1. INTRODUCTION: CLINICAL LABORATORIES, THEIR WORK AND THEIR WORKFORCE

1.1 Laboratories and Healthcare

Clinical laboratories play an indispensable role in contemporary healthcare, not only in diagnosis but also in monitoring of treatment and prevention of disease. Tests are performed on samples from patients in hospitals, patients visiting General Practitioners or Specialists outside the hospital environment, and on newborn babies to screen for selected inherited diseases. Laboratory tests are essential in assessing and monitoring the progress of essentially all patients, and for common diseases such as anaemia, cancer, diabetes, heart attack, infection, kidney disease, and trauma,.

In Australia, laboratory testing is carried out in the public sector (mainly in public hospitals or laboratory services run by Area Health Services) and by the private or commercial sector (mainly serving patients seeing general practitioners or specialists outside hospital, and for some private hospitals).

Laboratory testing covers a very wide range of techniques, and has traditionally been divided into a number of sub-specialties or disciplines. These include Biochemistry, Haematology, Histopathology, and Microbiology. In more recent times the areas of Immunology and Molecular Genetics have been growing. In large organisations, each of the disciplines has been managed separately but there is an increasing blurring of the boundaries between them. Scientific and technological advances drive this, and to some extent by cost pressures. Scientific advances are also producing increased workloads through the introduction of new areas of testing, and test numbers for existing tests are increasing because of community expectations for rapid diagnosis and because of medico-legal pressures.

As well as testing carried out in laboratories, there is a significant amount of testing which is done closer to the patient. This ‘point-of-care testing’ (POCT) calls on laboratory resources for training, quality maintenance, and data capture. Although the test materials are designed to be used by doctors, nursing staff or the patients, there is still a need for backup from laboratory professionals.

In addition to the clinical laboratories themselves, there is a significant industry designing, manufacturing, selling and maintaining equipment and consumables, generally based overseas but with significant employment within Australia. This is best described as the ‘in-vitro diagnostics’ (IVD) industry. There are also regulatory and accreditation agencies which ensure the quality of laboratory activities. All of these need to recruit staff with training and experience in clinical laboratories and should be included in workforce calculations.

1.2 Economic aspects

Laboratory based activities, including outreach to support of point-of-care testing, require a significant proportion of healthcare costs (approximately 10% of the total health budget) and this is not likely to decrease. This includes both public hospital funding (state and federal governments, directly and through the Health Insurance Commission (HIC)) and the private sector (which receives its income from the HIC and to some extent from direct patient payments). The Commonwealth government, through the HIC, provides around $1.3 billion annually but the amount from State and Territory budgets is harder to estimate.

These activities, and the amounts of money spent, imply significant impacts on employment and economic activity. Most employment is in the major cities, but maintenance of laboratory facilities in rural centres to serve their regional hospitals is essential. Although samples for specialised tests can be sent to city laboratories, urgent tests must be done on the spot and this implies a need for retention of staff in rural and regional areas.

1.3 Number and location of labs

There appear to be approximately 500 laboratories performing general clinical chemistry tests in Australia on NATA accreditation data (see below). Each requires both pathologist and senior scientist supervision, although not necessarily by a full-time on-site presence.

1.4 Staffing

These laboratories are staffed by a mix of pathologists, scientists and technical staff – the AACB's main constituency is the scientists but we are also stakeholders in the success of the system. Scientists outnumber pathologists by maybe 10 to 1; they do the laboratory work and manage the various sections of the organisations. The Royal College of Pathologists of Australasia (RCPA) conducted a survey in 2002 and estimates that there are 1300 active pathologists (RCPA, 2002).

2. TRAINING PATHWAYS FOR THE CLINICAL LABORATORY WORKFORCE

2.1 Pathologists

After intern and resident positions, medical graduates undertake specialist training. Those who choose pathology undertake a five-year program, pass examinations, and are admitted to Fellowship of the RCPA and to the specialist register. There are currently about 260 pathologist trainees, with about 50 entering each year, and the RCPA states that a recent AMWAC report recommended a further 100 positions should be created (RCPA 2002). Practically all of these training positions are as registrars in the public hospital system, and are funded by State and Territory governments[1]. If the recommendation to increase training positions to 360 is implemented, this would give a ratio of one trainee for each 3.6 pathologists.

2.2 Scientists and Senior Scientists

Scientists enter the workforce after the completion of a (usually full time) Bachelor of Science (Applied Science) from a University. Training is then usually dependent on individual employer organisations and consists of on-the-job orientation and mentor based skill acquisition.

Many scientists will join a professional association such as the AACB and use this to receive exposure to peers and relevant scientific updates at Conferences, Courses and Seminars run by these organisations. The AACB provides a substantial number of these educational activities for on-going professional development of both scientists and chemical pathologists.

Some scientists will further their education via the acquisition of higher degrees (Masters or PhD) either in management or a relevant scientific discipline, usually at their own expense. There are also professional qualifications such as the Membership of the Australasian Association of Clinical Biochemists (MAACB) which is maintained by the AACB and recognised as roughly equivalent in content to the Part 1 of the FRCPA. Preparation for the MAACB falls upon the candidate, usually with some assistance from formal and informal mentor networks. The MAACB requires the candidate to have at least two years relevant post graduate laboratory experience and a significant, broad understanding of the theory and practice of clinical biochemistry. It is seen as appropriate qualification for a section head in a specialised laboratory or senior scientist, but there are no designated training positions for scientists analogous to the registrar grade for trainee pathologists.

There is also a Fellowship (FAACB) qualification which requires at least nine years relevant post graduate laboratory experience and a significant theoretical and practical knowledge of the discipline of clinical chemistry, laboratory management and the application of clinical chemistry tests in the diagnosis of disease. FAACB candidates are also self-motivated, self-funded and largely self trained, although the same mentor arrangements hold. Typically FAACB holders are the laboratory managers or directors of chemical pathology departments at large teaching hospitals or private laboratories. There are no funded training positions for these roles.

The FAACB qualification is recognised by NPAAC as a suitable qualification to supervise a specialist laboratory. In the absence of an FAACB a Chemical Pathologist (with FRCPA) would supervise these laboratories. Thus the FAACB is already recognised as a suitable substitute for an FRCPA in certain circumstances, and some pathologists choose to take the examinations for FAACB in addition to the FRCPA. The general requirements of the FAACB make it an ideal qualification for a Director

[1] If we assume that pathology registrars' average salary without on-costs (current NSW rate) is $76,000 per year, the recommended number of 360 requires a training budget of some $27.4m per year.

of a chemical pathology laboratory. In the UK and the USA chemical pathology qualified scientists without a registrable medical degree but with either PhD or FRCPath qualifications head laboratories.

2.3 Technical staff

Other technical staff typically comprises diploma holders from the TAFE sector or equivalent. Training for these staff is conducted in-house under the supervision of the scientific staff. Some of these in-house courses are of a high level; indeed some laboratories have Registered Training Organisation status and can award nationally recognised Certificates and Diplomas.

3. WORKFORCE ISSUES

3.1 Current Trends in Scientific Workforce

There is a decrease in the number of scientists employed in chemical pathology laboratories. The AACB has seen membership fall from 1213 in 1995 to 1021 in 2005. In the same period the number of MAACB (senior biochemists) has fallen from 223 to 207 while the number of specialist biochemists (FAACB) has fallen from 57 to 45). This, we believe, represents a general trend in the profession revealing a drop in the number of biochemists employed. This reduction in biochemist numbers is the result of a series of environmental drivers including amalgamation of laboratories leading to downsizing of some laboratories and the introduction of 'simpler' technologies in laboratories. There has also been a general trend in major teaching hospitals to reduce in-house research and development and to concentrate on service. These general tends have led to employment of fewer graduate biochemists (scientists) and a higher proportion of technical staff. These same changes have decreased the number of sites where biochemists can train. Training for biochemists has always been 'on the job' under the supervision of mentor biochemists. The reduction in the number of laboratories, the number of senior biochemists and the emphasis on service has reduced the capacity of current laboratories to train the next generation of senior biochemists. This trend is also evident in the number of biochemists presenting for examination: 1995 10 MAACB candidates and 1 FAACB, and in 2004 4 MAACB candidates and 2 FAACB.

3.2 Recruitment Issues

Most laboratories are unable to currently recruit sufficient staff to meet requirements. This is particularly true for junior scientists who are required to provide the out of hours and on call staff. There is also a relatively high attrition rate of scientists in the early years of their career. The reasons for this are the same as for other professions, a demand for greater pay and better life style with more sociable work hours. Medical scientists have a high proportion of females, which also leads to a high number of scientists who leave the workforce for part time work or altogether. Thus there is a need for the tertiary sector to review the demand for medical scientists in the community. Overall, there appears to be a current shortage of middle experienced and senior scientists although appropriately trained people are in the community. Professional scientists, like many others, leave medical laboratories seeking better career prospects. Thus providing more satisfying career options for scientists via (for example) pathologists substitution would lead to better retention rates and a more efficient use of highly trained people.

3.3 Sources of the clinical laboratory workforce

The Australian tertiary sector are currently the major source of technically competent laboratory staff in Australian laboratories, although there is a noticeable trend of laboratories employing foreign trained (particularly New Zealanders) scientific staff. It would appear that tertiary students do not see medical laboratory work as appealing because of the relatively low pay rates (compared to business graduates) and unsociable hours of work demanded by the nature of the work. Appropriately motivated students also are being streamed towards more glamorous aspects of applied science such as forensic science or medicine.

It takes many years of training to produce a competent senior scientist, hence a decrease in the number of graduates entering the profession will not be evident for some years to come when the current batch of senior scientists leave the workforce.

4. SUGGESTED ACTIONS

4.1 Common examination standards and training pathways for Senior Scientists

The roles and training for clinical laboratory scientists across Chemistry/Microbiology/ Haematology/Genetics/Immunology and even Anatomical Pathology have much in common because (a) the types of skills and career patterns for scientists are similar and (b) these disciplines are merging into each other as chemistry, biochemistry and molecular biology infiltrate them all. Therefore a common pattern (but with differing content) of postgraduate training, assessment and qualifications is achievable; it is also desirable in order to integrate career development and continuing professional development of scientists across the different areas of pathology.

At present, the FAACB is recognised by the HIC and NPAAC as a qualification necessary for a senior scientist to be able to supervise a specialist laboratory. There are currently no formal training programs for candidates for the MAACB or the FAACB, although most chemical pathology registrars will sit for the MAACB at the time they sit for the FRCPA Part 1 as these exams are seen to be complementary. There are some tutorials run by the State branches of the AACB but candidates need to be self-motivated and self funded for these exams. Training positions for FAACB candidates could be provided in the major teaching hospitals to ensure the ongoing supply of senior scientists and managers for the medical laboratory sector.

Because of the potential importance of the MAACB and the FAACB qualifications for future senior biochemists and chemical pathology laboratory directors, it is suggested that the training process, the syllabus and the examination process for these qualifications become more transparent. This could be achieved by incorporating these examinations under a general examination process for all laboratory professionals including other scientists and registrars. A general council made up of representatives of the RCPA; NPAAC and the various professional associations would oversee this. It would be envisaged that this council would set the program, examination and maintain the standards for all senior scientists' professional qualifications. This is the situation in the UK, where the FRCPath qualification is an exam, which is available to medical, veterinary and scientist candidates.

4.2 Provision for Training Positions for Senior Scientists.

There appears to be an impending shortage of senior scientists, just as there is for medical specialists in pathology. The shortage of pathologists has been addressed by funding of more training positions; a similar solution could be applied for senior scientists, for which there are no identified training positions currently.

5. SUMMARY

Appropriate staffing and workforce development are essential for the future of clinical laboratories in Australia. Issues relating to pathologist numbers have been documented and, to some degree, addressed. Specialist training for the much greater number of scientists has not, and we propose that training and qualifications and recognition for this group should be facilitated by more widespread recognition of qualifications, introduction of specialist qualifications in areas where they do not exist, and funding of postgraduate training for scientists by creation of trainee positions.

Dr Tony Badrick
President AACB

Mr Tony Prior
Executive Officer AACB

On behalf of AACB Workforce Group

Dr John Whitfield
Dr Andrew St John
Dr Renze Bais

References and Websites

NATA 2005. http://www.nata.asn.au/fs_medical_dir.php (Accessed 15th June 2005)

RCPA 2002. Fact sheet 'Pathology Workforce in Australia'. http://www.rcpa.edu.au/applications/DocumentLibraryManager2/upload/Pathology%20Workforce%20Australia%20Fact%20Sheet.pdf
(Accessed June 15th 2005.)

Australasian Association of Clinical Biochemists http://www.aacb.asn.au

Table 1. NATA-accredited laboratories by categories of work performed.

AS 4308 (drug testing)	7
Anatomical pathology	200
Assisted reproduction procedures	39
Autopsy facilities	52
Autopsy service	6
Bacteriology	350
Biochemical Genetics	10
Blood transfusion service	4
Chemical pathology	458
Cytogenetics	27
Cytopathology – Gynaecological (cervical)	71
Cytopathology - Non-gynaecological	116
Examination by electron microscopy	26
General chemistry	459
Genetic testing	26
Haematology	411
Histopathology	192
Immunohaematology	362
Immunology	100
Medical practice pathology	18
Microbiology	376
Molecular genetics	35
Mycobacteriology	102
Mycology	110
Parasitology	154
Semen analysis (Screening Test)	282
Serology of infection	136
Virology	125

Source: NATA Website, 2005