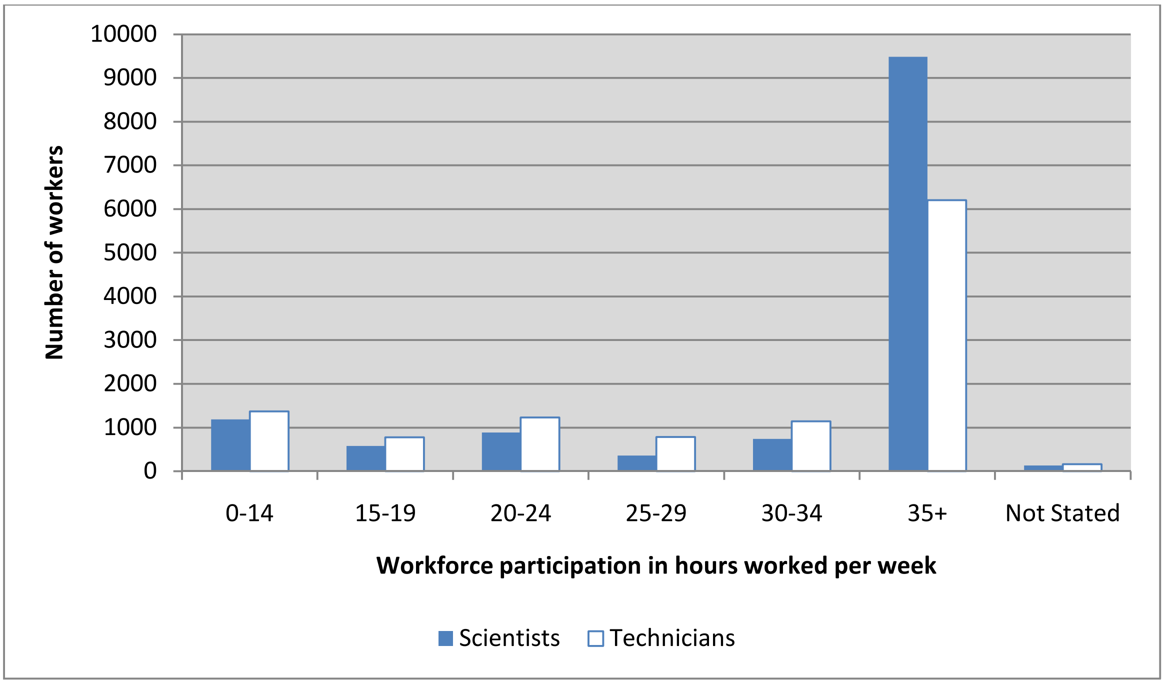

***Source: NPAAC Survey, 2007***

## *Distribution by level of workforce participation*

The scientific workforce in medical pathology laboratories is considerably fulltime oriented (see Figure 20). Just over 70% of the medical laboratory scientist workforce works more than 35 hours per week. A much lower proportion (53%) of medical laboratory technicians (including laboratory assistants), work fulltime than do medical scientists. This is reflected also in the estimated FTE conversion factors. The conversion factor for medical laboratory scientists is 0.86 (that is the average scientist works 86% of a fulltime job or 32.6 hours per week) while that for medical laboratory technicians is only 0.79.

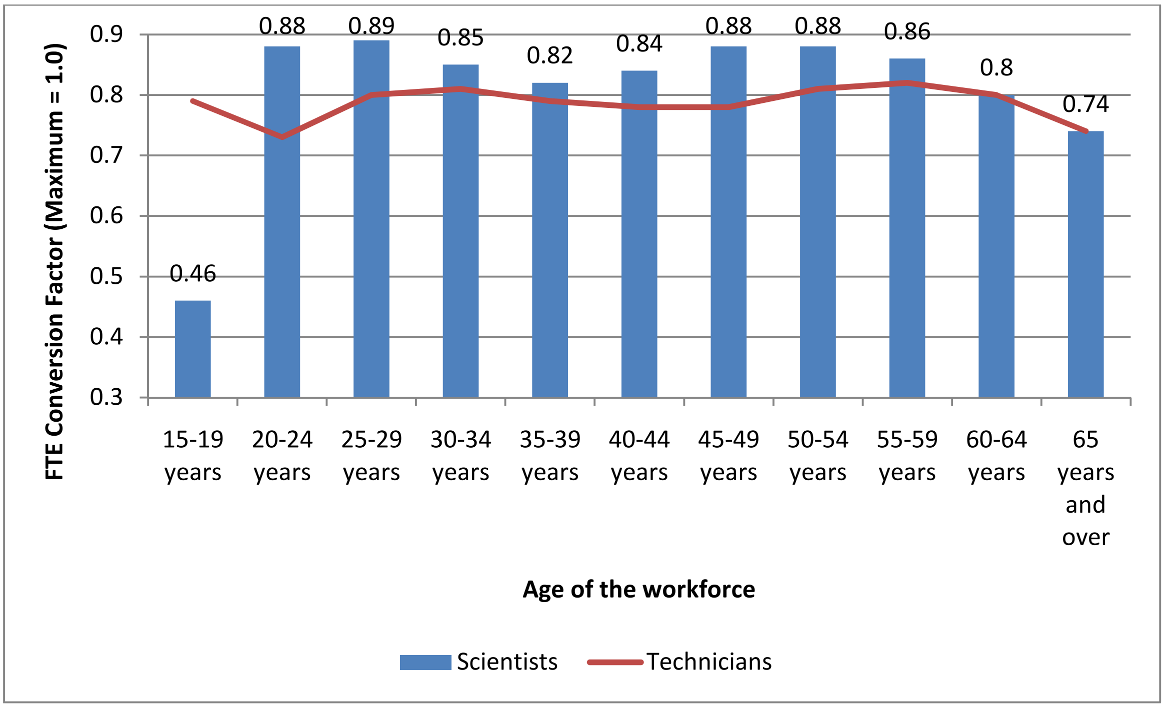
Like most workforces, participation levels vary across workforce age cohorts. As shown in Figure 20, using the FTE conversion factor (where fulltime employment equals 1.0), there are (1) clear differences in the patterns of participation between laboratory scientists and technicians, (2) there are generally higher levels of participation across all scientist age categories when compared to respective technician age categories, and (3) a customary trend in the workforce participation where participation is high at the commencement of the career, dips during the normal child bearing and rearing years (30 to 45 years old), increases again during the later years of the career (45 to 60 years old) and then begins to tail off after 60 years old.

**Figure 20: Distribution of the medical laboratory science workforce by levels of workforce participation**




***Source: ABS Population Census, 2006***

**Figure 21: Distribution of the medical laboratory science workforce by levels of workforce participation by age cohorts**




***Source: ABS Population Census, 2006***

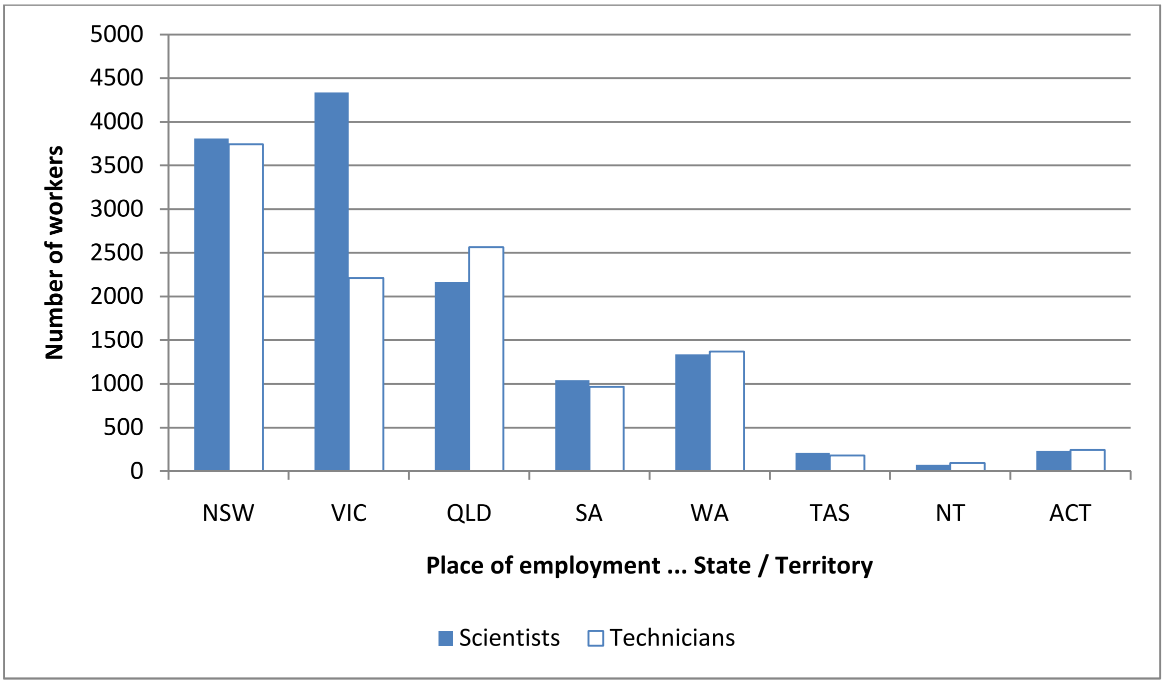
A notable feature of the statistics of Figure 21 is the comparatively uniformly high levels of workforce participation, especially of scientists, throughout their career. While a dip as noted earlier in mid career is discernable, it does not represent a drastic reduction in participation levels, the like of which would have been the case some years ago in a female dominated profession.

An anomaly in Figure 21 is the participation level of 20 to 24 year old technicians. Why should it be low compared to other age groups and to the participation of scientists of the same age? The consultations suggested that many science graduates are continuing to study in postgraduate courses and working part time as a technician or laboratory assistant during their study years.

## *Distribution by geography*

The medical laboratory scientist and technician workforces are distributed between the States and Territories as shown in Figure 22. The distribution of the workforce roughly accords with what might be expected on the basis of respective State and Territory population size.

**Figure 22: Distribution of the medical laboratory science workforce by State or Territory**

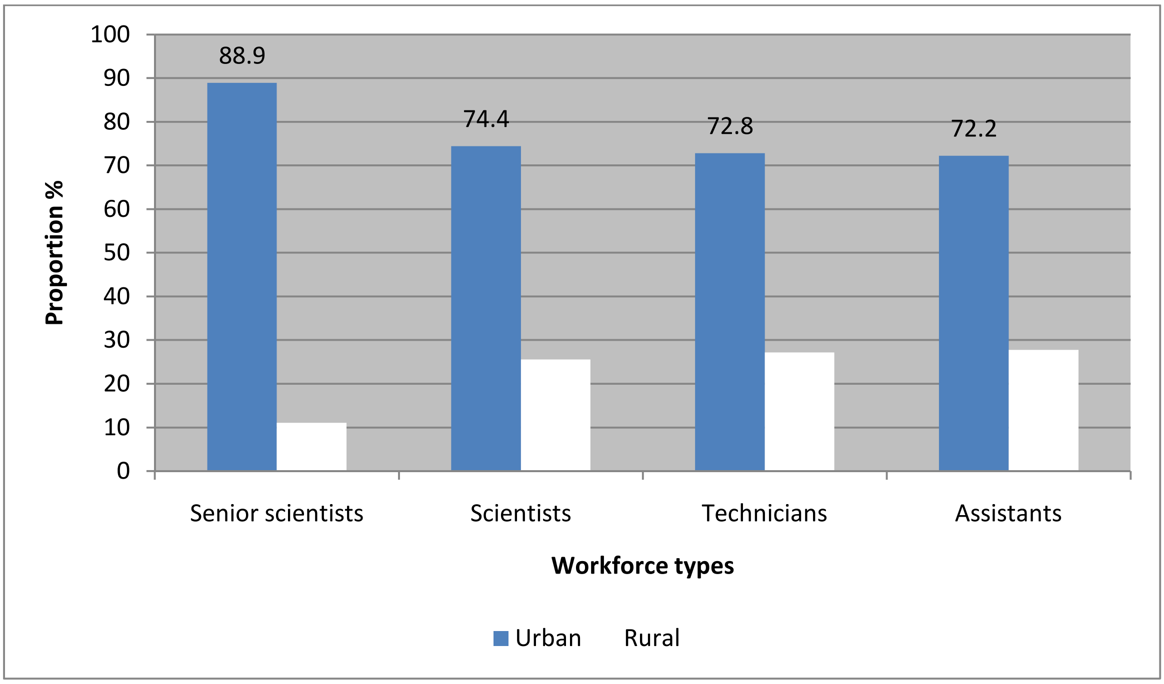



***Source: ABS Population Census, 2006***

The interesting aspect though is the variation between States and Territories in the workforce balance between scientists and technicians. In this regard Victoria is the standout. While the number of medical scientists as a proportion of the total medical laboratory science workforce varies in other states between a low of 45.2% (Northern Territory) to a high of 53.7% (Tasmania) with the others all slightly higher or lower than 50%, the proportion in Victoria is 66.2%. Why this State should have such a professionalised medical laboratory science workforce is not obvious, although the strong and somewhat uniquely structured presence of the employee representative in Victoria and their consistent stance on professional labour was suggested as a probable reason for the difference.

Like most health workforces the distribution of the medical scientist workforce between urban and rural work locations is strongly skewed towards urban located workplaces. Based on Urbis (2011) data the proportion of senior scientists in urban locations is much higher than for other workforce types as shown in Figure 23. This accords with consultation findings that identified most opportunities for senior scientists in larger, centralised and specialised pathology laboratories.

**Figure 23: Distribution of medical laboratory workforce by location of workplace and level of skill**




***Source: Urbis, 2011***

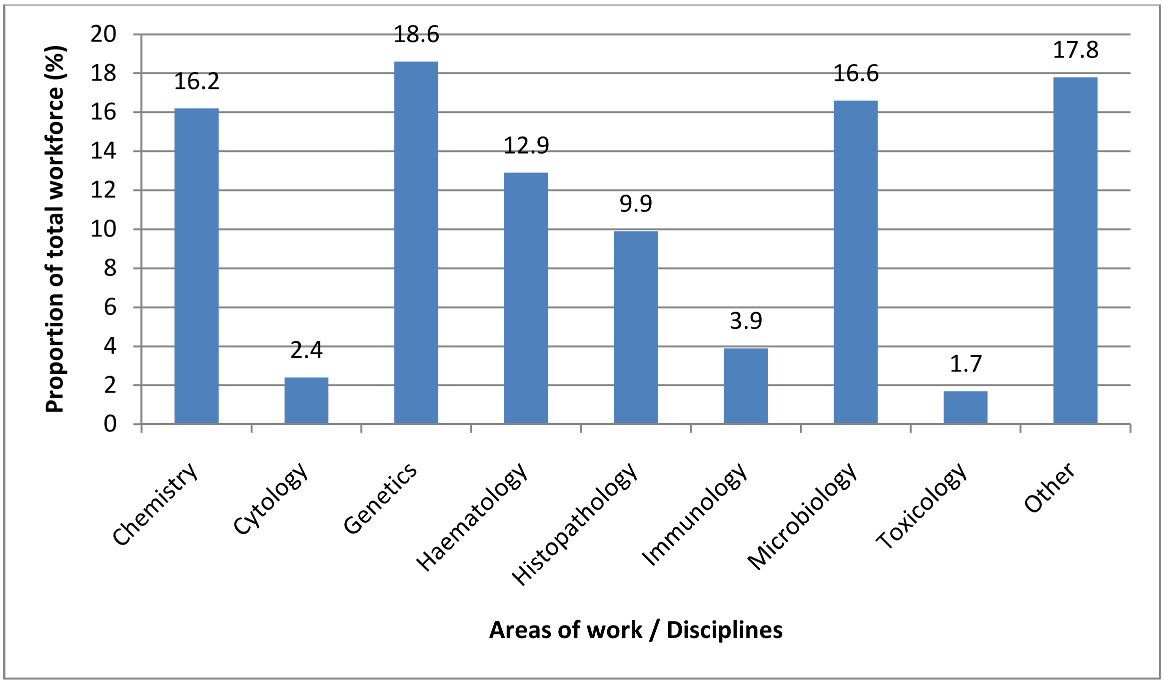
## Distribution by discipline / area of speciality

There is limited data on the distribution of the medical laboratory science workforce by discipline or area of work. ANZSCO occupational codes do not proceed to finer levels of classification than six digits (e.g. Medical Laboratory Scientists, 2346-11) and so no data is available from the Population Census or any other relevant ABS statistical collections.

The Pathology Workforce Survey undertaken by NPACC in 2007 can provide insight into the distribution of ***senior*** medical scientists and the results of that survey are shown in Figure 24. One might assume that this sub section of the total medical laboratory scientist workforce would provide a reasonable estimate of the distribution of the entire workforce, although a number of stakeholders consulted indicated the figures did not seem to make sense.

Another way of trying to appreciate the distribution of the workforce between areas of work is to review professional association membership. While not exact because (a) associations rarely have comprehensive coverage of a workforce and (b) there is often some overlap between associations in membership, nevertheless many of the associations are neatly linked to areas of work specialty.

**Figure 24: Proportional distribution of the senior medical laboratory science workforce by area of work / discipline**




***Source: NPAAC Survey, 2007***

Accordingly all the relevant professional associations were requested to provide information on their membership, the results of which are summarised in Table 15.

**Table 15: Statistics on membership of selected professional associations relevant to the medical laboratory science workforce**

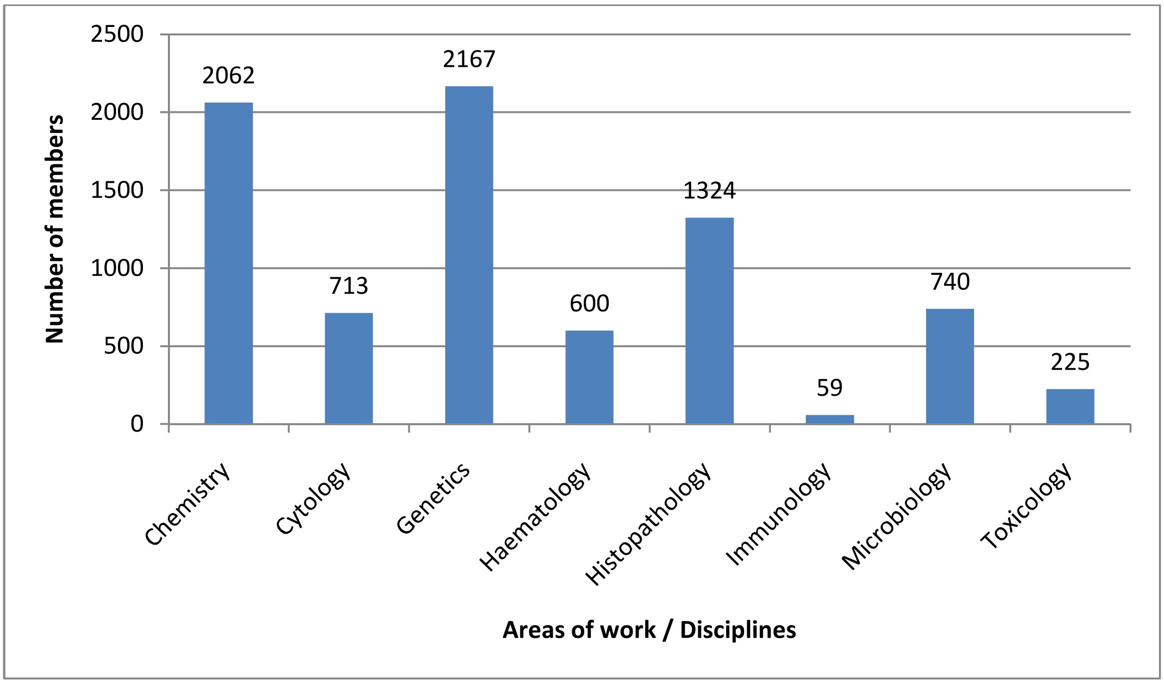
| Professional Association | Speciality work area / discipline covered | Number of scientists / technician members | Proportion (%) of workforce covered | Overlap with other associations |
|---|---|---|---|---|
| Australian Association of Clinical Biochemists (AACB) | Clinical biochemistry | 1031 | 50% | AIMS (~ 70); RCPA (~70) |
| Scientists in Reproductive Technology (SIRT) … sub group of Fertility Society of Australia (FSA) | Clinical Embryologists (are these scientists?) | 341 | 381 Full/Ordinary members | Insignificant |
| Australian Society for Microbiology (ASM) | Clinical Microbiology | 2240 | <33% | Unknown |
| Australian Society of Cytology (ASC) | Cytology | 571 | 80% | NA |
| Haematology Society of Australia & New Zealand (HSANZ) | Haematology | ~30 + another 50 in related societies | 5% | ~ 12% with AIMS also ASTH |
| ANZ Society of Blood Transfusion (ANZSBT) | Transfusion medicine | 280 | | HSANZ, ASTH and ANZSBT |

| **Professional Association** | **Speciality work area / discipline covered** | **Number of scientists / technician members** | **Proportion (%) of workforce covered** | **Overlap with other associations** |
|---|---|---|---|---|
| Human Genetics Society of Australia (HGSA) | Genetics & cytogenetics | 650 | 30% | Negligible |
| Australian Society of Clinical Immunology and Allergy (ASCIA) | Immunopathology | 59 | 10% | Unknown |
| Australian Institute of Medical Scientists (AIMS) | None | 1771 | ~10-20% | AIMS members are also members of the AACB, ASM, ANZSBT, ASTH, ASC, HSANZ, and HGSA |

***Source: HCA data gathering, 2010***

The data in Table 15 can be crudely refashioned (allowing for estimated workforce coverage and ignoring overlap) as in Figure 25.

**Figure 25: Estimated distribution of the medical laboratory science workforce, estimates developed from processional association membership statistics**

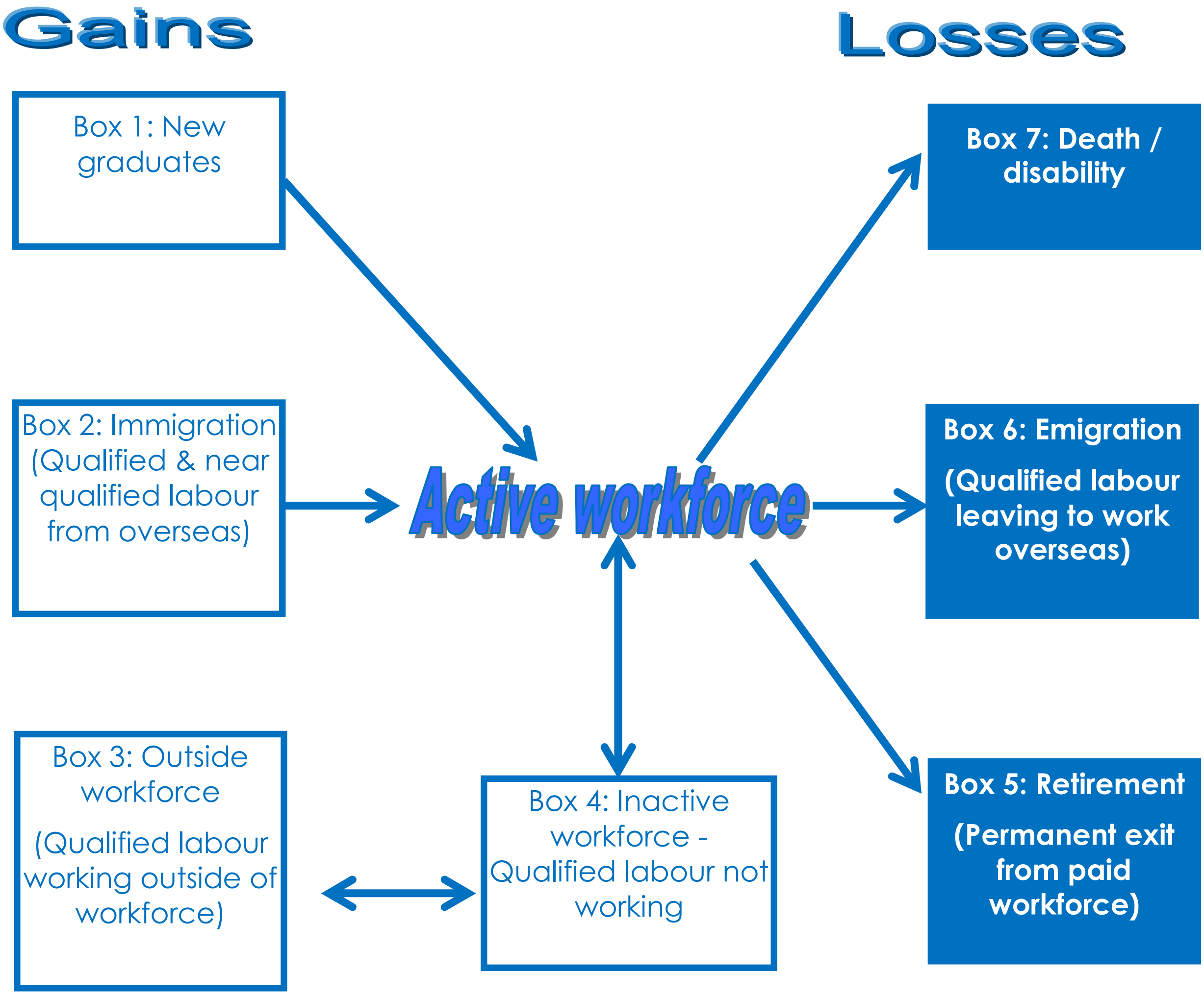



***Source: HCA data gathering, 2010***

# Medical scientist workforce supply issues

Supply *to* the workforce comes from two primary sources and loss *from* the workforce is due to several different factors. These are illustrated in the figure below and expounded on and described in the following text.

**Figure 26: Conceptualisation of workforce supply variables**




## *New graduate supply*

Graduate supply comes from higher education undergraduate courses for senior scientists and scientists and from vocational education courses such as Certificate IV and Diploma level courses for the technician and assistant workforce.

New graduate supply from higher education courses can be estimated for the next 3-4 years through analysis of current enrolments of relevant courses. Beyond that it is possible to project new graduate supply on the basis of either trends in past graduate statistics or trends in course commencing enrolments, or both. New graduate supply from vocational courses can be estimated from a review of past 'graduation' or 'course completion' trends.

## Graduate supply to the scientist workforce

The starting point for looking at graduate numbers to the senior scientist and scientist workforce is to include those courses that are accredited by the Australian Institute of Medical Scientists (AIMS). There are currently eight courses with AIMS accreditation as follows:

A. Queensland University of Technology — Bachelor of Applied Science (Medical Science);
B. James Cook University — Bachelor of Medical Laboratory Science;
C. University Of South Australia — Bachelor of Laboratory Medicine;
D. University Of Tasmania — Bachelor of Biomedical Science;
E. RMIT — Bachelor of Applied Science (Laboratory Medicine);
F. Curtin University of Technology — Bachelor of Science (Laboratory Medicine);
G. University of Technology, Sydney — Bachelor of Science In Biomedical Science; and
H. Charles Sturt University — Bachelor of Medical Science (Patholog.)

Table 16 shows graduations (course completions) data collected by the Department of Employment Education and Workplace Relations (DEEWR) for undergraduate degrees (3 and 4 year courses) for Australia Standard Classification of Education (ASCED) 'Field of Education' (FOE) code 019901 '***Medical science***'. The data reported is only for the Universities where there are AIMS accredited courses and reports the number of persons graduating over the 5 years 2005 to 2009.

**Table 16: AIMS accredited course completions (graduations) by school, by year**

| School | 2005 | 2006 | 2007 | 2008 | 2009 |
|---|---|---|---|---|---|
| James Cook University of North Queensland | 0 | 0 | 14 | 14 | 14 |
| Curtin University of Technology | 72 | 74 | 57 | 62 | 60 |
| Charles Sturt University[63] | 45 | 31 | 69 | 54 | 59 |
| University of Technology Sydney | 48 | 51 | 43 | 38 | 40 |
| University of South Australia | 34 | 24 | 18 | 0 | 20 |
| RMIT University | 51 | 38 | 63 | 46 | 59 |
| Queensland University of Technology | 66 | 59 | 51 | 71 | 64 |
| University of Tasmania | 0 | 0 | 0 | 21 | 23 |

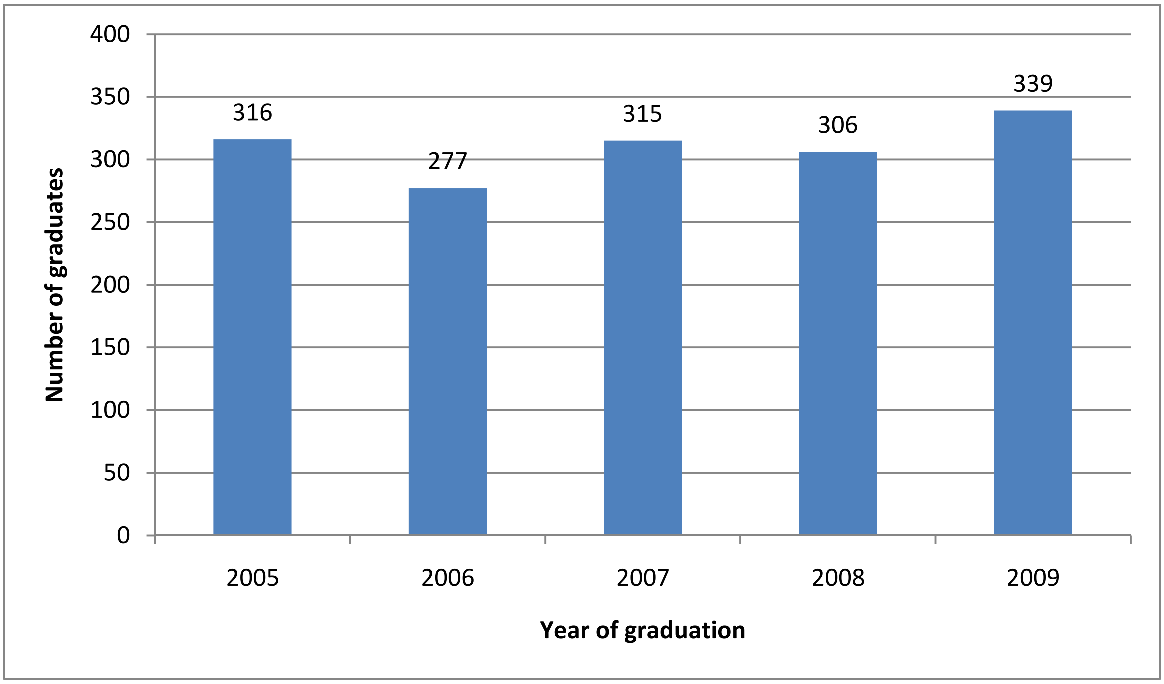
***Source: DEEWR, 2011***

As shown in Figure 27, there is little apparent trend in graduations over the most recent five year period for which data has been collected. The commencing enrolments in the AIMS accredited courses over the same years seems to have

[63] The Charles Sturt University course includes several different but highly related conferred qualifications.

trended down slightly although uncertainty about the RMIT enrolment numbers hampers a proper interpretation of trend figures (see Table 17).

**Figure 27: Total graduations from AIMS accredited courses by year of graduation (2005-2009)**




***Source: DEEWR, 2011***

**Table 17: Commencing enrolments in AIMS accredited courses by school and by year (2005-2009)**

| School | 2005 | 2006 | 2007 | 2008 | 2009 |
|---|---|---|---|---|---|
| James Cook University of North Queensland | 0 | 0 | 25 | 32 | 22 |
| Curtin University of Technology | 123 | 108 | 111 | 107 | 102 |
| Charles Sturt University | 75 | 71 | 72 | 63 | 84 |
| University of Technology Sydney | 178 | 189 | 170 | 174 | 178 |
| University of South Australia | 41 | 42 | 42 | . | 32 |
| RMIT University | 67 | 78 | 66 | na | na |
| Queensland University of Technology | 107 | 93 | 153 | 131 | 118 |
| University of Tasmania | 27 | 25 | 29 | 26 | 22 |
| Total | 511 | 606 | 668 | 533 | 474 |

***Source: DEEWR, 2011***

Interestingly, the attrition rate in some AIMS accredited courses seems quite high. Some of the courses with larger enrolments for instance appear to have up to 50% attrition rates (that is half the year one enrolments fail to complete the course) while overall the attrition rate is estimated to be about 20%. Most other health professional courses estimate only between 5% and 10% losses, hence this issue is something that deserves further investigation, first to validate the findings and second, if validated, to identify causes for such comparatively high levels.

Data was collected by HCA direct from the AIMS course providers in 2010 on current course enrolments (see Table 18). This data seems to suggest that the attrition problem lies in significant drop outs from the courses after year 1 (possibly through transfer to other courses). The data in Table 18 can be used to project graduate supply over the next four years, although it is not attempted here given the missing data from two of the larger courses.

**Table 18: Current enrolments in AIMS accredited courses**

| University | Course | 2010 student enrolments | | | | Projected student enrolments 2011-2015 |
|---|---|---|---|---|---|---|
| | | Yr1 | Yr2 | Yr3 | Yr4 | |
| University of Tasmania | Bachelor of Biomedical Science | 22 | 25 | 21 | 14 | 20-25 per year |
| Queensland University of Technology | Bachelor of Applied Science (Medical Science) | 141 | 69 | 41 | * | Enrolments normally increase approx. 10% per year** |
| James Cook University of North Queensland | Bachelor of Medical Laboratory Science | 16 | 17 | 18 | 11 | Steady |
| University of South Australia | Bachelor of Laboratory Medicine | 43 | 32 | 35 | 31 | 42 to 58, increasing over next 5 years |
| RMIT University | Bachelor of Applied Science (Laboratory Medicine) | NA | NA | NA | NA | |
| Curtin University of Technology | BSc (Laboratory Medicine) | 102 | 82 | 106 | * | Increasing |
| University of Technology, Sydney | Bachelor of Science in Biomedical Science | NA | NA | NA | NA | |
| Charles Sturt University | Bachelor of Medical Science (Pathology) | 24 | 22 | 21 | 20 | Steady |

***Source: HCA data gathering, 2010***

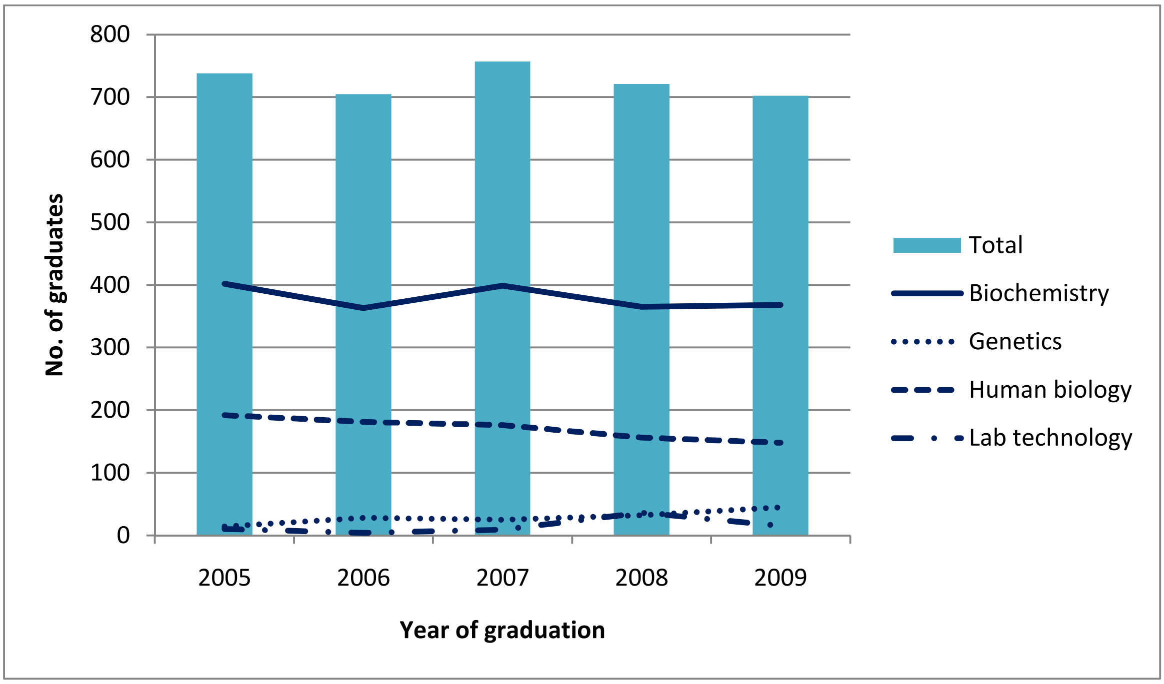
* Note no year 4 only 3 year course
**Queensland University of Technology has indicated that their enrolments normally increase approx. 10% per year. However Griffith University are launching a course in 2011 and QUT are preparing to move to a 4 year course in 2012. QUT anticipates a decrease during those times but are unsure of exactly how much that will be at this stage. QUT are still conducting market research to ascertain this figure.

Through discussions with stakeholders during the consultation stages of the project, it was indicated that graduates from non AIMS accredited courses could find employment opportunities in medical pathology laboratories if AIMS course graduates were not available[64]. Relevant undergraduate degree courses from which new graduate supply might be recruited included those from the following FOE coded courses:

- 010901 Biochemistry and cell biology;
- 010909 Genetics;
- 010911 Microbiology;
- 010913 Human biology; and
- 019909 Laboratory technology.

There are 24 universities offering courses in one or more of the above FOE coded areas, which includes the eight universities where there are currently AIMS accredited courses being provided. A list of the universities with details of their enrolments by FOE category is provided in Attachment A. Figure 28 below tracks the number of graduates from these courses for the five year period from 2005-2009 by FOE category.

**Figure 28: Graduate supply from relevant non AIMS accredited courses by FOE category and year of graduation (2005 – 2009)**




***Source: HCA data gathering, 2010***

Total graduate supply from relevant non AIMS accredited courses is higher than from accredited courses and provides a safety valve, backup source of supply to employers if the preferred source of supply is not available. Stakeholders vary in their estimate on the amount of additional on-the-job training graduates from these courses require to 'catch-up' with AIMS accredited course graduates.

[64] In most cases supply from this source would be treated as inferior and accordingly might be employed initially into technician roles rather than against dedicated scientist jobs. A few employers argued though that for some specialist pathology science disciplines certain non AIMS accredited course graduates may be the equal of those from AIMS accredited courses.

Little is known quantitatively about the transfer from education to medical pathology laboratory work of graduates. Some questions were asked by stakeholders as to the fate of graduate scientists and what proportion for instance might have transferred to postgraduate studies that lead to an alternative career (for instance medicine) rather than enter the medical pathology laboratory scientist workforce. Data from Career Destination Surveys (supplied by Graduate Careers Australia) might help explore this issue.

## Graduate supply to the technician and assistant workforce

The medical laboratory technician and assistant workforce is made up of people with a range of vocational education and training (VET) qualifications (Certificate II through IV through to Advanced Diploma), though persons employed in the assistant workforce will more often than not have no qualifications. The Laboratory Operations Training Package (MSL09) is the current training package for laboratory technicians and assistants and includes the following qualifications:

Targeting laboratory assistants:

MSL20109 – Certificate II in Sampling and Measurement;

MSL30109 – Certificate III in Laboratory Skills;

Targeting laboratory technicians:

MSL40109 – Certificate IV in Laboratory Techniques;

MSL50109 – Diploma of Laboratory Technology;

MSL60109 – Advanced Diploma of Laboratory Operations; and

MSL70109 – Vocational Graduate Certificate in Instrumental Analysis.

A description of these courses is provided in Attachment B.

In order to estimate supply to the technician and assistant workforce included in this study, available National Centre for Vocational Education Research (NCVER) data on course enrolments and qualifications were gathered for the years 2005-2009. During this period the previous training package PML04 was in operation which included the following qualifications:

Targeting laboratory assistants:

PML20104 - Certificate II in Sampling and Measurement;
PML30104 - Certificate III in Laboratory Skills;
PML30199 - Certificate III in Laboratory Skills[65];

Targeting laboratory technicians:

PML40104 - Certificate IV in Laboratory Techniques;
PML40199 - Certificate IV in Laboratory Techniques[66];
PML50104 - Diploma of Laboratory Technology;
PML50199 - Diploma of Laboratory Technology[67];
PML60104 - Advanced Diploma of Laboratory Operations; and
PML60199 - Advanced Diploma of Laboratory Operations[68].

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[65] Replaced by PML30104
[66] Replaced by PML40104
[67] Replaced by PML50104
[68] Replaced by PML60104

The following two tables show the total number of enrolments and completions over the five year period from 2005-2009 in each of the above listed qualifications. The qualifications are supported mostly by one or two year courses with considerable on-the-job training requirements.

**Table 19: VET qualification course enrolments by qualification and by year (2005 – 2009)**

| Course / qualification | Year of enrolment | | | | |
|---|---|---|---|---|---|
| | 2005 | 2006 | 2007 | 2008 | 2009 |
| Certificate II in Sampling and Measurement (PML20104) | 2 | 151 | 133 | 213 | 171 |
| Certificate III in Laboratory Skills (includes PML30104 & PML30199 data) | 1,257 | 1,030 | 1,080 | 1,490 | 1,309 |
| Certificate IV in Laboratory Techniques (includes PML40104 & PML40199 data) | 874 | 1,131 | 1,206 | 1,235 | 1,492 |
| Diploma of Laboratory Technology (includes PML50104 & PML50199 data) | 1,949 | 1,897 | 1,761 | 1,718 | 1,975 |
| Advanced Diploma of Laboratory Operations (includes PML60104 & PML60199 data) | 22 | 6 | 12 | 22 | 61 |

*Source: NCVER, 2011*

**Table 20: VET qualification course completions by qualification and by year (2005 – 2009)**

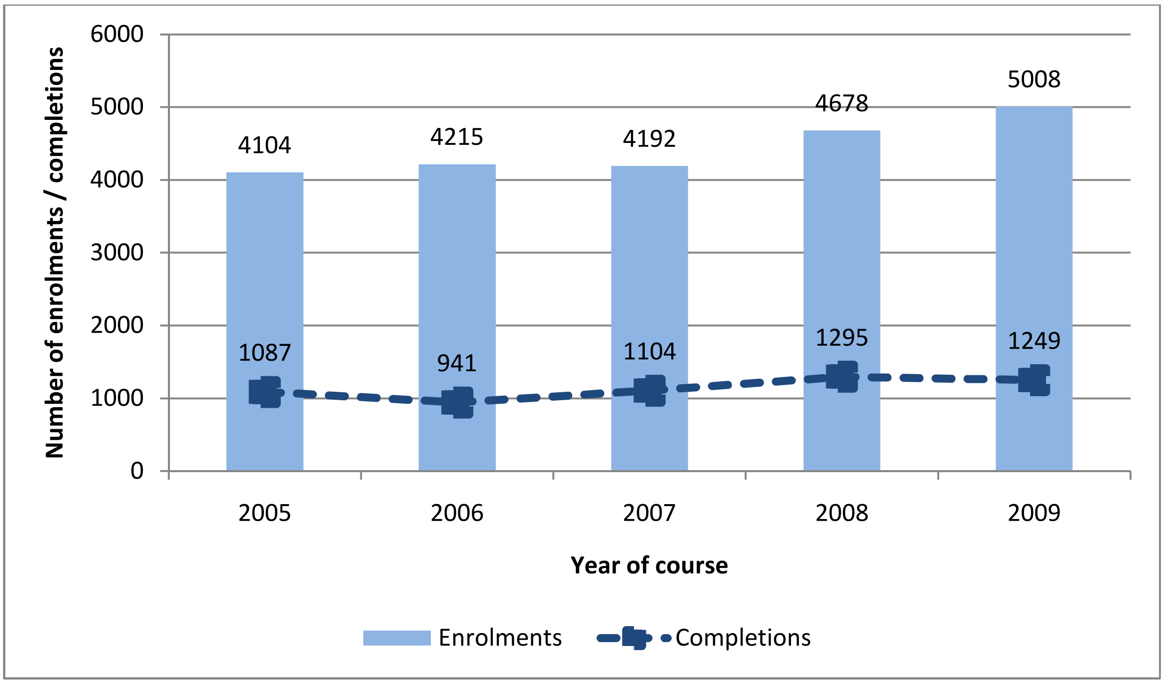
| Course / qualification | Year of enrolment | | | | |
|---|---|---|---|---|---|
| | 2005 | 2006 | 2007 | 2008 | 2009 |
| Certificate II in Sampling and Measurement (PML20104) | 2 | 24 | 46 | 91 | 57 |
| Certificate III in Laboratory Skills (includes PML30104 & PML30199 data) | 425 | 277 | 305 | 509 | 492 |
| Certificate IV in Laboratory Techniques (includes PML40104 & PML40199 data) | 282 | 270 | 322 | 308 | 328 |
| Diploma of Laboratory Technology (includes PML50104 & PML50199 data) | 370 | 368 | 426 | 380 | 362 |
| Advanced Diploma of Laboratory Operations | 8 | 2 | 5 | 7 | 10 |

| Course / qualification | Year of enrolment | | | | |
|---|---|---|---|---|---|
| | 2005 | 2006 | 2007 | 2008 | 2009 |
| (includes PML60104 & PML60199 data) | | | | | |

*Source: NCVER, 2011*

Total enrolments and course completions for all relevant VET qualifications is shown in Figure 29. The figure indicates the high wastage rate in such courses — almost 3 of 4 enrolments fail to complete the course. This is a common phenomenon with VET courses and qualifications, the cause of which is not well understood. It is often theorised to be a consequence of individuals having to enrol in courses with the intention of only ever completing a single 'subject', and / or persons using VET course as a stepping stone only to undergraduate course entry.

**Figure 29: Total enrolments and course completions in relevant VET courses by year of study (2005 – 2009)**




*Source: NCVER, 2011*

Not all graduates from the identified courses find their way into medical pathology laboratories — unfortunately the proportion that does is unknown. It was discussed in the consultations that the VET qualifications were not designed specifically for medical pathology laboratory work, rather for more commercial sector laboratories. This is evidenced in the laboratory operations training package - MSL09 having been developed by the Manufacturing Industry Skills Council and the course description identifying the following industry sectors that graduates could enter:

- process manufacturing;
- construction materials testing;
- food and beverage processing;
- wine making;
- biotechnology, biomedical research, pathology testing;
- environmental monitoring and technology;

- mining, mineral assay;
- calibration;
- chemical, forensic, environmental analysis; and
- education.

Investigation of the NCVER graduate outcomes data could offer a better understanding of the actual share of VET graduate market that enter the medical laboratory workforce. It is anticipated that the actual share for medical laboratories is low and attempts could be made to talk with the VET sector to increase their uptake by offering apprenticeships and traineeships, especially desirable in rural, remote and disadvantaged areas where identifying and training a local workforce could alleviate workforce shortages.

## *Supply from immigration*

New supply through immigration from overseas (of workers with an overseas qualification) can be through several avenues, for some of which data is more easily able to be captured than others. From a data capture perspective, the preferred process of immigration is through the formal application and assessment of qualifications in preparation for a permanent resident visa. AIMS has been specified by the Minister for Immigration and Citizenship in accordance with the Migration Regulations 1994 as the assessing authority for the occupations Medical Laboratory Scientist and Medical Laboratory Technician.

Skills and qualifications of medical laboratory scientists are individually assessed by a committee of AIMS prior to migration. To apply for assessment of skills persons must complete the form *Application for Assessment of Professional Skills and Qualifications*. The fee for assessment is $500.00.

Applications are assessed by a two stage process. This involves an initial document based assessment, followed by the AIMS Professional Examination for those candidates whose qualifications and experience are satisfactory. An additional fee of $550.00 is payable for the examination. The examination is held in March and September each year in venues in Australia and overseas.

To be classified by AIMS as a medical laboratory scientist an applicant will in most cases have to satisfy the following requirements:

- be a graduate of an AIMS accredited bachelor degree course; OR
- be a graduate of a relevant science degree course that is educationally comparable with an Australian bachelor degree and that meets AIMS requirements in the subjects studied AND have completed two years postgraduate professional experience in a diagnostic medical laboratory AND have successfully completed the AIMS Professional Examination.

The initial assessment can take from four to six weeks, and intending applicants are advised to take the deadlines into consideration when lodging applications. Also of note is that satisfactory command of the English language must be demonstrated. This requires an IELTS test report form showing an overall band score of 7.0 or better (General or Academic) being submitted with the initial application.

Over the last five years there has been no real pattern in immigration supply through the AIMS assessment process (see Table 21). Applications for assessments have averaged around 100 to 160 per year. In two years (2005 and 2006) the bulk of applications were from medical science technicians, while in other years the scientists and technicians have been roughly equivalent in numbers.

**Table 21: Summary description of immigration through AIMS processes**

| Year | Applic-ations | Stage 1 Assessment — Document appraisal | | Eligible for Examin-ation* | Stage 2 Assessment — Examination |
|---|---|---|---|---|---|
| | | Medical Scientist | Technical Officer | | |
| 2005 (July to Dec) | 113 | 12 | 101 | NA | 12 |
| 2006 | 1063 | 33 | 105 | 25** | 35 |
| 2007 | 120 | 31 | 36 | 53 | 26 |
| 2008 | 99 | 34 | 31 | 34 | 23 |
| 2009 | 117 | 33 | 35 | 49 | 23 |
| 2010 (Jan to - June) | 51 | 19 | 13 | 19 | 13 |

***Source: AIMS, 2010***

* Examinations started on the 1st Oct 2004.
** Only last quarter data available

As noted in Table 21, not all of those who apply for assessment get through the first hurdle. Some that do still do not actually sit the exam. In addition, not all who are eligible for an examination sit it in the same period, and some sit the exam more than once. For the year 2005 AIMS do not have the numbers eligible to sit the examination and for 2006 the records for how many were eligible are only for the last quarter.

On average over the five years of statistics, roughly one in five applicants succeed in passing through the AIMS process and becoming eligible to practice as a qualified medical scientist or medical technician. The Skilled Occupational List (SOL) list changed in June 2010 so AIMS suspects it may see a reduction in the number of Technical Officer applications in the future.

Of course the AIMS process is potentially the most difficult pathway to travel. Overseas scientists could enter the Australian workforce if their spouse was a citizen or if their spouse was successful in getting immigration status from the Department of Immigration and Citizenship (DIAC) (in whatever occupation) and they as the spouse accompanied them. Only AIMS assessment would guarantee these immigrants a job as a medical scientist, however an employer could choose to independently acknowledge the overseas qualifications of an individual worker or employ them at a lower skill level (say a scientist as a technician, or a technician as an assistant). The Australian Association of Clinical Biochemists (AACB) notes that some employers do recruit in this way (especially when the recruits are from English-speaking countries and the source qualification is known to be acceptable to AIMS) in part because the AIMS/NOOSAR process is tedious and "*... it can take years to get someone into the country*". The AACB reports that it often finds students who are travelling on temporary visas who will work for a limited time. Other ways around the AIMS process include:

- Visa 457 - Temporary Business (Long Stay) ; and
- Permanent basis via Regional Sponsored Migration Scheme.

## Sources of loss to the workforce

The sources of short term or permanent losses from the medical pathology laboratory scientific workforce include:

- those working outside the medical pathology laboratory scientific workforce — that is those who are qualified in a relevant field but who are working outside of the studied workforce in other non related areas such as in sales and marketing for drug companies, performing scientific duties for cosmetic or food companies or those who have moved into non related fields of work all together. Many stakeholders were of the opinion that this was a significant area of loss of middle level scientists as they became frustrated with a lack of career progress after 8-10 years in the profession and looked to other careers as a consequence. Studies elsewhere have shown repeatedly that this is a rare source of supply [back] into the workforce;
- the inactive workforce — that is those who are qualified in the relevant field but who are not currently participating in the workforce in any capacity. This could be for a number of reasons such as childbearing or childrearing responsibilities, family commitments, illness etc. With a high proportion of the medical scientific workforce being female it is anticipated that significant numbers of the workforce are lost temporarily or permanently in the 'inactive' workforce;
- retirement — loss to the scientific workforce from retirement will be in line with general losses to the workforces at large due the workforce reaching retirement age. The scientific workforce however, as noted earlier, is comparatively young and less potentially affected therefore by retirements. However there is a sizeable cohort of senior scientists approaching (or having already passed) retirement age (Urbis, 2011) which could cause specific labour loss problems. Off-setting concerns is that workers in the scientific workforce seem to remain active and in the workforce for significantly longer than those in other professions;
- emigration — loss to the workforce via the emigration of qualified scientific persons to overseas jobs mean these persons are not included in the workforce numbers nor in the scope of this study; and
- death/disability — loss to the workforce via death and/or disability is the same as loss to the workforce from retirement and will be in line with general losses to workforces at large due to ageing and/or incident. The medical scientific industry is not one which is rated as 'high risk' for its workers meaning higher rates of loss than is the average for health workers is not perceived.

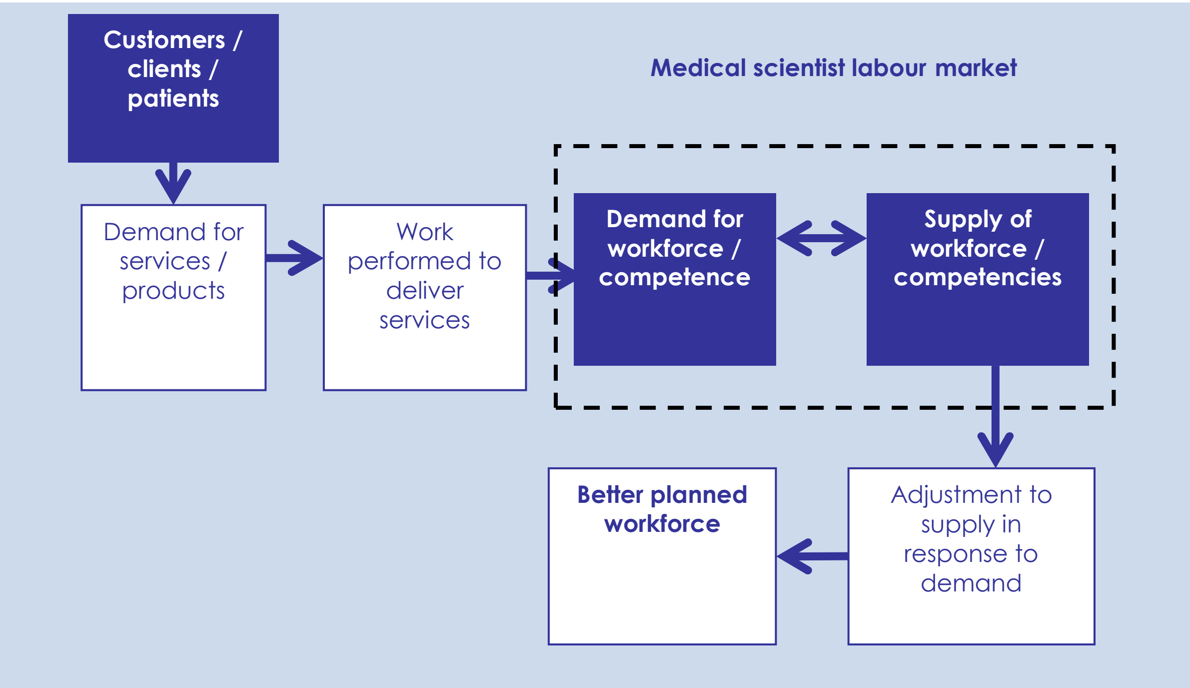
Estimates for most the above sources of loss are not too difficult, with the exception of estimating losses between the active workforce and the population of 'inactive' workers (second dot point above). Unfortunately this also happens to be the most crucial of the 'loss' variables and the one likely to contribute most to total annual losses from the workforce. A sensible approach to estimating loss in this way might be to survey a sample of employers seeking information only on staff turnover and estimating how much of that turnover is likely to be temporary absence (1-5 years) and how much is permanent loss (and possible wastage from the workforce).

# Demand for medical pathology laboratory workforce

Demand for the workforce is defined by the WORK that must be done and therefore the labour or workforce that is required to perform that work.

Within the 'medical scientist labour market' the demand is normally expressed as a demand for certain occupational types (for instance pathologist, medical scientist, technical officer, laboratory assistant, etc. or different types of specialist medical scientist), but this can also be expressed as a demand for 'competence'. The value of expressing workforce demand in this way is that it frees thinking on work organisation (the consideration then only becomes on who is competent, not what type of labour can do this job) and so thinking about supply can become much more flexible[69]

**Figure 30: Demand for the medical pathology laboratory science workforce**




Demand for medical laboratory scientist workforce is therefore a derived demand for relevant services. The services being demanded that will accordingly place the *most* demand on labour are:

- Private sector medical pathology services largely funded by Medicare through related MBS item numbers. Growth in demand for these services is fuelled by population growth and changes in population composition (ageing of the population) modified by changes in ordering practice by general practitioners and specialist medical practitioners (with attempts being made to reduce unnecessary testing effort). Growth in service demand

[69] Fortuitously the medical scientist profession has spent considerable time and energy developing a commendable set of competency standards to define foundation and other levels of practice. See NAC (2010)

is also likely to be reduced by changes in technology (introduction of more efficient and automated testing procedures) and by improvements in communication infrastructure. Counterbalancing this trend might be growth in new forms of testing disease conditions;

- Public sector medical pathology services servicing the needs of testing for patients in public hospitals. Growth in demand for these services is directly related to hospital admissions, which in turn is fuelled by population growth (and change in population composition). Similar factors influence growth trends in the public sector as those that prevail in the private sector (ordering behaviour of medical practitioners and others such as nurse practitioners, technology change); and
- Research and development effort in the public and private sector. Growth in demand for services in this area is largely underpinned by infrastructure investment and the funding (Government, corporate and general public donations) able to be attracted to research effort. The demand for medical laboratory science workforce will depend on the nature of the research funded (that is specific disease conditions and type of research).

Each of these areas of demand needs to be modelled separately taking into account trend data for the last 5-10 years and estimates of the direction of nominated growth factors. This was not within the scope of this consultancy project. However, in the sections below some trend data on key variables associated with the demand for services (and hence the demand for workforce, see Figure 30) are presented.

## Population growth

Population growth and composition underpins much of the quantitative modelling of demand for labour.

The Productivity Commission has a model developed initially for its study of the economic implications of ageing that permits population growth by single year of age and growth in GDP per capita to be estimated to the year 2051 under various assumptions. It draws on the two main official publications that include population projections for Australia:

- The 'Intergenerational Report' (IGR) produced by the Australian Treasury; and
- 'Population Projections' produced by the ABS.

Both use the 'cohort-component method' to generate population projections but differ with estimates for fertility rate, life expectancy and immigration rates. The assumptions behind the different population projection scenarios are detailed in Table 22. In a recent report on the pharmacy workforce (Ridoutt et al 2010), the ABS population growth projections were preferred and scenarios created using the medium and high growth assumptions.

**Table 22: Population projections under different assumptions**

| Method | Total fertility rate | Net overseas migration | Life expectancy at birth | | Population projections | | |
|---|---|---|---|---|---|---|---|
| | | | Males | Females | Base year | Projection year | Projected population |
| | | persons | years | years | | | Million |
| ABS 2008 | | | | | | | |
| Series A | 2.0a | 220 000b | 93.9c | 96.1c | 2007 | 2056 | 42.5 |
| Series B | 1.8a | 180 000d | 85.0c | 88.0c | 2007 | 2056 | 35.5 |
| Series C | 1.6a | 140 000b | 85.0c | 88.0c | 2007 | 2056 | 30.9 |
| Intergenerational Report, 2010 | | | | | | | |
| IGR 1 | 1.6e | 90 000f | 82.5g | 87.5g | 2002 | 2042 | 25.3 |
| IGR 2 | 1.7h | 140 000i | 86.0j | 89.8j | 2007 | 2047 | 28.5 |
| IGR 3 | 1.9k | 180 000l | 87.7m | 90.5m | 2009 | 2050 | 35.9 |
| Current level | 1.901n | 277 710o | 79.3p | 83.9p | | | |

***Sources: ABS (2008b); Treasury (2002, 2007, 2010.***

[a] From 2021. [b] From 2010-11. [c] From 2056. [d] From 2007-08. [e] From 2042. [f] From 2008. [g] From 2047. [h] From 2047. [i] From 2010. [j] From 2047. [k] From 2013. [l] From 2012. [m] From 2050. [n] For 2009 (ABS 2010e). [o] For 2009 (ABS 2010b). [p] For 2007-2009 (ABS 2010f).

These population projections can be used to estimate future demand for testing services by creating and validating age-specific relationships between the *population and MBS item utilisation* (at the group or maybe even individual item level) and between the *population and hospital admissions* (which in turn will support a relationship between admissions [probably by case mix coding such as broad DRG groupings] and pathology testing). A methodology which then creates a relationship between labour (quantity and skill mix) and 'units' of work to be performed completes the link between work and labour requirements.

## *Trends in demand for private sector medical pathology services*

An initial understanding of the demand for private sector medical pathology services can be obtained from analysis of Medicare statistics for pathology related MBS item numbers (MBS items in groups P1 to P11). The trend in Medicare claims within each of the major pathology services groups between financial years 2005 and 2009/10 is shown in Table 23.

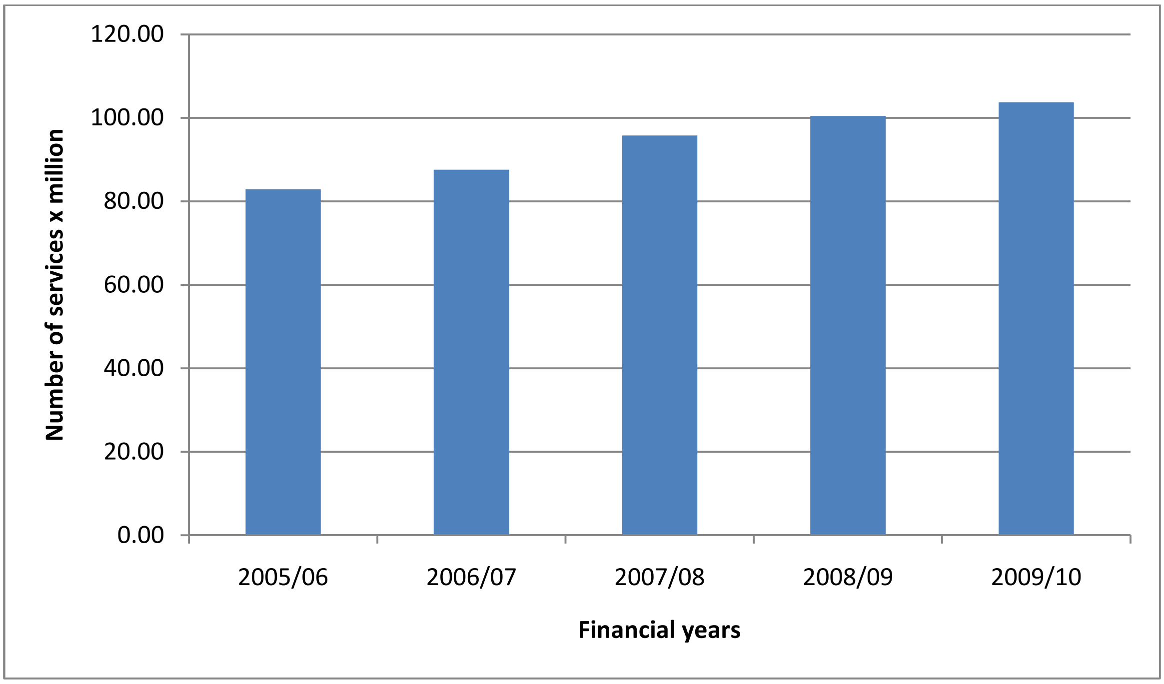
**Table 23: Medicare claims data (tests) for pathology services groups; 2005 to 2010**

| Pathology services group | 2005/06 | 2006/07 | 2007/08 | 2008/09 | 2009/10 |
|---|---|---|---|---|---|
| P1 Haematology | 13,592,064 | 14,077,120 | 14,608,902 | 14,923,005 | 15,252,481 |
| P2 Chemical | 28,498,090 | 30,702,743 | 33,365,151 | 35,204,937 | 36,923,848 |
| P3 Microbiology | 8,534,086 | 9,045,903 | 9,607,593 | 10,362,668 | 10,587,533 |
| P4 Immunology | 2,069,745 | 2,237,808 | 2,416,591 | 2,570,600 | 2,710,314 |
| P5 Tissue Pathology | 2,242,409 | 2,234,099 | 2,342,399 | 2,444,839 | 2,537,685 |
| P6 Cytopathology | 1,912,427 | 1,921,345 | 1,955,356 | 1,965,826 | 1,914,939 |
| P7 Cytogenetics | 55,214 | 119,742 | 132,404 | 136,779 | 153,188 |
| P8 Infertility and Pregnancy Tests | 451,243 | 474,685 | 485,255 | 517,417 | 532,055 |
| P9 Simple Basic Tests | 655,304 | 661,779 | 632,986 | 605,207 | 575,757 |
| P10 Patient Episode Initiation | 24,502,908 | 25,691,239 | 29,777,903 | 31,274,385 | 32,083,853 |
| P11 Specimen Referred | 375,968 | 375,704 | 426,396 | 439,268 | 446,462 |

*Source: Medicare Statistics, 2010*

In Figure 31 the trend in total pathology services growth is summarised. Over the five year period services performed grew by approximately 21 million (from 82.889 million to 103.718 million billable item numbers) and just over 25%. In the consultations the trend figures were largely accepted (most people though a compound growth rate of close to 5% per annum to be reasonable) but the absolute pathology services numbers challenged. First, some stakeholders wondered if certain types of 'tests' actually fitted within the scope of work of the medical pathology laboratory scientist workforce, and advocated analysis at the individual item rather than service group level. Second, many stakeholders claimed the practice of 'coning' introduced by the Government put a cap on payments but not on actual tests performed and so underestimated the actual work performed. Some stakeholders believed this could be as high as 10%. This issue was also noted and considered as part of the recent Commonwealth review of pathology funding arrangements.

**Figure 31: Summary of trend in pathology services growth 2005 to 2010**




The overall growth figure disguises quite different growth rates within the pathology area and between pathology service groups as follows:

| Pathology services group | Growth in number of services claimed between FY 2005 and 2009/2010 (%) |
|---|---|
| P1 Haematology | 12.2 |
| P2 Chemical | 29.6 |
| P3 Microbiology | 24.1 |
| P4 Immunology | 30.9 |
| P5 Tissue Pathology | 13.2 |
| P6 Cytopathology | 0.1 |
| P7 Cytogenetics | 178.2 |
| P8 Infertility and Pregnancy Tests | 17.9 |
| P9 Simple Basic Tests | -12.2 |
| P10 Patient Episode Initiation | 30.9 |
| P11 Specimen Referred | 18.9 |

These figures emphasise the need to model demand for private sector workforce in as granulated manner as possible, certainly at the service group level, possible at the individual item number level.

## *Services demand in the public sector*

There are no aggregated statistics to describe current public sector pathology laboratory activity across Australia. During several of the case study visits for the consultancy activity data for individual organisations was made available (or could have been made available). Any attempt to model workforce demand in this area would need to develop trend data on public sector pathology services activity by surveying the comparatively small number of employers (NCOPP, 2010) or by approaching State and Territory health authorities.

Projected demand for pathology services in [public] hospitals though depends mainly on the number of people attending hospitals. Attendance at hospitals, in turn, is largely driven by population size and composition. There are a number of considerations though that may modify the relationship between growth in pathology services and population growth:

- The way in which hospital services are used can influence demand for pathology services. The duration of hospital stays has been declining. Between 1993-04 and 2004-05 the average length of stay at a hospital declined by nearly 25% (Table 24).

**Table 24: Hospital days per person by age: 1993-94 to 2004-05**

| | 1993 -94 | 1994 -95 | 1995 -96 | 1996 -97 | 1997 -98 | 1998 -99 | 1999 -00 | 2000 -01 | 2001 -02 | 2002 -03 | 2003 -04 | 2004 -05 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| <1 | 3.25 | 2.99 | 3.16 | 3.04 | 3.01 | 2.87 | 2.88 | 2.85 | 2.86 | 2.90 | 2.93 | 2.82 |
| 1-4 | 0.36 | 0.34 | 0.35 | 0.33 | 0.33 | 0.32 | 0.32 | 0.31 | 0.31 | 0.30 | 0.30 | 0.28 |
| 5-9 | 0.19 | 0.18 | 0.18 | 0.17 | 0.17 | 0.17 | 0.16 | 0.16 | 0.16 | 0.15 | 0.15 | 0.15 |
| 10-14 | 0.20 | 0.19 | 0.20 | 0.18 | 0.21 | 0.18 | 0.17 | 0.17 | 0.17 | 0.18 | 0.17 | 0.17 |
| 15-19 | 0.40 | 0.38 | 0.40 | 0.41 | 0.42 | 0.40 | 0.42 | 0.38 | 0.42 | 0.38 | 0.37 | 0.37 |
| 20-24 | 0.61 | 0.60 | 0.64 | 0.66 | 0.66 | 0.65 | 0.60 | 0.58 | 0.61 | 0.61 | 0.57 | 0.56 |
| 25-29 | 0.83 | 0.81 | 0.82 | 0.86 | 0.83 | 0.80 | 0.77 | 0.75 | 0.79 | 0.77 | 0.71 | 0.75 |
| 30-34 | 0.81 | 0.81 | 0.86 | 0.88 | 0.88 | 0.85 | 0.82 | 0.81 | 0.86 | 0.85 | 0.82 | 0.84 |
| 35-39 | 0.67 | 0.67 | 0.73 | 0.74 | 0.71 | 0.70 | 0.71 | 0.71 | 0.72 | 0.73 | 0.71 | 0.73 |
| 40-44 | 0.64 | 0.62 | 0.69 | 0.71 | 0.71 | 0.66 | 0.68 | 0.64 | 0.68 | 0.66 | 0.65 | 0.67 |
| 45-49 | 0.76 | 0.74 | 0.83 | 0.82 | 0.82 | 0.79 | 0.79 | 0.75 | 0.74 | 0.75 | 0.74 | 0.75 |
| 50-54 | 0.98 | 0.97 | 1.04 | 1.01 | 0.98 | 0.99 | 0.93 | 0.92 | 0.91 | 0.92 | 0.91 | 0.92 |
| 55-59 | 1.27 | 1.27 | 1.34 | 1.35 | 1.31 | 1.28 | 1.23 | 1.20 | 1.23 | 1.20 | 1.20 | 1.19 |
| 60-64 | 1.78 | 1.75 | 1.84 | 1.78 | 1.80 | 1.75 | 1.70 | 1.63 | 1.63 | 1.63 | 1.61 | 1.60 |
| 65-69 | 2.57 | 2.53 | 2.71 | 2.60 | 2.51 | 2.41 | 2.42 | 2.27 | 2.27 | 2.28 | 2.26 | 2.27 |
| 70-74 | 3.73 | 3.65 | 3.79 | 3.61 | 3.61 | 3.49 | 3.44 | 3.32 | 3.30 | 3.29 | 3.28 | 3.21 |
| 75-79 | 5.43 | 5.37 | 5.44 | 5.13 | 5.07 | 5.00 | 5.00 | 4.90 | 4.90 | 4.84 | 4.80 | 4.67 |
| 80-84 | 7.42 | 7.33 | 7.47 | 7.15 | 7.05 | 6.82 | 6.91 | 6.83 | 6.76 | 6.78 | 6.74 | 6.53 |
| 85+ | 10.61 | 10.16 | 10.32 | 9.56 | 9.43 | 9.17 | 9.67 | 9.38 | 9.34 | 9.44 | 9.30 | 8.85 |
| All | 1.18 | 1.17 | 1.23 | 1.21 | 1.21 | 1.19 | 1.19 | 1.17 | 1.19 | 1.19 | 1.18 | 1.18 |

***Sources:*** *ABS 3201.0 Population by Age and Sex, Australian States and Territories. Table 9. Estimated Resident Population By Single Year of Age, Australia; AIHW, Interactive national hospital morbidity data (data cubes), www.aihw.gov.au/hospitals/datacubes/index.cfm*

Arguably a new admission or separation creates more work for pathology services than an existing patient — new admissions (with unknown histories or incomplete records) require tests to be undertaken to identify or confirm a diagnosis while existing patients are being monitored and therefore presumably require less testing (unless that is integral to the monitoring process).

- As the Australian population ages, the average admissions to hospital and days in hospital per year per person will increase. Older people are more likely to be admitted to hospital and to spend more time in hospital after being admitted than are younger people. In 2004-05, for instance, people aged 85 or over spent an average of 8.8 days in hospital compared with only 0.4 days for 15 to 19 year-olds (Table 25) and average hospital separations for 15 to 19 year-olds were 0.15 compared with 1.1 for persons 85 years or older (Table 25). Some of the age-specific differences in hospital attendance may be associated with 'proximity to death', which means that an ageing population profile does not increase demand for health services beyond what they would otherwise be, but much is associated with increasing morbidity with age.

- The morbidity of a population can change. If morbidity increases even while life expectancy increases and this increase requires more hospital-based interventions to manage the morbidity, then demand for hospital services may increase. Age-specific days in hospital per person declined over the period 1993-04 to 2004-05 for almost all age groups, but while hospital separations were almost unchanged for younger age groups, they increased for persons 30 years or older and increased substantially more for older persons. Of course the *nature* of illness will have a significant effect on the demand for pathology services since some illnesses require more labour intensive testing than others (e.g. cytology, some infectious disease testing), so modelling service demand is probably best facilitated by examining trends in case mix related admissions than simply reviewing total admissions.

**Table 25: Hospital separations per person by age: 1993-94 to 2004-05**

| | 1993 -94 | 1994 -95 | 1995 -96 | 1996 -97 | 1997 -98 | 1998 -99 | 1999 -00 | 2000 -01 | 2001 -02 | 2002 -03 | 2003 -04 | 2004 -05 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| <1 | 0.58 | 0.56 | 0.59 | 0.54 | 0.56 | 0.55 | 0.56 | 0.55 | 0.56 | 0.57 | 0.57 | 0.53 |
| 1-4 | 0.17 | 0.17 | 0.18 | 0.18 | 0.18 | 0.18 | 0.17 | 0.17 | 0.17 | 0.17 | 0.17 | 0.16 |
| 5-9 | 0.09 | 0.09 | 0.09 | 0.09 | 0.09 | 0.09 | 0.09 | 0.09 | 0.09 | 0.09 | 0.09 | 0.09 |
| 10-14 | 0.08 | 0.08 | 0.08 | 0.08 | 0.08 | 0.08 | 0.08 | 0.08 | 0.08 | 0.08 | 0.08 | 0.08 |
| 15-19 | 0.14 | 0.14 | 0.14 | 0.14 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 |
| 20-24 | 0.20 | 0.21 | 0.21 | 0.21 | 0.21 | 0.21 | 0.21 | 0.21 | 0.21 | 0.21 | 0.21 | 0.21 |
| 25-29 | 0.25 | 0.25 | 0.26 | 0.26 | 0.26 | 0.26 | 0.25 | 0.26 | 0.25 | 0.25 | 0.25 | 0.25 |
| 30-34 | 0.24 | 0.25 | 0.26 | 0.26 | 0.26 | 0.27 | 0.27 | 0.27 | 0.28 | 0.28 | 0.28 | 0.28 |
| 35-39 | 0.21 | 0.22 | 0.23 | 0.23 | 0.24 | 0.24 | 0.24 | 0.25 | 0.25 | 0.26 | 0.26 | 0.27 |
| 40-44 | 0.20 | 0.21 | 0.22 | 0.22 | 0.23 | 0.23 | 0.23 | 0.24 | 0.25 | 0.25 | 0.25 | 0.26 |
| 45-49 | 0.22 | 0.24 | 0.25 | 0.25 | 0.26 | 0.26 | 0.26 | 0.27 | 0.28 | 0.29 | 0.29 | 0.29 |
| 50-54 | 0.28 | 0.29 | 0.31 | 0.31 | 0.32 | 0.32 | 0.32 | 0.33 | 0.34 | 0.35 | 0.35 | 0.36 |
| 55-59 | 0.33 | 0.35 | 0.37 | 0.38 | 0.39 | 0.40 | 0.40 | 0.41 | 0.43 | 0.44 | 0.45 | 0.45 |
| 60-64 | 0.40 | 0.43 | 0.45 | 0.47 | 0.49 | 0.49 | 0.50 | 0.51 | 0.53 | 0.54 | 0.55 | 0.56 |
| 65-69 | 0.51 | 0.54 | 0.57 | 0.59 | 0.60 | 0.62 | 0.64 | 0.65 | 0.66 | 0.68 | 0.70 | 0.71 |
| 70-74 | 0.61 | 0.65 | 0.69 | 0.71 | 0.75 | 0.77 | 0.79 | 0.81 | 0.83 | 0.87 | 0.89 | 0.89 |
| 75-79 | 0.70 | 0.73 | 0.78 | 0.80 | 0.85 | 0.88 | 0.92 | 0.97 | 0.99 | 1.03 | 1.07 | 1.08 |
| 80-84 | 0.75 | 0.78 | 0.83 | 0.87 | 0.90 | 0.93 | 0.97 | 1.02 | 1.05 | 1.10 | 1.14 | 1.18 |
| 85+ | 0.80 | 0.81 | 0.87 | 0.87 | 0.91 | 0.93 | 0.96 | 1.00 | 1.03 | 1.07 | 1.10 | 1.10 |
| All | 0.26 | 0.27 | 0.28 | 0.29 | 0.30 | 0.30 | 0.31 | 0.32 | 0.33 | 0.34 | 0.34 | 0.35 |

***Sources:*** *ABS 3201.0 Population by Age and Sex, Australian States and Territories. Table 9. Estimated Resident Population By Single Year of Age, Australia; AIHW, Interactive national hospital morbidity data (data cubes), www.aihw.gov.au/hospitals/datacubes/index.cfm*

## Demand for research services

It is difficult to quantify the demand for research effort, and methodologically a satisfactory relationship between investment in research from Government, private and general public (donations) sources will need to be established. What is clear is that research effort in the health / medical field continues to grow (National Health and Medical Research Council, 2010) and some (if not a significant proportion) of this effort requires medical laboratory services support. National Health and Medical Research Council (NHMRC) figures indicate an almost doubling of investment in health research overall between 2000 and 2007 (see below, figures are $million):

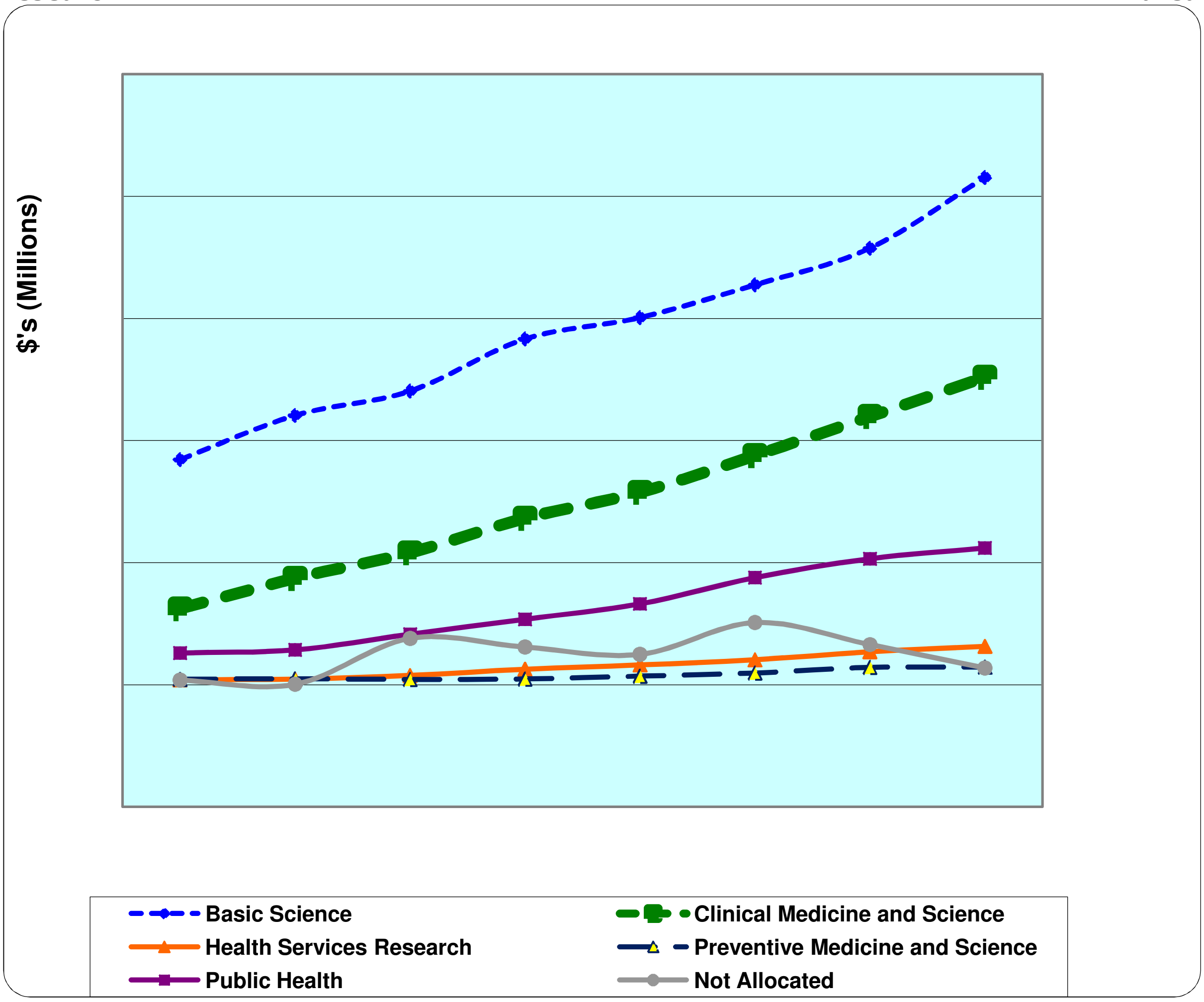
**Table 26: NHMRC figures for investment in health research**

| 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 |
|---|---|---|---|---|---|---|---|
| 171.1 | 207.8 | 264.1 | 313.0 | 343.7 | 410.4 | 452.9 | 503.4 |

Figure 32 shows how the NHMRC's gross investment is distributed between types of research. It is suspected that the "*Clinical Medicine and Science*" area of research is most closely aligned with medical laboratory services and therefore most likely to demand medical laboratory scientist workforce.

This would need to be the subject of more study.

**Figure 32: Growth in investment in health research between 2000 and 2007 by type of research area**




***Source: NHMRC Core Trend Data Set, 2010***

## Trend anomalies

The increased demand for health care services and a resultant need to increase the general health workforce has been regularly reported both within Australia and internationally. Apart from the broad factors discussed above, KPMG (2009) has identified several other potential service demand drivers which could modify or even distort future trend based projections (based largely on assumptions about population growth and the ageing of the population). These include;

- changing nature of the burden of disease;
- greater focus on health prevention; and
- increased consumer expectation that testing is part of diagnosis and treatment.

Legg & Associates (2008) identified other drivers specific to pathology services:

- increasing cancer prevalence but with increased longevity;
- increasing emphasis on evidence based medicine that requires pathology for decision making;

- increasing use of pathology testing for eligibility for subsidised drug therapy and monitoring; and
- increasing genetics (epigenetic and molecular pathology) testing for pre-emptive and personalised medicine.

Legg & Associates (2008) also highlighted a range of changes in technological advances which will impact on the nature of pathology services now and in the near future:

- automation within the laboratory and the use of electronic decision support;
- the development of instruments capable of being used at the point of care;
- digital microscopy;
- increases in the understanding of biology, molecular biology and epigenetics;
- the capacity to trap and identify blood-born cells from solid tumours such as breast and colon;
- medical advances, such as the introduction of the cervical cancer vaccine (Gardasil) in 2007; and
- automated screening (using liquid based cytology samples and an imager).

The Australian Society of Cytology (2008) has identified workforce concerns for its specialisation as it is expected to be subject to immense changes due to the implications of the cervical cancer vaccine (note in figures earlier that growth in MBS P6 Pathology Group Services since 2005 has been negligible). Currently 75% of its work is estimated to be conducting tests on cervical screening smears. The increased use of HPV testing and new technologies such as automated screening using liquid based cytology samples will change the environment of cytology reducing the number of cervical screening smears being conducted. However, these changes may be offset to a small degree by increasing demand for non cervical cytology services such as FNA and fluid cytodiagnostic services use for cancer identification in ageing populations.

An area of rapid change, genetic testing offers increasing opportunities to advance health in the treatment of cancer. As the number of cancer diagnoses increase so does the importance of genetic testing for:

> *"…. risk assessment, diagnosis, prognosis, tailored treatment and responsiveness to drugs and degree of unwanted side effects."* Crossing (2008)

This is but one area of change in what is a clearly very dynamic workforce environment. In no other comparable health profession is the relationship between labour, capital investment (in technology which radically changes the relationship between labour and service delivery) and efficiency imperatives as evident as with the medical pathology laboratory scientific workforce.

# Priority actions for workforce planning

In this broad overview of currently available medical pathology laboratory workforce statistics a secondary aim has been to highlight areas of data weakness, which would make meaningful workforce planning difficult. As is generally the case, data on supply variables is more readily available and able to be applied, although in many cases a consensus would need to be sought on how data was to be interpreted, and greater insight gained into the accuracy of the data (for instance checking undergraduate course enrolments and graduations) and how it might be interpreted (for example by obtaining graduate destination data). The exception to the general worth and availability of the supply data is the key variable of workforce size. There is significant uncertainty around current estimates for this variable which would totally undermine credibility of any projections. A way must be found with ABS to generate a workforce size estimate in which stakeholders will have confidence.

On the demand side there is much work to be done. The simplest approach would be to gather more detailed data on public (employer / departmental survey) and private (MBS detail) sector service activity level trends, and assume the trends will hold into the future. In this case the key variables to estimate will become those associated with the relationship between service activity and workforce requirements, and how those relationships might change over time as a result of productivity growth and technology innovation. This approach might provide reasonable projections for the next five years.

Any longer term projections will have to probably abandon service utilisation statistics in favour of projections based on need (driven by population growth and change in composition). This will be a more complex but potentially more enlightening approach.

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Australian Bureau of Statistics publication number 1220.0

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# Annexure A

**Course completions (graduates) from relevant Non AIMS accredited courses by university, by FOE category and by year (2005 – 2009)**

| University | FOE category | Reference year | | | | |
|---|---|---|---|---|---|---|
| | | 2005 | 2006 | 2007 | 2008 | 2009 |
| James Cook University | Biochemistry and cell biology | 5 | 1 | 0 | 3 | 5 |
| | Microbiology | 5 | 8 | 2 | 3 | 2 |
| | Human biology | 0 | 0 | 0 | 1 | 0 |
| | All | 10 | 9 | 2 | 7 | 7 |
| The University of Western Australia | Microbiology | 0 | 0 | 0 | 0 | 18 |
| | Human biology | 2 | 0 | 2 | 0 | 1 |
| | All | 2 | 0 | 2 | 0 | 19 |
| University of Wollongong | Biochemistry and cell biology | 3 | 6 | 0 | 4 | 1 |
| | Human biology | 0 | 1 | 0 | 2 | 1 |
| | All | 3 | 7 | 0 | 6 | 2 |
| University of Ballarat | Human biology | 2 | 1 | 0 | 0 | 0 |
| | All | 2 | 1 | 0 | 0 | 0 |
| Central Queensland University | Biochemistry and cell biology | 7 | 2 | 4 | 1 | 0 |
| | Laboratory technology | 2 | 0 | 1 | 0 | 2 |
| | All | 9 | 2 | 5 | 1 | 2 |
| Edith Cowan University | Biochemistry and cell biology | 0 | 0 | 0 | 1 | 1 |
| | Human biology | 42 | 39 | 35 | 29 | 19 |
| | All | 42 | 39 | 35 | 30 | 20 |
| Curtin University of Technology | Biochemistry and cell biology | 69 | 41 | 46 | 41 | 33 |
| | Microbiology | 1 | 7 | 7 | 9 | 3 |
| | Human biology | 0 | 0 | 1 | 1 | 2 |
| | All | 70 | 48 | 54 | 51 | 38 |
| University of Canberra | Microbiology | 2 | 0 | 0 | 0 | 0 |
| | Human biology | 17 | 25 | 31 | 32 | 28 |
| | Laboratory technology | 0 | 0 | 1 | 0 | 0 |
| | All | 19 | 25 | 32 | 32 | 28 |
| Charles Darwin University | Biochemistry and cell biology | 0 | 0 | 0 | 2 | 1 |
| | Genetics | 0 | 0 | 1 | 0 | 0 |
| | Microbiology | 0 | 0 | 1 | 0 | 0 |
| | All | 0 | 0 | 2 | 2 | 1 |

| **University** | **FOE category** | **Reference year** | | | | |
|---|---|---|---|---|---|---|
| | | 2005 | 2006 | 2007 | 2008 | 2009 |
| Charles Sturt University | Genetics | 4 | 7 | 9 | 10 | 11 |
| | Laboratory technology | 8 | 4 | 7 | 2 | 2 |
| | All | 12 | 11 | 16 | 12 | 13 |
| The University of New South Wales | Biochemistry and cell biology | 27 | 22 | 23 | 25 | 19 |
| | Microbiology | 14 | 18 | 13 | 9 | 15 |
| | Human biology | 6 | 4 | 4 | 3 | 2 |
| | All | 47 | 44 | 40 | 37 | 36 |
| The University of Newcastle | Biochemistry and cell biology | 77 | 85 | 115 | 102 | 102 |
| | Genetics | 0 | 1 | 2 | 1 | 1 |
| | Microbiology | 2 | 3 | 1 | 4 | 3 |
| | Human biology | 0 | 3 | 2 | 2 | 4 |
| | All | 79 | 92 | 120 | 109 | 110 |
| University of Technology, Sydney | Human biology | 48 | 51 | 43 | 38 | 40 |
| | All | 48 | 51 | 43 | 38 | 40 |
| The University of Queensland | Biochemistry and cell biology | 77 | 83 | 72 | 58 | 54 |
| | Genetics | 1 | 5 | 3 | 8 | 13 |
| | Microbiology | 29 | 28 | 29 | 39 | 30 |
| | Human biology | 19 | 13 | 7 | 13 | 9 |
| | All | 126 | 129 | 111 | 118 | 106 |
| La Trobe University | Biochemistry and cell biology | 29 | 27 | 45 | 28 | 29 |
| | Genetics | 5 | 6 | 4 | 2 | 0 |
| | Microbiology | 1 | 0 | 5 | 2 | 3 |
| | Human biology | 1 | 1 | 4 | 0 | 1 |
| | All | 36 | 34 | 58 | 32 | 33 |
| Macquarie University | Biochemistry and cell biology | 0 | 2 | 1 | 0 | 0 |
| | All | 0 | 2 | 1 | 0 | 0 |
| University of South Australia | Biochemistry and cell biology | 2 | 3 | 4 | 0 | 0 |
| | Laboratory technology | 0 | 0 | 0 | 34 | 10 |
| | All | 2 | 3 | 4 | 34 | 10 |
| Deakin University | Biochemistry and cell biology | 58 | 50 | 46 | 65 | 84 |
| | Microbiology | 17 | 20 | 19 | 8 | 1 |
| | All | 75 | 70 | 65 | 73 | 85 |
| The Australian National University | Genetics | 0 | 0 | 0 | 0 | 5 |
| | Human biology | 1 | 0 | 0 | 0 | 0 |

| University | FOE category | Reference year | | | | |
|---|---|---|---|---|---|---|
| | | 2005 | 2006 | 2007 | 2008 | 2009 |
| | All | 1 | 0 | 0 | 0 | 5 |
| RMIT University | Microbiology | 0 | 11 | 17 | 14 | 19 |
| | Human biology | 0 | 2 | 2 | 0 | 0 |
| | All | 0 | 13 | 19 | 14 | 19 |
| The University of Melbourne | Biochemistry and cell biology | 10 | 18 | 15 | 9 | 14 |
| | Genetics | 4 | 9 | 4 | 10 | 13 |
| | Microbiology | 9 | 7 | 21 | 18 | 9 |
| | Human biology | 39 | 25 | 21 | 23 | 26 |
| | All | 62 | 59 | 61 | 60 | 62 |
| The University of Sydney | Biochemistry and cell biology | 25 | 11 | 17 | 14 | 10 |
| | Genetics | 0 | 0 | 2 | 1 | 2 |
| | Microbiology | 0 | 0 | 1 | 1 | 0 |
| | Human biology | 14 | 15 | 20 | 11 | 15 |
| | Laboratory technology | 0 | 0 | 0 | 0 | 1 |
| | All | 39 | 26 | 40 | 27 | 28 |
| Queensland University of Technology | Biochemistry and cell biology | 10 | 11 | 8 | 12 | 15 |
| | Microbiology | 35 | 21 | 17 | 22 | 17 |
| | All | 45 | 32 | 25 | 34 | 32 |
| University of the Sunshine Coast | Biochemistry and cell biology | 3 | 1 | 0 | 0 | 0 |
| | Microbiology | 5 | 5 | 15 | 3 | 6 |
| | Human biology | 1 | 1 | 4 | 1 | 0 |
| | All | 9 | 7 | 19 | 4 | 6 |
| Total | Biochemistry and cell biology | 402 | 363 | 399 | 365 | 368 |
| | Genetics | 14 | 28 | 25 | 32 | 45 |
| | Microbiology | 120 | 128 | 148 | 132 | 126 |
| | Human biology | 192 | 181 | 176 | 156 | 148 |
| | Laboratory technology | 10 | 4 | 9 | 36 | 15 |
| | All | 738 | 704 | 757 | 721 | 702 |

*Source: DEEWR, 2011*

# Annexure B

**Description of relevant courses from the MSL09Training Package for medical science technicians and laboratory assistants**

| Qualification | Code | Name | Description (taken from the Training Package) |
|---|---|---|---|
| Certificate III | MSL30109 | Certificate III in Laboratory Skills | The Certificate III in Laboratory Skills offers entry level technical training in laboratory skills across a range of industries. Employment outcomes targeted by this qualification include laboratory technicians, instrument operators and similar personnel.<br><br>A laboratory technician in a pathology laboratory may receive and prepare tissue samples. |
| Certificate IV | MSL40109 | Certificate IV in Laboratory Techniques | The Certificate IV in Laboratory Techniques offers technical training in laboratory techniques across a range of industries. Employment outcomes targeted by this qualification include laboratory technicians, instrument operators and similar personnel.<br><br>Laboratory technicians undertake a wide range of sampling and testing that requires the application of a broad range of technical skills and some scientific knowledge. |
| Diploma | MSL50109 | Diploma of Laboratory Technology | The Diploma of Laboratory Technology offers broad or specialised technical training in a range of laboratory technologies. Employment outcomes targeted by this qualification include technical officers, laboratory technicians, analysts and similar personnel.<br><br>A laboratory technician who works in a pathology laboratory may perform a range of tests on body tissues and fluids to measure quantities such as:<br><br>the amount of biological substances, (for example, cholesterol or creatine)<br><br>biological function (for example, clotting)<br><br>the presence of drugs (for example, |

| Qualification | Code | Name | Description (taken from the Training Package) |
|---|---|---|---|
| | | | heparin or alcohol).<br><br>They may also prepare cultures, stained tissue sections and thin films to count and classify cells, bacteria and parasites. |
| Advanced Diploma | MSL60109 | Advanced Diploma of Laboratory Operations | This qualification covers the skills and knowledge required to apply specialist technical skills or to supervise laboratory operations within a work area or project team.<br><br>The Advanced Diploma of Laboratory Operations offers training in the coordination of day-to-day laboratory operations. Employment outcomes targeted by this qualification include laboratory supervisors, laboratory technical officers and similar personnel. |

*Source: National Training Information System, 2010*