Australian Medical Workforce Advisory Committee

THE SPECIALIST RADIOLOGY WORKFORCE IN AUSTRALIA

SUPPLY, REQUIREMENTS AND PROJECTIONS

2001 - 2011

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ABBREVIATIONS

ABS	Australian Bureau of Statistics
ACT	Australian Capital Territory
AHMAC	Australian Health Ministers' Advisory Council
AIHW	Australian Institute of Health and Welfare
AMC	Australian Medical Council
AMWAC	Australian Medical Workforce Advisory Committee
AN-DRG	Australian National Diagnosis Related Groups
ATP	Advanced Training Position
BEACH	Bettering the Evaluation and Care of Health
CAR	Canadian Association of Radiologists
CME	Continuing medical education
CR	Computerized Radiography
CT	Computerized Tomography
DGP	Divisions of General Practice
DHAC	Commonwealth Department of Health and Aged Care
DSA	Digital Subtraction Angiography
FNA	Fine Needle Aspiration
FRANZCR	Fellow of the Royal Australian and New Zealand College of Radiologists
FTE	Full Time Equivalent
GP	General Practitioner
HIC	Health Insurance Commission
ICPC-2	International Classification of Primary Care (Version 2)
JSAC	Joint Specialist Advisory Committee
MBS	Medicare Benefits Schedule

MIBA	Medical Informatics and Image Analysis
MRA	Magnetic Resonance Angiography
MRI	Magnetic Resonance Imaging
NARs	National Accreditation Requirements (BreastScreen Australia)
NHD	Notional Half-day
NSW	New South Wales
NT	Northern Territory
OPG	Orthopantography
PACS	Picture Archiving and Communications System
PET	Positron Emission Tomography
Qld	Queensland
RANZCR	Royal Australian and New Zealand College of Radiologists
RCR	Royal College of Radiologists, United Kingdom
RVU	Relative Value Unit
RRMA	Rural, Remote Metropolitan Areas classification
SA	South Australia
SAS	Screening and Assessment Services
SPR	Specialist:Population ratio
Tas	Tasmania
Terr	Territory
TRD	Temporary Resident Doctor
Vic	Victoria
VMO	Visiting Medical Officer
WA	Western Australia

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TERMS OF REFERENCE OF AMWAC AND THE AMWAC SPECIALIST RADIOLOGY WORKFORCE WORKING PARTY

The Australian Health Ministers' Advisory Council (AHMAC) established the Australian Medical Workforce Advisory Committee (AMWAC) to advise on national medical workforce matters, including workforce supply, distribution and future requirements.

AMWAC Terms of Reference

1. To provide advice to AHMAC on a range of medical workforce matters, including:

   - the structure, balance and geographic distribution of the medical workforce in Australia;
   - the present and required education and training needs as suggested by population health status and practice developments;
   - medical workforce supply and demand;
   - medical workforce financing; and
   - models for describing and predicting future medical workforce requirements.

2. To develop tools for describing and managing medical workforce supply and demand which can be used by employing and workforce controlling bodies including Governments, Learned Colleges and Tertiary Institutions.

3. To oversee the establishment and development of data collections concerned with the medical workforce and analyse and report on those data to assist workforce planning.

AMWAC Specialist Radiology Workforce Working Party Terms of Reference

As part of its 2000-01 work plan, AMWAC was asked by AHMAC to prepare a report on the specialist radiology workforce. The AMWAC Specialist Radiology Workforce Working Party was established as a sub-committee of AMWAC and was asked to provide a report to AMWAC on the optimal supply and appropriate distribution of specialist radiologists across Australia, including projections for future requirements.

The Working Party held meetings on August 18th 2000, February 14th and May 9th 2001, presented a progress report to the AMWAC April 30th 2001 meeting and a final report to the September 3rd 2001 AMWAC meeting. The report was then presented to the 25 October 2001 AHMAC meeting.

MEMBERSHIP OF AMWAC

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Professor John Horvath Physician, Sydney

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Mr Robert Wells — First Assistant Secretary, Health Industry and Investment Division, Commonwealth Department of Health and Aged Care

Nominee of Australian Institute of Health and Welfare

Dr Richard Madden — Director, Australian Institute of Health and Welfare

Nominee of the Australian Medical Association

Dr Robert Bain — Secretary-General, Australian Medical Association

Nominee of the Australian Medical Council

Dr Lloyd Toft — President, Medical Board of Queensland

Nominee of the Australian Vice Chancellors' Committee

Prof. Allan Carmichael — Executive Dean, School of Medicine, University of Tasmania

Nominee of the Committee of Presidents of Medical Colleges

Dr David Theile — Surgeon, Brisbane (former President, Royal Australasian College of Surgeons)

Nominee of the Royal Australian College of General Practitioners

Dr Mary Mahoney — Director, Queensland Training Program

Nominee of the Commonwealth Department of Education and Training and Youth Affairs

Mr Michael Gallagher — First Assistant Secretary, Higher Education Division, Department of Education and Training and Youth Affairs

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MEMBERSHIP OF THE AMWAC SPECIALIST RADIOLOGY WORKFORCE WORKING PARTY

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The Working Party would like to acknowledge the helpful comments provided by Professor John Horvath and Mr Paul Gavel (AMWAC); Mr Ross Saunders (DHAC), and for assistance with data collection the Royal Australian and New Zealand College of Radiologists, the specialist radiologists and trainee radiologists who completed questionnaires, Divisions of General Practice, State and Territory health authorities and BreastScreen Australia program directors who responded to the AMWAC survey. The report was prepared by Dr Mary Harris, Australian Medical Workforce Advisory Committee on behalf of and with the assistance of the Chairman and other members of the AMWAC Specialist Radiology Workforce Working Party.

INTRODUCTION

Introduction

The main objective of the Working Party has been to provide a report to AMWAC on the number, distribution and adequacy of the current specialist radiology workforce and to recommend strategies for the promotion of an adequate supply and appropriate distribution of specialist radiologists across Australia by the year 2011.

In presenting this report, the Working Party acknowledges that important changes are occurring in the organisation of radiology and medical practice due to practice mergers, selling of practices to corporations and the globalisation of the clinical and industrial environment. The impact of these changes on requirements for radiologists in the next ten years is difficult to predict with any accuracy (Appendix F). Hence, whilst the report details the future requirements for radiologists it has been undertaken against this background of uncertainty. The Working Party cautions that if the environment (national or international) for radiology practice changes dramatically it may necessitate a revision of the report's conclusions when the scheduled update of this review is undertaken. The Working Party has recommended that the graduate output from the RANZCR training program be increased from 36 to 52 and that the number of RANZCR training positions be increased from 200 to 260 over the next three years.

It is evident from the international literature that there is a general shortage of specialist radiologists in the United States, the United Kingdom and Canada and that requirements for radiologists in these countries are projected to increase. Factors driving these predictions are population ageing, the application of new technologies to medical practice, the impact of changes in technology on medical imaging plus the use of more interventionalist approaches to screen for and treat disease.

Definitions

The Working Party defined a specialist radiologist as a qualified medical specialist who is involved in the clinical practice of general radiology, computerised tomography, ultrasound, magnetic resonance imaging and nuclear imaging for diagnosis and the performance of interventional procedures.

The definition includes radiologists who:

- work as imaging specialists in salaried positions in public and private hospitals, in clinics and other health care settings;
- work in full time or part time academic or research positions relating to radiology;
- conduct interventional procedures for treatment of patients, or
- conduct legal consultations on medical imaging.

The definition does not include registrars who hold accredited training positions or service registrars who work in radiology but are not in accredited training positions. Also not covered by the definition are non radiologist providers of imaging services, such as GPs, and other specialist groups, including nuclear medicine physicians.

The Royal Australian and New Zealand College of Radiologists (RANZCR)

The RANZCR is responsible for the determination and maintenance of standards for the practice of Diagnostic Medical Imaging and Radiation Oncology and for the training and education of Diagnostic Radiologists and Radiation Oncologists.

Specialty of Diagnostic Medical Imaging

The Working Party defined the specialty of Diagnostic Medical Imaging as the specialty concerned with medical diagnosis utilising ionising radiation, radioisotopes, ultrasound and magnetic resonance imaging.

Acceptable and Sustainable Specialist Radiology Service

The RANZCR considers that an acceptable and sustainable resident radiology service includes facilities for:

- all plain film radiographs
- all gastro-intestinal contrast studies and other screening procedures, such as arthrography, general ultrasound and Doppler ultrasound for musculoskeletal and full vascular studies as well as interventional ultrasound procedures
- digital subtraction angiography (DSA)
- computerised tomography
- nuclear medicine
- bone mineral density studies
- orthopantography (OPG), and
- interventional radiology.
- Magnetic resonance imaging (MRI) scanning is desirable but not essential.

Ideally, at least three radiologists should be available within a population catchment area. Population catchments of 100,000 or more are associated with practices with these characteristics. The RANZCR recognises that solo radiologists may provide services in rural centres with population catchments of less than 100,000. However, for a sustainable service it is considered that it is best if these radiologists are part of a larger regional or urban based service from which they are rotated to the smaller centre and from which they receive support.

Guiding Principles

The Working Party adopted the following guiding principles:

- the Australian community should have available an adequate number of trained radiologists, appropriately distributed to provide the medical imaging services it requires;
- the community is best served when radiologists have high standards of qualification and work with a high level of ongoing experience;
- standards of practice will be highest if radiologists perform a reasonable volume of work;
- the best assurance of standards is a high quality requirement for entry to practice and a high quality requirement for continuing practice which takes into account the rapid changes, including changes in pathways of care, that are impacting on philosophical and organisational aspects of care and on the role and practice of radiologists;
- all Australian citizens should have access to a good standard of medical imaging irrespective of geography and economic status. In achieving this, convenience to

the patient should be balanced against the quality of services that can be distributed to meet that convenience;
- both public and private sectors have an appropriate mix of services;
- both public and private sectors have an important role in ensuring that other providers have access to training in medical imaging; and
- both public and private sectors have a role in exploring optimal use of medical imaging services in ambulatory care settings and private offices for training purposes.

Data Sources

The approach of the Working Party has been to analyse existing data sources and to undertake consultation with relevant persons and organisations, in order to make informed comments on the factors affecting the current and future market for specialist radiology services.

In estimating workforce numbers, establishing a profile of the workforce and assessing its adequacy, important sources of data were:

1. The Royal Australian and New Zealand College of Radiologists (RANZCR)

The RANZCR keeps a variety of data, principally on number, age, gender and location of all specialist radiologists in Australia. RANZCR also holds data about training in diagnostic radiology, including number of training posts and trainees and on the number of overseas trained specialists entering the workforce through the AMC/College pathway.

All radiologists on the RANZCR database were surveyed by the College to obtain information about workforce participation, distribution and satisfaction and to gain a provider perspective of the adequacy of the current workforce. This survey achieved a 60% (684/1,148) response from practising diagnostic radiologists. The results of the survey will be published in the RANZCR publication, Australasian Radiology.

All 195 trainees of RANZCR were surveyed by the College to obtain information about their workforce participation plans. This survey achieved a 55.4% (108/195) response. As with the survey of qualified radiologists, the results of this survey will be published in the RANZCR publication, Australasian Radiology.

The RANZCR undertook a survey of all State/Territory members of the RANZCR Workforce Committee to obtain information about workforce adequacy and factors influencing the supply of, and requirements for, radiologists. Responses were received from all States and Territories. The results of this survey are presented in Appendix B.

2. Australian Institute of Health and Welfare (AIHW)

The principal AIHW data source is the annual Medical Labour Force Survey which presents national labour force statistics for registered medical practitioners, principally through a survey collected as part of the annual renewal of registration. In the Labour Force Survey, a specialist radiologist was defined as a specialist in active practice who reported being a specialist whose principal qualification was in

radiology and whose main practice was in radiology. The numbers presented in this report are estimates produced from the National Medical Labour Force Survey of all medical practitioners registered in Australia in 1998. In producing these estimates, the AIHW has assumed that non-respondents to the survey had the same characteristics as respondents. Overall, the response to the 1998 survey was 81.3%.

The AIHW and the Family Medicine Research Unit, Department of General Practice, University of Sydney maintain a database of quality assurance audit activity of general practitioners based on details of 100 consecutive office/surgery encounters and home visits. Aggregated, de-identified data from the audit were extracted with the permission of participating general practitioners and relevant data analysed by the Family Medicine Research Unit and the AIHW for the Working Party.

3. Commonwealth Department of Health and Aged Care Medicare provider database

Medicare provider statistics (from the Health Insurance Commission [HIC] data base) define medical specialists in two ways, namely by recognised specialist qualification and according to the predominant services billed to Medicare. For this report the Working Party requested Medicare to provide data about recognised specialty of provider (viz radiologists and nuclear medicine radiologists) and by number and location of service. The Medicare statistics include all practitioners who have billed Medicare (Medicare Benefits Schedule - MBS) for at least one service during a financial year.

The major deficiency with the use of Medicare MBS data for workforce planning purposes is that it does not provide data on practitioners who are salaried specialist radiologists in the public hospital system and who do not render MBS services billed to the HIC. Medicare data thus excludes services rendered to public hospital patients, to Veterans' Affairs patients and to compensation cases nor does it include screening procedures (eg BreastScreen Australia program). However, this limitation is less of an issue for radiology than for other medical disciplines due to a very high participation in MBS services billed to the HIC.

4. AMWAC Survey of Divisions of General Practice

AMWAC surveyed all 122 Divisions of General Practice throughout Australia to obtain information on the adequacy of supply of specialist radiology services. This survey had a 58.2% response rate. The results of this survey are presented in Appendix C.

5. AMWAC Survey of State/Territory Health Departments

AMWAC surveyed all State/Territory health departments in 2000 to obtain information on the supply and adequacy of specialist radiology services. This survey had an 87.5% response rate. The results of this survey are presented in Appendix D.

State/Territory Health Departments also assisted with the public hospital vacancy survey. This survey was undertaken in July 2001. A vacancy was defined as an approved position for which funding is available and for which active recruitment

action had been undertaken, but was unsuccessful. The survey collected information on staff specialist and visiting medical officer (VMO) vacancies and vacancies filled by temporary resident doctors (TRDs).

6. AMWAC Survey of member organisations of BreastScreen Australia

All State/Territory member programs of BreastScreen Australia were surveyed in consultation with the BreastScreen Australia Workforce and Training Group to obtain information about 'consumer' satisfaction with access to the services provided by specialist radiologists. This survey achieved a 100% response rate. The results of this survey are presented in Appendix E.

7. Rural, Remote and Metropolitan Areas classification

Wherever possible, distributional data has been interpreted using the rural, remote and metropolitan area (RRMA) classification developed by the Commonwealth Departments of Primary Industries and Energy and Health and Family Services (DPIE & DHFS 1994). A summary of the RRMA classification is provided in Appendix A.

8. Australian Bureau of Statistics (ABS)

The Australian Bureau of Statistics' (ABS) population data and projections are used as the sole source on population data. In making its population projections ABS uses three different series. The population projections in this report are based on Series II, where constant fertility and low overseas migration are assumed (ABS 1998).

Key Assumptions

The Working Party would like to emphasise that the projections on specialist radiologist supply and requirements are based on the assumption that there will be no significant change in existing national health structures. If there is a change to the national health structure the Working Party recommends the supply requirements and projections be reviewed.

In conducting the projection analysis, the Working Party has assumed that workforce requirements will increase at a per annum growth of 1.5%. This estimate is based on the likely impact of population growth (0.9%) and the effects of an ageing population (0.4%) combined with the likely impact on workforce requirements of the increasing complexity in treatment modalities (0.2%). It has also been assumed that the current length of the RANZCR training program will continue to be five years (one year of which may be used to gain experience overseas) and the majority of trainees will continue to complete their training within this period. In addition, the Working Party has assumed no substantial increase or decrease in entrants to the workforce from migration and that the pattern of workforce participation and service delivery of the current workforce provides a suitable basis on which to project future workforce requirements. These assumptions are necessary in the absence of any definitive data to the contrary.

It should also be noted that AMWAC favours, as a general course of action, adjustment to trainee intake as the best long term solution to any anticipated imbalances between expected supply and estimated requirements. Hence the conclusions and recommendations are framed in this context.

SUMMARY OF FINDINGS AND RECOMMENDATIONS

This report describes the current specialist radiology workforce, assesses the adequacy of that workforce, and projects workforce supply and requirements to the year 2011.

The report concludes that, overall, the workforce is inadequate with a shortage of not less than 37 FTE specialist radiologists. There are particular problems in the supply of specialist radiologists in New South Wales and Queensland and to a lesser extent in Tasmania.

The report concludes that among States/Territories there is variation in the distribution of specialist radiologists between the private sector and public sector with some states experiencing problems in recruiting and retaining radiologists to work in the public sector. These problems are thought to be due to the inability of the public sector, including BreastScreen Australia services, to offer competitive remuneration packages rather than an overall shortage of specialist radiologists. In addition, the working conditions for specialist radiologists in some public sector facilities is relatively poor (eg a lack of MRI facilities, run-down equipment and heavy workloads). This situation is leading to access problems for consumers and the Working Party recommends that State/Territory based radiology working groups, comprising the RANZCR and State/Territory department of health representatives, recognise and address these issues.

The Working Party concluded that while some rural areas had problems in accessing radiology services, nationally, the provision of services to rural areas was adequate. It was also noted that the nature of radiology practice is such that a resident specialist service is not essential for the provision of a quality service. Recent developments in imaging technologies (eg Picture Archiving and Communications Systems [PACS] and Computerized Radiography [CR]) and the increasing use of teleradiology have the potential to improve access for rural consumers. According to the RANZCR 2000 survey, 39.5% of radiologists are involved in the provision of imaging services to rural areas either on a resident basis, visiting basis or e-health/teleradiology basis. However, it should be noted that the provision of visiting and e-health services assumes the provision of basic diagnostic radiology services by GPs and other providers in small rural centres and remote rural locations with acute hospitals where a sustainable specialist resident radiology service is not viable. Some rural Divisions of General Practice expressed a need for improved access to specialist radiologists, including quality assurance activities.

The report concludes that the workforce undersupply situation will worsen without an increase in the number of radiodiagnosis trainees graduating from the RANZCR training program. It is estimated that requirements will increase by 1.5% per year. Future supply will be affected by the increasing representation of female radiologists and the cohort of predominantly male radiologists aged 55 years and over proceeding through to retirement.

As a result, it is recommended that the graduate output of the RANZCR training program be increased from an average of 36 per year to 52 per year. Because this number represents a significant increase on previous years, a staged increase is

proposed with 44 graduates in 2007, 48 in 2008 and, on average, 52 per year from 2009 to 2011, with a formal review in five years. Output from the training program over the past five years has averaged 37 and over the next five years is expected to average 36. This recommendation assumes that the current level of migration will be maintained (viz., on average, a net gain from migration of seven per year) and that the majority (99%) of trainees will enter the workforce on completion of the five-year training program. Because of a degree of uncertainty in these assumptions, the Working Party recommends that RANZCR and AMWAC monitor outputs on an annual basis and, if any serious deviation occurs from projection modelling, that the projections be amended. Some of this uncertainty is associated with the expressed intentions of some trainees to undertake additional advanced training, either in Australia or overseas.

To achieve the desired increase in the number of new RANZCR Fellows entering the workforce it is recommended that State and Territory health departments undertake negotiations with the RANZCR for the accommodation of 60 additional training positions to be introduced across three years commencing in 2002.

Description of the Current Specialist Radiologist Workforce

Number of practising specialist radiologists

- In 2000, there were approximately 1,148 specialist radiologists in active practice in Australia, 93.1% of whom were full time and 6.9% were part time;

- Radiology is a relatively large specialty, representing 6% of all medical specialists;

- Between 1992 and 2000, the number of radiologists increased by 17.7% (from 975 to 1,148) with a compound average increase of 2.1%;

- Population growth between 1990 and 2000 was 12.4%, with a compound annual increase of 1.1%.

Specialist radiologists to population

- Per 100,000 population there were 5.9 radiologists and an estimated SPR of 1:16,809. RANZCR data and Medicare data indicated that per 100,000 population, the supply of radiologists in Queensland and Tasmania was below the national average.

Geographic distribution

- RANZCR data indicated that 77.6% of radiologists were located in capital cities, 8.3% in other metropolitan locations, 11.3% in large rural centres and 2.8% in other rural locations. Medicare data showed that 17.2% of radiologists had their main practice in a rural area, with above average representation of rural radiologists in Queensland (27.1%) and Tasmania (42.3%).

Age profile

- According to AIHW data, the average age of radiologists is 49.1 years, with 65.4% of the workforce aged between 35 and 54 years.

- The age profile of the workforce varies across States/Territories (RANZCR and AIHW data), with a higher proportion of radiologists in the Australian Capital Territory (36.3%) aged 55 years and over, compared with the national average of 29.7%. On the other hand, 48.4% of radiologists in South Australia were aged less than 45 years, compared with the national average of 42%. Medicare data indicated that 34.1% of radiologists are aged 55 years and over.

Gender profile

- In total, 84.2% of the workforce are male and 15.8% female. The representation of women is expected to increase given that 26.6% of trainees are women. Among radiologists aged less than 50 years, women accounted for 18.7% of the workforce compared with 8.7% of radiologists aged 50 or more years.

Country of first qualification

- Data from Medicare showed that 30.1% of radiologists obtained their primary medical qualification overseas, with the highest representation of overseas qualified doctors working as specialist radiologists in Western Australia (53%), Tasmania (50%) and Queensland (34.5%).

Hours worked

- RANZCR survey data indicates that, on average, specialist radiologists work a total of 45 hours per week, with variation by gender and age. Male radiologists, on average, work 46.6 hours per week and female radiologists 38.4 hours. From the age of 65 years there is a steady reduction in the hours worked by radiologists, however, some radiologists continue to work beyond the age of 75 years, on average, 20 hours per week. AIHW 1998 data shows that, on average, radiologists work 48.6 hours per week.

Work setting

- The RANZCR survey indicated that the private sector was the primary work setting of 71% of specialist radiologists, while 27.6% indicated that they worked primarily in the public sector and 1.3% worked either in a university or some other type of service.

Type of radiology work

- In total, 97.8% of specialist radiologists are involved in medical imaging work (ie. Involved in medical imaging examinations/studies), 62% are involved in administration and 57.5% are involved in research and/or teaching.

Imaging modalities performed by specialist radiologists

- By State/Territory there was variation in the volume of imaging procedures performed per radiologist, with radiologists in Queensland carrying an above average workload. On average, male radiologists perform approximately 21% more imaging procedures per year than female radiologists.

- Between 1996 and 1998, there was little change in the mix of imaging modalities performed by specialist radiologists with a generalist approach dominating. On average, a higher percentage of radiologists who work predominantly in the public sector perform basic angiography and MRI than do radiologists who work primarily in the private sector. On the other hand, a higher percentage of

radiologists who work primarily in the private sector perform diagnostic mammography, screening mammography and nuclear medicine than radiologists who work primarily in the public sector.

Services provided

- The AIHW/University of Sydney GP Data Collection reported that, on average, GPs ordered imaging tests at the rate of 4.7% of patient problems managed. Plain x-rays made up 59.1% of all imaging test ordered, contrast/ultrasound/CT scan accounted for 34.7% and other imaging 6.2%. The most frequently ordered imaging test was a chest x-ray, these accounted for 13.6% of all imaging at a rate of 1.0 per 100 GP patient encounters.

- Because multiple payers fund medical imaging, it is difficult to gain an accurate measure of the utilisation of these services. Per 1,000 population, the RANZCR estimates that the medical imaging utilisation rate (for medical imaging provided by specialist radiologists) is in the range of 800-900 procedures per 1000 population per year. Medicare data includes some non-radiologist rendered diagnostic imaging procedures. However, the Working Party was advised that these represent a small number. For example, in 1999-2000, non-specialist radiology imaging services accounted for approximately 10% of the total 11.74 million MBS billed services with specialist radiologists providing 10.55 million services. The RANZCR Workforce Subcommittee estimates that overall the total Australian medical imaging utilisation rate is therefore in the range of 900-1000 procedures per 1,000 population per year. This is based on the estimation that approximately 60-70% of total medical imaging services in Australia is related to MBS/Medicare services, while non-Medicare services (eg public sector services, compensation/third-party insurers, and BreastScreen services) account for the remaining 30-40%. It should be noted that while the MBS data are available there is no additional hard data to support this estimation; rather it is based on the consensus opinion. It should also be noted that the Working Party did not regard estimation of utilisation on the basis of data provided by practising radiologists, at the time of the RANZCR 2000 survey, as sufficiently reliable.

- In 1999-00, 1,211 specialist radiologists provided 10,554,122 Medicare/MBS billable services, which represents an average of 8,715 services per radiologist. Specialists aged between 45 and 59 years provided more Medicare-billed imaging services per radiologist than younger and older radiologists and male radiologists, on average, provided more than female radiologists. If this is estimated to represent approximately 65% of total imaging volume, this extrapolates to about 13,400 services per radiologist per year.

Services to rural areas

- It should be noted that radiology is one discipline that lends itself to the provision of outreach services. The RANZCR 2000 survey found that 39.5% of radiologists were involved in the provision of imaging services to rural areas either as a resident rural specialist or on a visiting basis or via some other approach (eg e-health/teleradiology). By State/Territory there was variation in the percentage of radiologists involved in the provision of services to rural areas.

- Nationally, per 1,000 persons, the rural population received fewer imaging Medicare-billed services than did the metropolitan population, respectively, 487.0 and 569.9 services per 1,000 persons per annum.

Training arrangements

- The RANZCR training program is a 5 year program and 90% of trainees complete their training in the minimum period.

- In March 2001, there were 195 RANZCR radiodiagnosis trainees, and 200 accredited and funded training positions (ie five unfilled positions). In total, approximately 38 health care facilities and several hundred specialist radiologists were involved in the provision of suitable supervision of training.

- In total, 29.2% of radiodiagnosis trainees are women.

- Since 1994, there has been an average annual increase of 1.5% in the number of trainees commencing the RANZCR training program and between 1998 and 2000 the number of graduates from the RANZCR training program increased from 36 to 47 with an average of 37 graduates per year. Over the next five years the program expects to graduate approximately 180 radiologists (on average 36 per year).

- The average age of acquisition of Fellowship is 34 years.

- The RANZCR 2000 survey of radiodiagnosis trainees found that, in the short term (viz., 1-2 years post graduation), 56.1% of trainees expect to undertake additional advanced training, either in Australia, or overseas. Because of the potential impact of these intentions on workforce supply, the Working Party recommends they be monitored by the RANZCR.

Adequacy of the Current Specialist Radiologist Workforce

International benchmarks

- Data published by the Canadian Medical Association (CMA) indicated in 1999 there were 6 radiologists per 100,000 persons in Canada. This level of supply was considered less than optimal by the Canadian Association of Radiologists (CAR), which recommended a SPR of 1:13,000 (ie 7.7 radiologists per 100,000 persons). Based on RANZCR 2000 data, the comparative figure for Australia is 1:16,809 (ie 5.9 radiologists per 100,000 persons). Australian Medicare data showed that over the last decade the number of Medicare-billing radiologists per 100,000 population has increased from 5 to 6.2.

- The Royal College of Radiologists (RCR), United Kingdom, in a 1993 report, supported a ‘volume of work’ benchmark of 12,500 examinations per radiologist per year. In 1999, a RCR report noted that procedure volume estimations were a relatively crude measure of workload, and did not take into account other factors such as complexity. This 1999 report attempted to set benchmarks which were corrected for imaging modality complexity. The report also noted that the average workload per FTE radiologist in the United States was 11,600 examinations. The United States reports also attempt to correct for complexity by using Relative Value Units (RVUs). Using Australian Medicare data, and consensus

assumptions, the Working Party estimated that, on average, specialist radiologists in Australia provide about 13,000-14,000 examinations per radiologist per year.

State/Territory health department assessment

- Across most States and the Northern Territory health authorities reported problems in recruiting and retaining specialist radiologists to work in the public sector, particularly, in outer metropolitan locations and large rural centres. Queensland Health reported that the shortage of radiologists in this State had resulted in unacceptably high workloads in some areas. The Department of Health and Human Services, Tasmania, reported that inability to recruit qualified staff specialists had resulted in a significant reliance on radiology registrars.

Public hospital vacancies

- The July 2001 AMWAC specialist public hospital vacancy survey reported specialist radiology vacancies of 37 FTE nationally, with a further 11 positions filled with TRDs. The majority of funded vacancies were in New South Wales (26) and Queensland (8).

Consultation with members of the RANZCR Workforce Committee

- Responses from State/Territory members of the RANZCR Workforce Committee indicated that in some States workforce supply in the private sector was adequate, while in the public sector there was variability among organisations in their ability to recruit and retain radiologists.

Practising radiologist assessment

- The RANZCR 2000 survey found for 63.9% of specialist radiologists their current overall imaging workload was about right, for 33.7% it was too heavy, while for 2.4% it was too light. In total, 78.5% indicated that their workload was sufficient to maintain income, 6.8% were dissatisfied with this aspect of their work, while 14.7% were neither, satisfied or dissatisfied. The ratings were very similar for amount of work and hours worked with approximately 56% of radiologists satisfied, 22% dissatisfied, and 22% neither satisfied, or dissatisfied.

- In total, 65.6% of radiologists were satisfied with the availability of medical imaging specialists, 62.3% with the availability of skilled nursing staff and 59.2% with the availability of allied health personnel, however, sonographers were identified as a workforce group in short supply. In total, 34.6% of radiologists perceived that it was harder to recruit radiologists today than it was five years ago, with a greater proportion of radiologists in non-capital city locations indicating that it was now more difficult.

General practitioner assessment

- In total 66.7% of Divisions of General Practice considered access to specialist radiologists to be adequate. However, while no metropolitan Divisions perceived a need for additional radiologists, some rural Divisions perceived a need for additional resident and/or visiting radiologists.

BreastScreen Australia assessment

- To gain additional views on the adequacy of the supply of specialist radiologists, AMWAC surveyed all State/Territory program managers of BreastScreen Australia. Across most States/Territories BreastScreen program managers reported problems recruiting specialist radiologists. Apart from Queensland, where there is a definite shortage, the Working Party believed that these recruitment problems reflect the fact that some radiologists do not find this work attractive; for many it tends to be an add-on job that they do after their regular work hours.

Projections of Requirements

Population indicators

- Australia is growing and has an ageing population. The 2001 population was estimated at 19.3 million (ABS 2001). The ABS estimates that the population will reach 21 million by 2011; a projected compound average annual growth of 0.9%.

- Population growth estimates for the next decade vary substantially between State/Territory and population age groups. Above average growth rates are expected in the Northern Territory, Queensland and Western Australia and among people aged 50-69 years.

Trends in service provision

- Between 1989-90 and 1999-00, the provision of Medicare/MBS-billed radiology services by specialist radiologists increased by 55%, which represented a compound average annual increase of 4.5%. During this same period, the average number of services per provider increased by 13.1%, with a compound average increase of 0.9%.

Factors influencing future requirements

- Specialist radiologists, health authorities and BreastScreen Australia programs perceived that the following factors would increase future workforce requirements:
  - population growth and ageing;
  - increases in the demand for interventional and/or complex imaging procedures, which require greater radiologist time per examination;
  - increased demand for ultrasound services as a first-line diagnostic tool for many medical and obstetric conditions, particularly in country practice;
  - State/Territory health authority plans to enhance the provision of radiology services to rural areas and to improve access to MRI services;
  - BreastScreen Australia National Accreditation requirements;
  - increased demand for imaging to reduce the risk of medical litigation; and
  - increased patient demand for imaging as community awareness grows about the availability of new imaging technologies (eg musculoskeletal imaging).

Changes in technology and options for service provision

- The introduction of clinical guidelines and the capping of medical imaging expenditure are unlikely to have a major effect on the utilisation of medical imaging because it is now recognised that an imaging modality may be superior to clinical examination in many situations.

- The Working Party concluded that the introduction of new medical imaging technologies is likely to lead to an increase in demand for medical imaging and therefore an increase in the demand for radiologists. As a result of new imaging technologies (eg MRI, CT), the role of the specialist radiologist has expanded and imaging examinations have become more complex and time-consuming.

Changes in the structure of radiology practice

- There is general uncertainty among the workforce, health authorities and other providers (eg GPs) as to the likely effects of transformations occurring in the structure of radiology practice due to consolidation of practices, the selling of practices to corporations and the globalisation of radiology. What is known is that three countries (viz., the United Kingdom, Canada and the United States) predict increased requirements for radiologists and a need to produce more radiologists.

Projections of Supply

Workforce entrants

- Over the next five years 180 new radiologists are expected to enter the workforce from the RANZCR training program, on average, 36 per year.

- The net gain from migration is expected to average 7 per year.

Workforce attrition

- The expected age range at which most radiologists will retire is between 65 and 75 years, with an estimated workforce loss of 2.5% per year from death and retirement over the next decade. In total, 29.7% of the workforce is 55 years of age or over, the majority of whom are men. In total, 20.3% of the workforce expect to decrease the hours they work over the next three years and most of these radiologists are aged 55 years and over. In radiology, people beyond the traditional retirement age tend to continue to work. Mooted compulsory re-certification requirements are thought not to impact on the current pattern of retirement in the short term (ie next 5 years).

Changes in the gender profile of the workforce

- The representation of women in the workforce is expected to increase from the current level of 15.8% to 21.5% in 2011.

Potential for substitution

- In some remote and small rural locations, routine x-rays and ultrasounds are done by qualified GPs, radiographers and ultrasonographers with the films sent away to a radiologist for reading and reporting. Some Divisions of General Practice expressed a need for greater recognition of the GP radiology role and for greater support from specialist radiologists for GPs supplying these services, including improved access to quality assurance activities.

Balancing Projected Supply with Projected Requirements

- The Working Party estimated that requirements for radiologists could increase by 1.5% per annum over the period 2001 to 2011.

- A balance in supply to match the estimated growth rate in requirements of 1.5% per annum can be achieved by increasing the number of Fellows graduating from the RANZCR training program to 52 from the year 2007 to 2011.

- To achieve an average annual output of 52 new RANZCR Fellows it is estimated that 60 new training positions are required. This is a reasonably large increase in the number of training positions within less than a year (ie by 2002). Hence, the report recommends a staged approach to increasing the number of training positions. This recommendation assumes that the current number of new workforce entrants from migration will continue and that all existing training positions will be filled.

- Ideally, training positions should be increased proportionately more in the comparatively undersupplied States of Queensland and New South Wales and kept roughly in line with projected State/Territory population shares in 2008. The final distribution of the additional positions and additional commencing trainees across the next three years should be determined through negotiations between the RANZCR and State/Territory health departments.

- The complicating factor of course is that new training positions require appropriate infrastructure to ensure that trainees gain adequate supervision, experience and support. Accordingly, AMWAC and the RANZCR consider that additional places should be provided where there are suitable supervisors and infrastructure.

RECOMMENDATIONS

The following recommendations recognise that radiology is a specialty that is particularly dependent on the availability of appropriate facilities, support staff and equipment. It is therefore important that workforce supply and the availability of essential equipment and facilities proceed in tandem.

Underpinning the recommendations of the Working Party are certain assumptions that were used in modelling future workforce requirements and supply. The main assumptions are summarised on page 5 of this report. The recommendations may need reviewing if changes are made to the key assumptions and/or if adjustments to the main inputs to the model do not occur in line with expectations. For example updating of the conclusions may be necessary if:

- major changes occur in radiology practice and organisation (See Appendix F);
- entrants to the workforce from migration increase or decrease substantially.

The Working Party recommends:

1. That there be an increase in the number of commencing radiodiagnosis trainees to match an expected future growth in requirements of 1.5% per year and that the number of funded radiodiagnosis training positions be increased accordingly.

2. That State and Territory health departments undertake negotiations with the Royal Australian and New Zealand College of Radiologists for the accommodation of 60 new training positions in specialist radiology with the additional positions and commencing trainees to be introduced across three years and to be located where suitable supervision, support and training experiences are available as approved by the Education Board of the RANZCR. This is a relatively large increase in the number of training positions and is based on all current accredited training positions being filled as from 2002.

Current and suggested additional RANZCR training positions (AMWAC), by State/Territory, 2002, 2003 and 2004

State	Total 2001 (current)	Total 2004 (suggested)	Total Increase	2002 Increase	2003 Increase	2004 Increase
NSW	56	**84**	28	10	10	8
Victoria	61	**63**	2	1	1	-
Queensland	27	**50**	23	9	8	6
SA/NT	25	**25**	-	-	-	-
West. Aust.	21	**27**	6	2	2	2
Tasmania	5	**6**	1	1	-	-
ACT	5	**5**	-	-	-	-
Australia	200	**260**	60	23	21	16

Source: AMWAC

(A more immediate adjustment to supply could involve the recruitment and employment of appropriately qualified overseas trained radiologists. To pursue this approach, the Commonwealth Department of Health and Aged Care should co-ordinate a meeting of Commonwealth/State/Territory health departments and RANZCR to consider if this approach would be preferable and practical. Any increase in supply from overseas would require an adjustment to the recommended increase in radiology training positions.)

3. That State/Territory health departments and the RANZCR explore innovative approaches to recruiting and training radiologists, including, public/private work arrangements with a view to recruiting and retaining specialist radiologists in the public system.

4. That specialist radiologist workforce requirements and supply projections be monitored on an annual basis so that they can be amended if new trends emerge, with a formal review in five years.

5. That this monitoring be coordinated by the RANZCR and AMWAC and the results incorporated into the AMWAC annual report to AHMAC.

DESCRIPTION OF THE CURRENT SPECIALIST RADIOLOGY WORKFORCE

As discussed in the Introduction, there is a variety of data sources on the numbers, attributes and distribution of specialists radiologists in Australia. While each of these data collections has some deficiency, it is possible to piece together a reasonably accurate, up-to-date and coherent profile of the workforce.

In establishing the profile of the current specialist radiologist workforce the Working Party defined:

- the number of specialist radiologists;
- distribution of the workforce by State/Territory and geographic location using the RRMA classification;
- age and gender profiles of the workforce;
- hours worked; and
- services provided and performed.

The Number of Practising Specialist Radiologists

The Working Party estimated that the current number of practising specialist radiologists is 1,148. This estimation was derived from an analysis of:

- the number of specialist radiologists on the RANZCR database (1,148);
- the number of specialists whose main specialty of practice was radiology as indicated by the AIHW 1998 labour force survey (1,060);
- the number of recognised specialist radiologists providing Medicare services in 1999-2000 (1,211), 91 (7.5%) of whom had provided less than 100 Medicare services during the 12 month period.

RANZCR records information about the age, gender, work status (full-time/part-time), and location of radiologists (this includes members and non-members of the RANZCR). In October 2000, the RANZCR reported that of the 1,148 radiologists in Australia, 93.1% were full time and 6.9% were part time.

The AIHW Annual Medical Labour Force Survey reports numbers based on specialists who indicate that their main, second or third specialty of practice was in radiology. It also identifies specialists qualified in radiology. The 1998 survey identified 1,115 specialists practising in diagnostic radiology, and for 1,060 (95%) it was their main specialty of practice, while for 53 specialists, diagnostic radiology was their second or third specialty. In total, 20 specialists with a qualification in diagnostic radiology were not practising in diagnostic radiology. Of these specialists, four were mainly practising in each of nuclear medicine, anatomical pathology and intensive care/internal medicine. The four nuclear medicine radiologists have, however, been included in the AIHW workforce total (ie. 1,064).

Medicare data for 1999-2000 identified 1,211 recognised specialist radiologists. These data refer to any specialist radiologist who bills Medicare at least once during a 12 month period (for an item defined as one that is provided by specialist radiologists). This includes nuclear medicine radiologists.

The data from the above sources are summarised in Table 1.

Table 1: Number of specialist radiologists (various sources), selected years

Source of data	Medicare 1999-2000	AIHW 1998	RANZCR 2000
Number of practising radiologists	1,120*	1,064	1,148

*radiologists who had provided 100 or more Medicare services during the 12 month period
Sources: RANZCR, AIHW, DHAC

Growth in the Specialist Radiology Workforce

Table 2 shows the changes occurring in the specialist radiology workforce since 1989-90. The picture is one of steady growth.

Between 1992 and 2000, the number of qualified radiologists on the RANZCR database grew from 975 to 1,148 (a compound annual growth of 2.1%).

Medicare data shows that the total number of recognised specialist radiologists billing Medicare increased from 851 in 1989-90 to 1,211 in 1999-00, which represents an increase of 42.3% with a compound annual increase of 3.6%. It should be noted that Medicare data do not reveal the complete workforce (although as already indicated this is less of an issue for the field of diagnostic imaging than for other fields of medicine) but the inclusion criteria are constant and therefore provide an indication of the magnitude of change in the workforce.

Per annum population growth between 1990 and 2000 was 1.2%.

Table2: Number of specialist radiologists, 1989-90 to 1999-2000

Source	1990	1992	1994	1995	1996	1997	1998	2000	% change[a]
RANZCR	-	975	1,007	-	1,061	-	1,100	1,148	2.1
AIHW	-	-	1,034	1,040	1,102	1,104	1,115	-	1.9
Medicare	851	-	-	1,065	-	-	1,184	1,211	3.6

a - compound annual increase
Sources: RANZCR, AIHW, DHAC

Some idea of the growth in the specialist radiology workforce across States and Territories can be gained using Medicare data. As indicated above, nationally, the number of specialist radiologists claiming at least one Medicare benefit per year increased by 42.3% during the last decade. Table 3 indicates that there is marked variation in the level of increase among States/Territories with an increase of 61.1% in Queensland, 55.2% in Victoria, 44.1% in Western Australia, 36.8% in Tasmania, 33.3% in the Australian Capital Territory, 32.8% in New South Wales and 23.9% in South Australia. In the Northern Territory, the number of radiologists providing Medicare services increased from 3 to 5. However, as discussed in another section of this report, this figure is regarded as a significant underestimate.

During this same period the Australian population increased by 12.4% (ABS, 1998). The Northern Territory, Queensland and Western Australia experienced above average population growth, respectively 24.1%, 23.9% and 17.9%, while South Australia and Tasmania experienced below average growth rates of 4.4% and 1.3% (Table 3).

Table 3: Growth in the number of recognised specialist radiologists (Medicare), by State/Territory, 1989-90 to 1999-2000

Year	NSW	Vic	Qld	SA	WA	Tas	NT	ACT	Aust
1989-90	323	181	126	88	93	19	3	18	851
1999-00	429	281	203	109	134	26	5	24	1,211
% workforce increase	32.8	55.2	61.1	23.9	44.1	36.8	66.7	33.3	42.3
% population increase	10.8	7.9	23.9	4.4	17.9	1.3	24.1	12.0	12.4

Sources: DHAC, ABS

Distribution of the Specialist Radiology Workforce

Table 4 uses AIHW 1998 survey data, RANZCR 2000 data and Medicare 1999-2000 data to examine the distribution of specialist radiologists by State/Territory.

Data from the AIHW shows that the distribution of the 1,060 specialist radiologists in 1998 was reasonably consistent with the distribution of the Australian population (Table 4). States/Territories with representations of specialist radiologists below that indicated by share of population were the Northern Territory with no resident radiologists and Queensland with 16.3% of specialist radiologists and a total population share of 18.4%. It should be noted that, historically, the radiology services rendered in the Northern Territory are on the basis of a 'visiting'/rotating roster radiologist service, from South Australia, along with a resident radiologist component in Darwin.

The distribution profile of radiologists produced by data from the RANZCR is similar to that produced by data from the AIHW (Table 4). The distribution by State/Territory of specialist radiologists providing Medicare services shows a greater representation of radiologists in New South Wales than that indicated by data from the other two sources. In addition, it shows that there were five radiologists in the Northern Territory in 1999-2000 and that these specialists represented 0.4% of all radiologists providing Medicare services. The representation of radiologists in New South Wales and Western Australia was above that indicated by share of population, while in Queensland it was marginally below that indicated by population share (Table 4).

Table 4, also uses AIHW 1998 data, RANZCR 2000 data, the 1999-2000 Medicare data and the relevant ABS (1998 and 2000) population estimates to examine the number of specialist radiologists per head of population. Data from the AIHW indicated that in 1998 there was one specialist radiologist per 17,890 persons nationally (5.6 per 100,000 population), with wide variation by State and Territory, ranging from no resident radiologist in the Northern Territory and 1:20,303 in Queensland and 1:11,489 in the Australian Capital Territory. All other States/Territories were reasonably close to the national SPR. Data from RANZCR indicated that in 2000, there was one specialist radiologist per 16,809 persons (5.9 per 100,000), with Queensland and the Northern Territory below the national norm.

Medicare data indicated that there was one specialist radiologist per 15,935 persons nationally (6.3 per 100,000 population), with variation by State and Territory similar to that indicated by data from the other two data sources.

Table 4: Specialist radiologist:population, by State/Territory

State/ Territory	Specialist radiologists	% of total specialist radiologists	% of Australian population	Specialist radiologists SPR	Specialist radiologists per 100,000
		(AIHW 1998)			
NSW	364	34.3	33.9	1:17,615	5.7
Victoria	274	25.8	24.8	1:17,198	5.8
Queensland	173	16.3	18.4	1:20,303	4.9
South Aust.	80	7.5	8.0	1:18,664	5.4
West. Aust.	113	10.7	9.7	1:16,469	6.1
Tasmania	27	2.5	2.6	1:17,419	5.7
North. Terr.	-	-	1.0	-	-
ACT	27	2.5	1.7	1:11,489	8.7
Australia	**1,060**	**100.0**	**100.0**	**1:17,890**	**5.6**
		RANZCR (2000)			
NSW	386	33.6	33.9	1:16824	5.9
Victoria	290	25.3	24.8	1:16374	6.1
Queensland	204	17.8	18.4	1:17792	5.6
SA/NT	104	9.1	8.9	1:16408	6.1
West. Aust.	115	10.0	9.7	1:16653	6.0
Tasmania	26	2.3	2.6	1:18096	5.5
ACT	23	2.0	1.7	1:13878	7.2
Australia	**1,148**	**100.0**	**100.0**	**1:16809**	**5.9**
		(Medicare 1999/00)			
NSW	429	35.4	33.9	1:15,138	6.6
Victoria	281	23.2	24.8	1:16,899	5.9
Queensland	203	16.8	18.4	1:17,879	5.6
South Aust.	109	9.0	8.0	1:13,777	7.3
West. Aust.	134	11.1	9.7	1:14,292	7.0
Tasmania	26	2.1	2.6	1:18,096	5.5
North. Terr.	5	0.4	1.0	1:40,940	2.4
ACT	24	2.0	1.7	1:13,300	7.5
Australia	1,211	100.0	**100.0**	1:15,935	6.3

Sources: AIHW, RANZCR, DHAC, ABS

Table 5 draws on data from the AIHW 1998 survey and the RANZCR 2000 survey to show the distribution of specialist radiologists by geographic location according to the RRMA classification. The AIHW data shows that in 1998, 80.9% of specialist radiologists were located in capital cities, 7.5% in other metropolitan locations, while 10.2% and 1.4% were located in large rural centres and other rural areas, respectively. Data from the RANZCR 2000 survey provided a similar distribution profile, with 77.6% of radiologists in capital cities, 8.3% in other metropolitan locations and 14.1% in rural locations. Findings from previous RANZCR surveys suggest that this distributional profile has been reasonable stable since 1994. For example, the 1998 survey indicated that 81% of radiologists were located in a capital city and the 1994 and 1996 surveys showed 76% of radiologists located in capital cities (Jones et al., 1999).

Table 5: Distribution of specialist radiologists, by geographic location, 1998 and 2000

Source of data	Capital city %	Other metro. Location %	Large rural centre %	Other rural %
AIHW 1998	80.9	7.5	10.2	1.4
RANZCR 2000 survey	77.6	8.3	11.3	2.8

Sources: AIHW, RANZCR 2000 workforce survey

Using data from the RANZCR 2000 survey, Table 6 indicates variation in the distribution profile of the workforce by State/Territory. In Tasmania, 31.6% of specialist radiologists were located in a rural area, 18.5% in Queensland, 16.7% in New south Wales, 18.5% in Victoria, 8% in Western Australia and none in South Australia/Northern Territory.

Table 6: Distribution of specialist radiologists (RANZCR), by geographic location and State/Territory, 2000

State	NSW	Vic	Qld	SA/NT	WA	Tas	ACT	Aust.
Capital city	153	147	80	68	51	12	12	523
Other metropolitan	21	10	24	-	(a)	-	-	56
Large rural centre	31	14	21	-	4	6	-	76
Other rural	4	7	5	-	2	(a)	-	19
% rural	16.7	11.8	18.5	-	8.0	31.6	-	14.1

a - indicates data suppressed to maintain confidentiality
Source: RANZCR 2000 workforce survey

Medicare 1999-00 data indicated that the main practice of 17.2% of specialist radiologists (ie 208 radiologists) was located in a rural area (Table 7). This Table also shows that the representation of radiologists with a main practice in a rural area varies by State, with above average representations in Queensland (27.1%) and Tasmania (42.3%). On the other hand, the data show that only 3.7% of radiologists in South Australia have their main practice in a rural area.

Table 7: Distribution of specialist radiologists (location of main practice) (Medicare), by State/Territory and geographic location, 1999-2000

State	NSW	Vic	Qld	SA	WA	Tas	NT	ACT	Aust.
Urban	363	230	148	105	113	15	4	24	1,002
Rural	66	51	55	4	20	11	a	-	208
% rural	15.4	18.1	27.1	3.7	14.9	42.3	20.0	-	17.2

Source: DHAC

Age Profile

The AIHW 1998 survey data showed that the average age of radiologists was 49.1 years. The largest cohort (35%) of specialist radiologists was aged between 35 and 44 years, while a further 30.4% were aged between 45 and 54 years (Table 8). In total, 30.3% of specialist radiologists were aged 55 years and over and 6.8% were aged 65 years and over. This is a relatively large cohort of specialists who are likely to move through to retirement in the next 10 years. In New South Wales, 34 (9.3%) specialist radiologists were aged 65 years or over in 1998, while only 3.5% were in this age group in Western Australia. The age profile of specialist radiologists in the Australian Capital Territory differs from that of the other States, with 59.2% less than 45 years of age and 37% aged between 55 and 64 years.

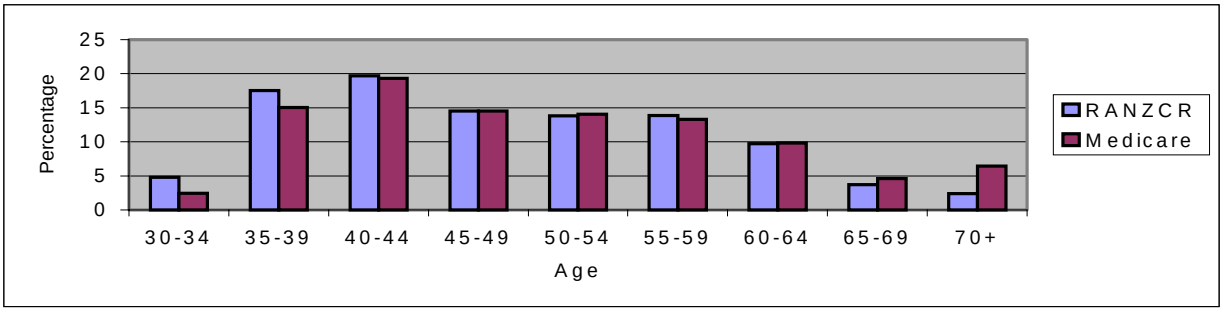
Table 8: Age profile of specialist radiologists (AIHW), by age group and State/Territory, 1998

State	30-34 yrs %	35-44 yrs %	45-54 yrs %	55-64 yrs %	65 plus yrs %	Total
NSW	3.8	29.4	29.7	27.5	9.3	100.0
Vic	4.0	39.1	32.1	19.0	5.8	100.0
Qld	3.5	37.0	30.1	22.5	7.5	100.0
SA	7.5	33.8	31.3	22.5	5.0	100.0
WA	2.7	40.7	30.1	23.0	3.5	100.0
Tas	11.1	25.9	44.4	14.8	3.7	100.0
ACT	7.4	48.1	11.1	37.0	-	100.0
Australia	**4.2**	**35.0**	**30.4**	**23.5**	**6.8**	**100.0**

Source: AIHW

Figure 1 uses data from the RANZCR (database) and Medicare to examine the age profile of the specialist radiologist workforce. Compared with the data from the RANZCR, Medicare data indicated that 34.1% of the workforce were aged 55 years and over, while the RANZCR data showed that 29.7% of the workforce were in this older age category. Medicare data also indicated that 11% of the workforce were aged 65 years and over, while the data from the RANZCR showed 6.1% of specialist radiologists in this category (Figure 1 and Table 9).

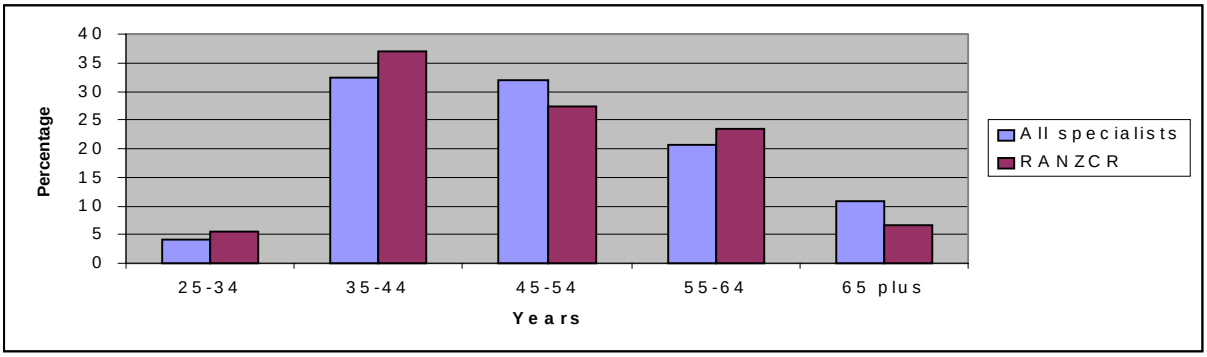
Figure 1: Age profile of specialist radiologists based on data from the RANZCR and Medicare, 2000



Sources: RANZCR, DHAC

Figure 2 compares the age profile of the specialist radiology workforce with the age profile of the total specialist medical workforce and shows that, while, the general pattern is similar, there are several age groups where the radiology workforce stands out. For example, a higher percentage of radiologists are aged 35-44 years and 55-64 years.

Figure 2: Age profile of all radiologists (RANZCR 2000) and age profile of all medical specialists in Australia (AIHW 1998)



Sources: RANZCR, AIHW

Using data from the RANZCR database, Table 9 indicates variation in the age of specialist radiologists by State/Territory, with a higher proportion of radiologists in the Australian Capital Territory (36.3%) aged 55 years and over when compared with the national average of 29.7%. On the other hand, a higher proportion of radiologists in South Australia/Northern Territory was aged less than 45 years (viz., 48.4% compared with the national average of 42.0%).

Table 9: Age profile of specialist radiologists (RANZCR), by State/Territory, 2000

State	30-34 yrs	35-39 yrs	40-44 yrs	45-49 yrs	50-54 yrs	55-59 yrs	60-64 yrs	65-69 yrs	70+ yrs	Total
NSW	6.2	16.1	18.7	13.0	13.3	16.7	9.6	3.4	2.8	100.0
Vic	6.1	16.6	22.4	14.4	11.6	13.7	6.9	4.0	4.3	100.0
Qld	3.3	17.8	21.1	13.3	13.3	11.7	11.7	5.0	2.8	100.0
SA/NT	8.2	20.6	19.6	16.5	12.4	13.4	7.2	2.1	1.0	100.0
WA	4.9	18.6	13.7	12.7	19.6	9.8	14.7	2.9	2.9	100.0
Tas	4.2	25.0	12.5	20.8	16.7	12.5	4.2	4.2	0.0	100.0
ACT	0.0	18.2	22.7	13.6	9.1	18.2	13.6	4.5	0.0	100.0
Aust.	**4.8**	**17.5**	**19.7**	**14.5**	**13.8**	**13.9**	**9.7**	**3.7**	**2.4**	**100.0**

Source: RANZCR

Gender Profile

Data from the RANZCR database showed that in 2000, 84.2% of the workforce were men and 15.8% were women. This is an increase in the representation of women from 14.5% in 1996 and 13.1% in 1994 (RANZCR, 1999). Among States and the Australian Capital Territory there was variation in gender distribution. For example, the RANZCR 2000 data indicated that in Western Australia only 13% of radiologists were female compared with 21.2% in South Australia and 17.4% in the Australian Capital Territory. The representation of female radiologists was also relatively low in Victoria and Queensland where they accounted for 14.1% and 14.7% of radiologists, respectively (Table 10).

This level of female representation is well below the average for all clinicians in the medical workforce (27.2%) and above the level for all medical specialists (14.0%) (AIHW 1998).

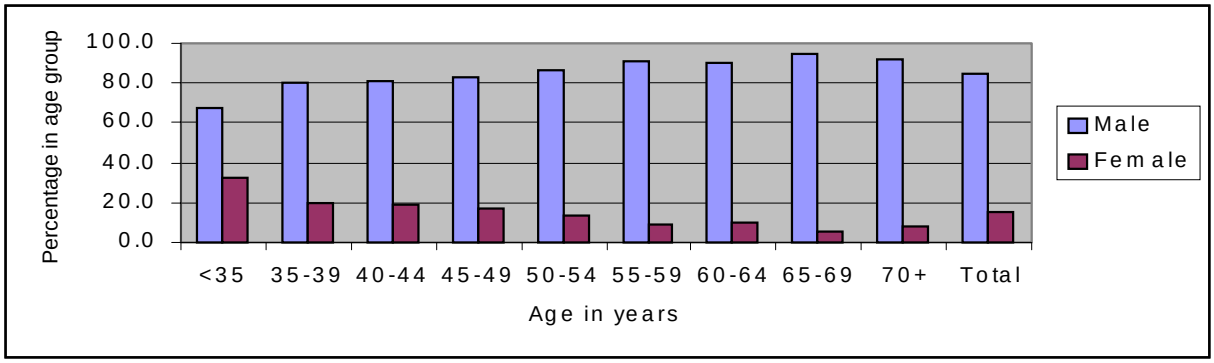
Table 10: Gender profile of specialist radiologists (RANZCR), by State/Territory, 2000

Gender	NSW	Vic	Qld	SA/NT	WA	Tas	ACT	Aust.
% Male	79.3	85.9	85.3	78.8	86.1	84.6	82.6	84.2
% Female	17.4	14.1	14.7	20.2	13.0	15.4	17.4	15.8

Source: RANZCR

Data from the RANZCR database showed that the representation of female radiologists was relatively low among specialists aged 35 years and over and relatively high (38.6%) among radiologists less than 35 years of age (Figure 3).

Figure 3: Percentage of male and female specialist radiologists within each age cohort (RANZCR), 2000



Source: RANZCR

Country of First Qualification

Data from Medicare for 1999-2000 showed that 30.1% of specialist radiologists obtained their basic medical qualification overseas, with 69.9% obtaining their basic qualification in Australia (Table 11). This figure is in agreement with that obtained from the RANZCR 2000 workforce survey. Table 11 also shows that, nationally, the representation of specialists from overseas has remained relatively stable at around 30% during the last decade. However, this Table also indicates wide variation in the representation of overseas trained radiologists by State/Territory. States with the highest representation of overseas trained radiologists in 1999-00 were Western Australia (53%) and Tasmania (50%) and the Northern Territory (80%), followed by Queensland (34.5%).

Table 11: Percentage of specialists radiologists who gained their initial basic medical qualification overseas (Medicare), by State/Territory, 1989-90 to 1999-2000

State/Territory	1989-90	1994-95	1998-99	1999-2000
NSW	30.0	27.1	25.2	24.7
Victoria	24.9	24.4	20.7	23.5
Queensland	33.3	35.3	34.8	34.5
South Aust,	36.4	31.4	28.8	24.8
West. Aust.	54.8	50.4	51.1	53.0
Tasmania	47.4	47.8	55.6	50.0
North. Terr.	100.0	50.0	20.0	80.0
ACT	27.8	16.7	30.4	29.2
Australia	**33.4**	**31.4**	**29.8**	**30.1**

Source: DHAC

The RANZCR 2000 survey indicated that 27.1% of radiologists gained their first specialist radiologist qualification overseas. Of these radiologists, 44.8% trained in the United Kingdom/Ireland and 26.8% trained in New Zealand. The 1998, RANZCR survey reported that of specialist radiologists, who gained their initial qualification in New Zealand, most were located throughout New South Wales, Victoria and Queensland. Furthermore, these radiologists were found to mainly stay in these locations. On the other hand, radiologists who trained in the United Kingdom tended to practise in New South Wales (30%), Western Australia (25%) and Victoria (12%) and they generally remained in these states. Whereas, South Africans, initially practised in Queensland (32%), Victoria (18%), New South Wales (18%) and Tasmania (18%) with some further movement to New South Wales (30%), Victoria (20%) and Western Australia (17%).

Hours Worked

According to the 1998 AIHW survey specialist radiologists work on average 48.6 hours per week and spend 43.6 hours per week on direct patient care (Table 12). In total, 13.4% of the workforce worked less than 35 hours per week, and 12.1% worked 65 hours or more per week. The AIHW data also indicated that specialist radiologists aged between 45-54 years work the longest hours (on average 52.5 hours per week) of any age group, while specialist radiologists aged 65 years work significantly fewer hours (on average 25.1 hours per week).

Male specialist radiologists aged 35-44 years worked the longest hours of any group (on average 54.3 hours per week), while among female specialist radiologists those aged between 45-54 years worked the longest hours (on average 47.6 hours per week). With respect to direct patient care hours, similar age distribution patterns apply (Table 11). On average, female specialist radiologists worked 7.5 hours less per week than male radiologists, with female radiologists averaging 42.4 hours per week and male radiologists averaging 49.9 hours per week (AIHW, 1998). The differential in average hours worked per week by male and female specialist

radiologists is at it lowest for those aged 45-54 years, respectively 53.2 and 47.6 hours per week (Table 12).

In total, 503 (47.5%) of specialist radiologists reported hours on call not worked, at an average of 46.9 hours per week (Table 12).

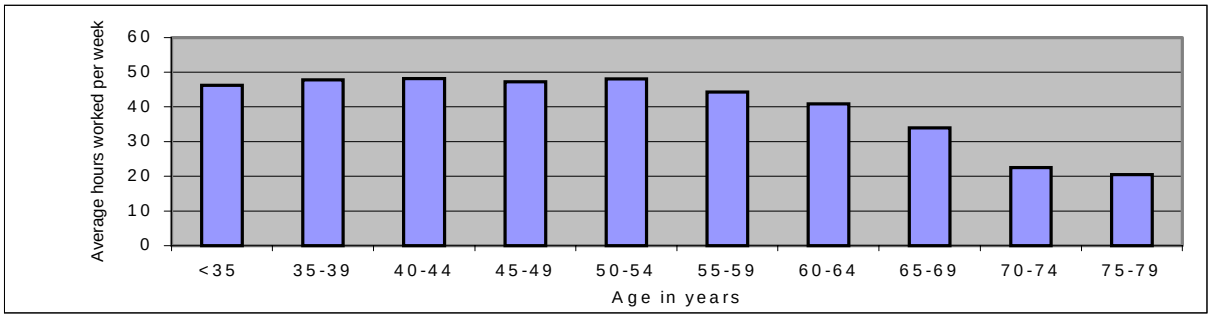
Table 12: Average hours worked by specialist radiologists (AIHW), by gender and age, 1998

Gender	<35 yrs	35-44 yrs	45-54 yrs	55-64 yrs	65 & over	Total
			Total hours worked			
Male	49.6	54.3	53.2	47.9	25.0	49.9
Female	43.3	40.7	47.6	37.6	a	42.4
Total	**47.0**	**51.7**	**52.5**	**46.7**	**25.1**	**48.6**
			Direct patient care hours worked			
Male	44.7	47.5	48.0	43.6	25.0	44.9
Female	41.0	37.2	36.5	34.6	a	37.0
Total	**43.4**	**45.4**	**46.6**	**42.5**	**25.1**	**43.6**
			Hours on call not worked			
Male	13.5	21.6	21.3	24.7	25.5	22.3
Female	4.3	24.9	30.3	22.9	a	24.4
Total	**11.0**	**22.1**	**22.3**	**24.5**	**25.5**	**22.5**

a – indicates data suppressed to maintain confidentiality
Source: AIHW

RANZCR 2000 survey data indicated that, on average, radiologists work a total of 45 hours per week (not including 'on call' not worked), with variation by gender and age. On average, male radiologists work 46.6 hours per week and female radiologists 38.4 hours. This is a marginal increase on the number of hours that male and female radiologists reported working per week in 1996, on average, respectively, 44.1 and 36.7 (Jones et al., 1997). Figure 4 shows a steady reduction in the hours worked by radiologists from the age of 60 years, however, some radiologists continue to work after the age of 75 years.

Figure 4: Average hours worked per week by specialist radiologists (RANZCR), by age, 2000



Source: RANZCR 2000 workforce survey

Data from the AIHW survey indicated variation in the total hours worked by specialist radiologists in different States and Territories (Table 13). For example, specialist radiologists in New South Wales, on average, worked the longest hours per week (51 hours).

Table 13: Average hours worked per week by specialist radiologists (AIHW), by State/Territory, 1998

	NSW	Vic	Qld	SA	WA	Tas	ACT	Total
Total hours worked	51.0	48.5	45.5	47.2	47.4	44.9	46.2	48.6
Direct patient care hours worked	44.2	44.4	43.2	41.9	44.4	33.3	33.9	43.0

Source: AIHW

Table 14 indicates that specialist radiologists in large rural centres work longer hours than specialist radiologists in other geographic locations. On average, specialist radiologists in large rural centres work, on average, 53.9 hours per week, while those in capital cities and other metropolitan locations work 48.5 and 47.7 hours per week, respectively.

Table 14: Average hours worked per week by specialist radiologists (AIHW), by geographic location, 1998

Geographic location	Capital city	Other metro centre	Large rural centre	Small rural centre	Other rural areal	Total
Total hours worked	48.5	47.7	53.9	44.2	44.1	48.8

Source: AIHW

The AIHW 1998 survey showed that, in total, 47% of specialist radiologists undertook on call work with wide variation by geographic location. For example, 64.1% of radiologists in large rural centres reported doing on call work, compared with 44.3% of radiologists in capital cities (Table 15). The table also shows that radiologists in rural locations, on average, spent more on-call hours not working than radiologists in urban locations.

Table 15: Percent of specialist radiologists on-call and hours on-call not worked (AIHW), by geographic location, 1998

Geographic location	Capital city	Other metro centre	Large rural centre	Small rural centre	Other rural area	Total
Percent of specialist radiologists on-call	44.3	57.9	64.1	45.8	22.2	47.0
Hours on-call not worked	20.3	22.0	27.1	39.0	70.0	22.2

Source: AIHW

Work Setting

Contribution to public sector specialist radiology

The RANZCR 2000 survey found that with respect to their primary work setting, 71% of specialist radiologists worked in the private sector, 27.6% in the public sector,

while the remaining 1.3% worked in either a university or some other type of service (Table 16). Approximately 48.7% (333/684) of radiologists reported involvement in a second work setting. Not surprisingly, Table 16 shows a very different pattern for this second work setting. Of the radiologists with a second work setting, 63% (211/333) were undertaking medical imaging activities in the public sector, and 32% (106/333) in the private sector.

Table 16: Primary work setting and second work setting under which specialist radiologists conduct medical imaging activities (RANZCR), 2000

Type of work setting	Primary work setting (%) (n=684)	Second work setting (%) (n=333)
Private sector	71.0	31.8
Public sector	27.6	63.4
University	0.9	1.8
Other	0.4	3.0
Total	100.0	100.0

Source: RANZCR 2000 workforce survey

Type of work

Table 17 indicates the type of work being undertaken by specialist radiologists with 97.8% of radiologists involved in diagnostic imaging studies/work, 62% involved in administration and 57.5% involved in research and/or teaching.

Table 17: Type of work undertaken by specialist radiologists (RANZCR), 2000

Activity	Number of respondents	Percentage of respondents
Procedural work	648	97.8
Administration	424	62.0
Research and/or teaching	393	57.5

Source: RANZCR 2000 workforce survey

Services Provided

Services required by general practitioners

The AMWAC 2000 survey of Divisions of General Practice (Appendix C) found that the services required by general practitioners of radiologists included:

- routine x-rays;
- ultrasound;
- CAT scans;
- MRI;
- bone densitometry;
- mammography; and
- interventional radiology.

In some locations, Divisions reported that routine x-rays and ultrasounds were done by qualified GPs or by radiographers and ultrasonographers with the films sent away to a radiologist for reading and reporting. Electronic transfer of films and reports was mentioned favourably by some Divisions in the interest of timeliness of report.

The AIHW/Sydney University GP data collection (1999-00) found that at least one imaging test was ordered by GPs at the rate of 6.7% of patient encounters, with the latter defined as any professional interchange between a patient and a GP. GPs

ordered imaging tests at the rate of 4.7% of patient problems managed. 'Problems managed' were defined as the GPs documented diagnosis of a health problem presented by a patient, family or community.

'Plain x-rays' made up almost two-thirds (59.1%) of all imaging tests ordered, 'contrast/ultrasound/CT scan' accounted for 34.7% and 'other' imaging for 6.2%. The most frequently ordered imaging test was a chest x-ray, these accounted for 13.6% of all imaging at a rate of 1.0 per 100 patient encounters. Contrast x-rays of the abdomen, the second most frequently ordered test, accounted for 5.5% of all imaging tests and were ordered at the rate of 0.4% per 100 patient encounters. Six of the 10 most common patient problems, or diagnoses, associated with orders for imaging were related to the musculoskeletal system. The remaining problems were related to abdominal, breast, skin and respiratory problems. Back complaint, the most common problem for which imaging was ordered, accounted for 6.4% of all imaging, while fracture accounted for 5.3% of orders (Table 18).

Table 18: The 10 most frequent problems managed for which an imaging test was ordered by GPs (AIHW/BEACH), 1999-2000

Problem managed	Number of problems	Number of problems/ imaging combinations	% problems/ imaging combinations[a]	% of problems with test[b]	Rates of image orders per 100 problems with imaging[c]
Back complaint*	2,880	506	6.4	15.3	114.8
Fracture*	1,032	423	5.3	37.9	108.1
Osteoarthritis*	2,346	325	4.1	12.6	109.6
Sprain/Strain*	1,878	318	4.0	16.0	105.8
Injury muskuloskeletal NOS	745	200	2.5	24.5	109.4
Abdominal pain*	620	191	2.4	27.7	111.1
Shoulder syndrome (including arthritis)	504	160	2.0	25.1	126.6
Injury skin, other	629	157	2.0	23.5	106.1
Breast lump/mass (female)	178	154	1.9	62.8	137.2
Acute bronchitis/bronchiolitis	3,319	146	1.8	4.4	100.5
Subtotal	14,131	2,579	32.6	-	-
Total	**153,857**	**7,918**	**100.0**	**-**	**-**

a - a test was counted more than once if it was ordered for the management of more than one problem at an encounter.; there were 6,844 imaging test orders and 6,922 problem/imaging combinations
b - the percentage of contacts with the problem which generated at least one order for imaging
c - the rate of imaging orders placed per 100 contacts with that problem generating at least one order for imaging
*includes multiple ICPC-2 and ICPC-2 PLUS codes
NOS - not otherwise specified
Source: AIHW/BEACH/University of Sydney

Imaging modalities performed by specialist radiologists

It is not possible to accurately assess the annual volume of diagnostic imaging that the average radiologist performs. For this section, data has been obtained from the RANZCR 2000 survey. Radiologists were asked to estimate the volume of medical imaging studies that they performed. The RANZCR Workforce Committee and the AMWAC Radiology Working Party have determined that this methodology is prone to significant error. In particular, over-estimation appears to be a likely result. If the survey responses were correct, this would imply that the Medicare MBS services

account for just under 50% of total imaging services. Both Committees agree that this figure is very likely to be too low, and is probably in the 60-70% range.

Table 19 indicates wide variation in the volume of imaging procedures reported by radiologist (per year by State/Territory), with radiologists in Queensland reporting an above average workload. This Table also shows that, on average, male radiologists report they perform approximately 21% more imaging procedures per year than female radiologists.

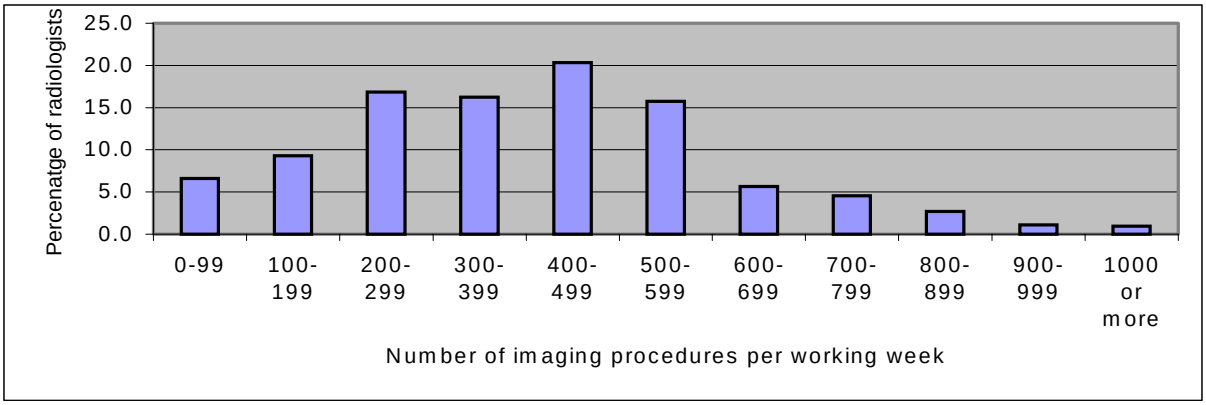
Table 19: Estimated average annual volume of work (imaging procedures) performed per specialist radiologist (RANZCR), by gender and State/Territory, 2000

Gender	NSW	Vic	Qld	SA/NT	WA	Tas	ACT	Aust.
Male	18,125	19,202	19,583	17,320	18,537	18,569	12,533	18,628
Female	16,760	14,750	15,158	12,691	16,618	14,250	10,500	15,385
Total	17,813	18,401	19,143	16,163	18,009	17,759	11,325	18,014

Source: RANZCR

Using data from the RANZCR 2000 survey, Figure 5 shows that specialist radiologists report a mode figure of approximately 400-500 medical imaging procedures per week, with 69% of radiologists reporting they perform between 200 and 599 imaging procedures.

Figure 5: Number of medical imaging procedures performed by radiologists in a typical working week (RANZCR), 2000



Source: RANZCR 2000 workforce survey

The RANZCR 1998 survey reported that there had been little change in the mix of imaging modalities performed by radiologists between 1996 and 1998, with a 'generalist' approach predominating (Table 20). However, MRI participation continues to grow, and parallels the increased diffusion and usage of this modality.

Table 20: Percentage of specialist radiologists performing various imaging modalities (RANZCR), 1996, 1998, 2000

Imaging modality	1996 RANZCR survey (% of total)	1998 RANZCR survey (% of total)	2000 RANZCR survey (% of total)
General radiography	96.0	95.0	96.2
Ultrasound	91.0	92.0	93.6
CT	86.0	91.0	92.3
Diagnostic mammography	72.0	73.0	80.4
Angiography/Interventional	43.0	39.0	59.1
Screening mammography	33.0	34.0	45.5
MRI	25.0	31.0	45.3
Nuclear medicine	17.0	16.0	16.4

Source: RANZCR 1996, 1998 and 2000 workforce surveys

Table 21 shows variation in the pattern of work of radiologists, as indicated by imaging modalities performed, by primary work setting. For example, a higher percentage of radiologists who work predominantly in the public sector perform basic angiography and MRI than do radiologists who work primarily in the private sector. On the other hand, a higher percentage of radiologists who work primarily in the private sector perform diagnostic mammography, screening mammography and nuclear medicine than radiologists who work primarily in the public sector.

Table 21: Percentage of specialist radiologists performing various imaging modalities (RANZCR), by primary work setting, 2000

Imaging modality	Private sector	Public sector	Total
Number of respondents	*481*	*185*	*677*
General radiology/fluoro.	98.1	91.9	96.2
Ultrasound	97.1	85.4	93.6
CT	94.6	86.5	92.3
Diagnostic mammography	90.9	54.1	80.4
Interventional radiology	60.3	57.8	59.1
Screening mammography	52.2	29.2	45.5
Basic angiography	36.8	52.4	41.2
MRI	42.6	51.4	45.3
Nuclear medicine	19.5	9.2	16.4
None of the above	0.6	1.6	1.0

Source: RANZCR 2000 workforce survey

Variation was also observed in the pattern of work of radiologists, as indicated by imaging modalities performed, by State/Territory of residence of the radiologist (Table 22). For example, fewer radiologists in New South Wales (5.8%) and Western Australia (6.7%) than in Victoria (28.4%) and Queensland (29.2%) performed nuclear medicine, while no specialist radiologists in Tasmania or the Australian Capital Territory performed nuclear medicine. A higher percentage of radiologists in New South Wales (52.6%) and Queensland (57.7%) performed screening mammography

than radiologists in South Australia/Northern Territory (32.7%), Western Australia (33.3%) and Tasmania (31.6%) (Table 22).

Table 22: Percentage of specialist radiologists involved in various imaging modalities (RANZCR), by State/Territory, 2000

Imaging modality	NSW	Vic	Qld	SA/NT	WA	Tas	ACT	Aust.
Number of respondents	*208*	*176*	*130*	*52*	*75*	*19*	*12*	*677*
General radiography	96.2	96.6	97.7	96.2	96.0	94.7	91.7	96.2
Ultrasound	90.9	93.8	96.9	98.1	93.3	100.0	83.3	93.6
CT	92.8	90.3	95.4	96.2	90.7	100.0	83.3	92.3
Diagnostic mammography	81.3	84.1	88.5	76.9	62.7	68.4	83.3	80.4
Interventional radioliology	59.1	64.8	55.4	44.2	61.3	68.4	66.7	59.1
Screening mammography	52.4	38.6	57.7	32.7	33.3	31.6	41.7	45.5
Basic angiography	40.9	45.5	51.5	28.8	26.7	26.3	50.0	41.2
MRI	46.2	34.1	58.5	63.5	29.3	68.4	41.7	45.3
Nuclear medicine	5.8	28.4	29.2	11.5	6.7	-	-	16.4
None of the above	0.5	2.3	1.5	-	-	-	-	1.0

Source: RANZCR 2000 workforce survey

Medicare Services

Procedural and other medical services in Australia are provided through Medicare (MBS) and through other insurance arrangements in fee for service practice, and also through the public hospital system, and BreastScreen Australia program. Detailed service-specific data through Medicare (MBS) have been available since 1984-85.

The RANZCR 1999 report notes that it is difficult to measure medical imaging utilisation in Australia, despite access to the Medicare database, largely because medical imaging is funded by multiple payers. Nevertheless, it is estimated that Medicare (MBS) accounts for approximately 60-70% of total imaging procedures provided in Australia. Medicare data also includes some non-radiologist rendered diagnostic imaging procedures. However, the Working Party was advised that these represent a very small number (viz., approximately 10%), with radiologists rendering 10.5 million of the 11.7 million diagnostic imaging Medicare services provided in 1999-00. As previously indicated (p. 9), the RANZCR Workforce Subcomittee estimates that overall the total Australian medical imaging utilisation rate is in the range of 900-1000 procedures per 1,000 population per year.

In 1999-00, 10,554,122 Medicare services (ie billable services) were provided by 1,211 specialist radiologists (Table 22). This represents an average of 8,715 services per radiologist. As previously indicated, this figure understates the number of procedures provided by radiologists because it does not take into account other non-Medicare imaging procedures, such as BreastScreen Australia services, and third party insurers, DVA services, and public sector services. Expert members of the

Working Party believed that radiology procedures other than Medicare billed services, accounted for between 30-40% of total procedures.

Table 23 also shows variation in the average number of Medicare services provided per radiologist by gender and age. On average, each male radiologist provided 9,262 services, while the comparative figure for female radiologists was 5,585. This differential is greater than that reported in the RANZCR 2000 survey. Table 23 also shows that, on average, radiologists aged between 45 and 59 years provided more services per radiologist than younger or older radiologists.

Table 23: Average number of Medicare services* provided per radiologist, by gender and age, 1999-2000

Age (years)	Male	Female	Total
Less than 35 years	4,758	3,254	4,227
35 – 39	6,621	4,141	6,086
40 – 44	9,712	5,470	8,916
45 – 49	12,206	8,134	11,443
50 – 54	10,938	6,109	10,338
55 – 59	11,455	7,405	11,102
60 – 64	8,408	4,968	8,150
65 – 69	7,398	2,749	6,900
70 plus	4,204	3,791	4,183
Age unknown	7,321	4,334	6,918
Total	**9,262**	**5,585**	**8,715**

*specialist radiologist services billed to Medicare.
Source: DHAC

Table 24 indicates that, based on postcode of patient residence, the provision of Medicare services by specialist radiologists is reasonably consistent with the distribution of the population.

Table 24: Number of Medicare services for patients who had claims for diagnostic imaging services involving radiologists, by State/Territory of patient and residence of specialist, 1999-2000

	NSW	Vic	Qld	SA	WA	Tas	NT	ACT	Australia
Number of services (000)	3,838,	2,584,	1,854,	712,	975,	218,	53,	122,	10,359,
Percentage of services	37.1	24.9	17.9	6.9	9.4	2.1	0.5	1.2	100.0
Percentage of specialists	35.4	23.2	16.8	9.0	11.1	2.1	0.4	2.0	100.0
Percentage of population	33.9	24.8	18.4	8.0	9.7	2.6	1.0	1.7	100.0

Source: DHAC

Additional data from Medicare indicated, that between 1989-90 and 1999-00, the number of specialist radiologists billing Medicare increased by 42.1%, the number of services provided increased by 55% and the average number of services provided by each radiologist increased by 9.0% (Table 24). During the same ten-year period, the average scheduled fee increased by 131.5%, the fees charged by radiologists increased by 116.4% and the Medicare benefits received increased by 131.2% (Table 25).

Table 25: Medicare billed services provided by specialist radiologists, 1989-90, 1994-95 and 1999-2000

	1989-90	1994-95	1999-00	% change	Annual increase %
Number of providers	852	1,065	1,211	42.1	4.2
Number of services	6,811,222	8,875,515	10,554,122	55.0	5.5
Average services per provider	7,994	8,334	8,715	9.0	1.0
Fee $	475,897,085	741,764,002	1,029,934,018	116.4	11.6
Scheduled fee $	461,269,705	761,818,419	1,067,797,918	131.5	13.2
Benefit $	393,582,694	653,598,549	909,892,494	131.2	13.1

Source: DHAC

Services to rural areas

Two sets of data provide information about the provision of radiology services to people living in rural locations, namely, data from the RANZCR 2000 workforce survey and data from Medicare.

The RANZCR survey found that 39.5% (270/684) of specialist radiologists were involved in the provision of services to rural areas either as a resident rural specialist or on a visiting basis or via some other approach (Table 26). Table 26 also indicates variation by State/Territory in the percentage of radiologists providing services to rural areas. For example, 73.1% of radiologists resident in South Australia reported providing services to rural areas, while in New South Wales and Victoria 35.2% and 31.8%, respectively, reported providing services to rural areas. Comparative figures for the remaining States are Queensland (42%), Western Australia (44%) and Tasmania (36.8%).

Table 26: Number of specialist radiologists providing services to rural patients (RANZCR), by State/Territory, 2000

Rural outreach work	NSW	Vic	Qld	SA/NT	WA	Tas	ACT	Aust.
Number of survey respondents providing rural services	74	57	55	38	33	7	6	270
Total number of survey respondents	210	179	131	52	75	19	12	684*
Percentage of radiologists providing rural services	35.2	31.8	42.0	73.1	44.0	36.8	50.0	39.5

*location data missing for 6 survey respondents;
Source: RANZCR 2000 workforce survey

The RANZCR survey also indicated that of the 39.5% specialist radiologists involved in the provision of services to rural areas, 24.8% (67/270) provided resident rural services, 58.1% (157/270) provided visiting services, 58.9% (159/270) provided e-

health/teleradiology and 43% (116/270) were involved in the interpretation of delivered studies from rural sites (Table 27).

Table 27: Type of services provided by radiologists involved in the provision of services to rural patients (RANZCR), by State/Territory, 2000

Rural outreach work	NSW	Vic	Qld	SA/NT	WA	Tas	ACT	Aust.
Number of survey respondents providing rural services	74	57	55	38	33	7	6	270
Number providing a resident rural service	27	16	13	2	5	4	-	67
Percent	36.5	28.1	23.6	5.3	15.2	57.1	-	24.8
Number providing visiting services to rural areas	48	35	33	21	16	-	4	157
Percent	64.9	61.4	60.0	55.3	48.5	-	66.7	58.1
Number providing e-health/teleradiology	38	30	30	37	15	5	4	159
Percent	51.4	52.6	54.5	97.4	45.5	71.4	66.7	58.9
Number providing delivery of studies from rural sites	22	19	22	21	25	5	2	116
Percent	29.7	33.3	40.0	55.3	75.8	71.4	33.3	43.0

Source: RANZCR 2000 workforce survey

Table 28 examines differences in the provision of Medicare services based on the geographic location of the patient as indicated by residential postcode. The Table shows that nationally in 1999-00, 1,211 specialist radiologists provided services to 5,232,980 patients. This Table also shows that, per 1,000 persons, the rural population received fewer services than did the metropolitan population (viz., 569.9 services per 1,000 in metropolitan areas and 487 services per 1,000 in rural areas).

Table 28: Specialist radiology Medicare service provision, by residential postcode of patient, 1999-00

Item	Metropolitan	Rural	Australia
Number of patients	3,878,812	1,384,631	5,232,980
Patients per 1,000 population	286.2	256.0	275.9
Services per 1,000 population	569.9	487.0	546.2
Benefits paid per 1,000 population	$48,981	$42,325	$47,082.8

Source: DHAC

Training Arrangements

Goals and Objectives of Training

The principal objectives of the diagnostic radiology training program are to ensure that registrars in training develop the communication and analytical problem solving skills necessary to function as effective diagnostic radiologists. During the training program the registrars are expected to develop the finely tuned cognitive and observation skills required to enable accurate performance and interpretation of plain radiographs, CT, ultrasound and MRI studies. With additional training some radiologists participate in nuclear medicine examinations.

Additionally, the program is designed to provide trainees with an understanding of the risks associated with radiation, radionuclides, contrast media and interventional procedures.

The training program is organised to ensure that candidates are able to successfully complete both the Part I and Part II examinations within the five year training period.

The program also aspires to ensure that the qualified radiologist will continue to keep up to date with new developments in imaging and make learning and teaching part of his / her entire professional career.

Practical Training
The minimum required period of training is five years. During this time, the trainee must obtain experience in all imaging modalities available in Australia and New Zealand. Before a trainee can be awarded the FRANZCR, his or her supervisor of training must certify that experience and training has been obtained in general radiology, computed tomography, ultrasound, nuclear medicine, MRI, angiography and basic interventional techniques.

All training prior to sitting and passing the Part II FRANZCR exam and completing four years in an accredited position must be undertaken in Australia or New Zealand. After passing the Part II FRANZCR and completing four years (in Australia or New Zealand) in an accredited training position, the trainee may gain experience in an overseas academic department. Before doing so, the trainee must apply to have the overseas training recognised by the Warden. A maximum of one year's training may be undertaken overseas.

Unlike many overseas training centres, particularly in North America, most accredited training positions in Australia and New Zealand do not have a rigid sectional structure based on a particular imaging modality or system. Instead, a more integrated approach to each clinical problem is usually encouraged and flexibility of trainee rotation is allowed. Therefore, depending on the individual department, a trainee may rotate on a daily, weekly or monthly basis through the various sections of the particular department.

The registrar will receive regular training in all aspects of ultrasound during each of the five years of training. Continuous exposure to ultrasound during the training years is expected to enable the registrar (at the successful completion of training) to perform obstetric, neonatal, musculoskeletal, general abdominal and vascular ultrasound studies. The training will also enable Fellows of the RANZCR to supervise ultrasound examinations undertaken by sonographers. In addition, during the five years of training, the registrar is expected to receive at least six months of advanced training, including hands-on scanning in ultrasound – colour Doppler, power Doppler and transvaginal ultrasound and to become proficient in the use of contrast media in ultrasound.

A minimum of three months full-time MRI training, including image interpretation and appropriate protocol selection and modification is required, although registrars should receive ongoing training in this modality throughout their five years.

A period of eight weeks experience in the practical and imaging aspects of nuclear medicine is required. For paediatric radiology, three months is the minimum period of practical experience required with six months the preferred maximum during the earlier years of training. The greater part of these periods of exposure to ultrasound, nuclear medicine and paediatric radiology should be undertaken before presenting for the Part II FRANZCR examinations.

Candidates are required to perform 100 vascular studies during their five years of training and a personal logbook is to be kept for verification.

It is expected that the majority of candidates will pass the Part II FRANZCR by the end of their fourth year. During the fifth year, the aim is to assist the trainee in determining his/her future career path by gaining experience in a particular modality (in an Advanced Training Position) such as nuclear medicine, MRI, mammography, ultrasound, interventional radiology or a particular sub-specialty such a paediatric radiology. Development towards consultant status is encouraged by reducing direct supervision of the trainee while maintaining access to qualified staff for assistance when required. Currently, in order to be recognised as a specialist in nuclear medicine, a holder of the FRANZCR must complete two years of full time training in nuclear medicine in Joint Specialist Advisory Committee (JSAC) for nuclear medicine approved centres.

Provided a trainee has completed four years of training in accredited departments in Australia or New Zealand and has passed the Part II FRANZCR, the final year of training may be spent in an academic department, interstate, overseas or in a training position in an accredited private practice. If successful in obtaining such a position, trainees must apply to the Warden of the Fellowship to have the training accredited as part of their required five years of practical training.

Length of training
The minimum required period of training is five years. In total, 90% of Radiodiagnosis trainees complete their training in the minimum period. Opportunity is available within the RANZCR program for part-time training.

Type of experience required
The College requires that trainees undertake training in accredited training positions. Most training positions are in large public teaching hospitals, although not all. In some states, there are accredited positions in smaller, rural centres but these must be accredited for training and must maintain a link with a fully accredited metropolitan department.

Overseas trained specialists
According to the RANZCR, all overseas trained radiologists are assessed through the Australian Medical Council (AMC)/College pathway and the majority are required to complete the RANZCR Part II Examination before they are able to be recognised as specialists. A smaller number are required to undertake up to two years of further training before sitting for the Part II Examination. The RANZCR does not assist these doctors to find training positions and they are not included in the training program, hence, they are not included in the trainee numbers. Data from the AMC indicated that between January 1993 and May 2001, 48 overseas trained radiologists were

accepted by the RANZCR as eligible for Fellowship of the College. This represents an average of 7-8 per year. The RANZCR estimated that, on average, one Australian radiologist migrates overseas per year, which means a net annual gain of 6 to 7 specialist radiologists from migration.

Table 29 indicates that in 2001, there were 195 radiodiagnosis trainees. In total, 27.7% were in New South Wales, 31.3% in Victoria, 12.8% in both Queensland and South Australia/Northern Territory, 10.8% in Western Australia, 2.6% in Tasmania and 2.1% in the Australian Capital Territory.

As at March 2001, an additional, 9 radiodiagnosis trainees were overseas.

Table 29: Radiodiagnosis trainees (RANZCR), by State/Territory, March, 2001

State/Territory	Total number of trainees	% of trainees
NSW	54	27.7
Victoria	61	31.3
Queensland	25	12.8
South Aust./North. Terr.	25	12.8
Western Australia	21	10.8
Tasmania	5	2.6
ACT	4	2.0
Australia	195	100.0

Source: RANZCR

Table 30 shows that throughout Australia there were 200 accredited radiodiagnosis training positions in 2001, including, 4 advanced training positions (ATP). These positions are fellowship positions in which registrars undertake dedicated training in a specific area of medical imaging (eg MRI, paediatric radiology) during their fifth year of training. This Table also shows that five funded and RANZCR accredited training positions were unfiled, two in New South Wales (Liverpool Hospital and Prince of Wales Hospital), two in Queensland (both at the Royal Brisbane Hospital) and one in the Australian Capital Territory. In total, 58.5% of training positions were in New South Wales (28%) and Victoria (30.5%), 13.5% of positions were in Queensland and a further 13.5% were in South Australia/Northern Territory. Western Australia had 10.5% of positions, while Tasmania had 2.5% and the Australian Capital Territory 2.6%.

Table 30: Accredited, funded radiodiagnosis training positions (RANZCR), by hospital and by State/Territory, March, 2001

Area/hospital	Accredited training positions	Number of trainees
New South Wales	***56***	***54***
Concord Hospital	5	5
John Hunter Hospital	6	6
Liverpool Hospital	4	3
Nepean Hospital	4	4
Prince of Wales Hospital	7	6
Royal North Shore Hospital	7	7
Royal Price Alfred Hospital	8	8
St George Hospital	3	3
St Vincent's Hospital	3	3
Westmead Hospital	7.5 (includes 1 ATP*)	8
New Children's Hospital	1.5	1
Victoria	***61***	***61***
The Austin & Repatriation Hospital, The Alfred and rotations to Royal Children's Hospital and Border Imaging	22 (includes 1 ATP*)	22
St Vincent's Hospital	9 (includes 1 ATP*)	9
The Royal Melbourne Hospital	13	13
Monash Medical Centre	8	8
The Northern Hospital	4	4
The Western Hospital	3	3
Peter MacCallum Cancer Institute	2	2
Queensland	***27***	***25***
The Royal Brisbane Hospital (includes rotations to Gold Coast Hospital, Royal Women's Hospital and Royal Children's Hospital)	13	11
Princess Alexandra Hospital	11	11
The Mater Adult & Childrens' Hospital	3	3
South Australia/Northern Territory	***24***	***25***
The Royal Adelaide Hospital, Flinders Medical Centre, the Queen Elizabeth Hospital, Womens and Childrens Hospital and Royal Darwin Hospital	25 (includes 1 ATP*)	25
Western Australia	***21***	***21***
The Royal Perth Hospital & Sir Charles Gairdner plus rotations to Fremantle, Bunbury, Princess Margaret Hospitals, Hollywood Private	21	21
Tasmania	***5***	***5***
The Royal Hobart Hospital	5	5
Australian Capital Territory	***5***	***4***
The Canberra Hospital plus rotations	5	4
Total	**200 (includes 4 ATPs*)**	**195**

*advanced training position; this is a Fellowship position in which registrars undertake dedicated training in a specific area of medical imaging (eg MRI, paediatric radiology) during their fifth year
Source: RANZCR

Table 31 indicates that between 1994 and 2000, there was an average annual increase of 1.5% in the number of trainees commencing the RANZCR training program. On average, 36 trainees commenced the training program per year between 1994 and 2001.

Table 31: Number of radiodiagnosis trainees commencing the RANZCR training program between 1994 and December 2000

	1994	1995	1996	1997	1998	1999	2000	2001
Number of commencing trainees	29	46	41	35	36	36	32	32
% average annual change								1.5

Source: RANZCR

Table 32 shows that the distribution of radiodiagnosis trainees in 2001 was not consistent with the distribution of the population. Using population distribution as the benchmark, States with more trainees than that indicated by population share were Victoria with 31.3% of trainees and 24.6% of the population and South Australia/Northern Territory, with 12.8% of trainees and 8.9% of population. On the other hand, New South Wales and Queensland had less than their share of trainees, respectively, 27.7% of trainees (33.7% of the population) and 12.8% of trainees (18.8% of the population).

The RANZCR 1998 survey report noted that 90-95% of radiologists trained in Australia practice initially in their state of qualification, and 80-90% remain in those states especially those practising in New South Wales, Victoria, Western Australia and Queensland.

Table 32: Radiodiagnosis trainees, by State/Territory (RANZCR), 1996 and March 2001

	NSW	Vic	Qld	SA/NT	WA	Tas	ACT	Aust.
1996	49	57	24	27	14	4	*	175
1998	57	58	25	26	16	4	*	186
2001	54	61	25	25	21	5	4	195
% 2001 trainees	27.7	31.3	12.8	12.8	10.8	2.6	2.0	100.0
% population 2001	33.7	24.6	18.8	8.9	9.9	2.4	1.7	100.0

*trainee numbers included in New South Wales figures for these years
Source: RANZCR, ABS

Table 33 outlines the age, gender and training status of trainees by State/Territory as at December 2000. In total, 28.1% of first year trainees were female and 33.9% of final year trainees were female. In total, 36.2% of trainees were in their first or second year of training and 26.1% were in their final year of training with 13 trainees in their sixth or seventh year. An additional 7 final year radiodiagnosis trainees are overseas. The RANZCR data indicated that 15 trainees were beyond the 5th year of training (ie in 6th year or beyond). Various factors have led to this situation. For example, two trainees have required extra time due to either extended sick leave or maternity leave, 4 have been unsuccessful in obtaining RANZCR Fellowship requirements within the specified time, while 9 have met RANZCR Fellowship requirements and have decided to undertake further advanced training. If the number taking extended study time increases in the future the projections of this review will need to be revisited.

Table 33: Radiodiagnosis trainees (RANZCR), by State/Territory, year of training and gender, December, 2000

Year of training	NSW	Vic	Qld	SA/NT	WA	Tas	ACT	Total	% Female
First year	8	11	3	5	4	-	1	32	28.1
Second year	12	13	4	2	3	2	-	36	41.7
Third year	11	9	5	5	3	1	2	36	25.0
Fourth year	10	12	6	5	2	-	-	35	14.3
Fifth year	5	12	5	3	4	2	2	36	29.3
Sixth year	2	3	1	2	2	-	-	10	41.7
Seventh year	-	-	-	3	-	-	-	3	66.7
Total	**51**	**60**	**24**	**25**	**18**	**5**	**5**	**188**	**29.2**

Source: RANZCR

The RANZCR survey of radiodiagnosis trainees found that the average age of trainees was 32 years (standard deviation of 3.3 years). Table 34 indicates that in 2000, 86.7% of radiodiagnosis trainees were less than 35 years of age, a further 13.3% were aged between 35-39 years, while the remaining 3.7% were aged between 40-45 years. Table 34 also shows that, in 2000, 29.2% of trainees were women and that the representation of women varied by State/Territory. For example, the representation of women trainees was below the national average in New South Wales, Queensland and Western Australia and above the national average in South Australia (48%). During the next ten years, the proportion of medical graduates who are women is expected to continue to increase. As a result the representation of women among radiodiagnosis trainees is expected to increase with a corresponding increased participation in the workforce in the longer term. The AIHW 1998 survey found that, on average, radiodiagnosis trainees worked 55.3 hours per week. On average, female trainees worked 47.3 hours and male trainees 57.4 hours per week.

Table 34: Radiodiagnosis trainees (RANZCR), by State/Territory, age and gender, December 2000

Characteristic	NSW	Vic	Qld	SA/NT	WA	Tas	ACT	Aust.
Total number	51	60	24	25	18	5	5	188
Age:								
- <35 years	39	51	19	23	17	5	3	163
- 35-39 years	9	6	4	2	1	-	2	25
- 40-44 years	3	3	1	-	-	-	-	7
% Male	80.4	68.3	79.2	52.0	77.8	60.0	80.0	73.4
% Female	19.6	31.7	20.8	48.0	22.2	40.0	20.0	29.2

Source: RANZCR

The average age of acquisition of Fellowship of the RANZCR is 34 years. There is some expectation that this age may tend to rise, with the advent of graduate entry medical courses. For example, the RANZCR survey of radiodiagnosis trainees found that the age of first year trainees in 2000 was, on average, 12 months older than previous cohorts of first year trainees (the RANZCR database indicates that the average age of first year trainees is 30.6 years). The survey also found that 77.8% of trainees planned to work full-time 5 years after completion of training and 20.4% planned to work part-time (on average, approximately three days per week).

Table 35 indicates that nationally, there was an average annual increase of 1.9% in the number of radiodiagnosis trainees between 1996 and 2000, with above average

levels of growth in Western Australia and New South Wales. On the other hand, there was no growth in Queensland and a decrease of two in South Australia.

Table 35: Radiodiagnosis trainees (RANZCR), by State/Territory, 1996, 1998, 2000

Year/State	NSW/ACT	Vic	Qld	SA/NT	WA	Tas	Australia
1996	49	57	24	27	14	4	175
1998	57	58	25	26	16	4	186
2000	56	60	24	25	18	5	188
% change	3.6	1.3	0.0	-1.9	7.1	6.3	1.9

Source: RANZCR

Table 36 shows that between 1998 and 2000, the number of trainees graduating from the RANZCR training program per year increased from 36 to 47, with a total of 111 graduates (ie on average, 37 graduates per year). In 2000, 23.4% of graduates were from New South Wales, 38.3% from Victoria, 14.9% from Queensland, 10.6% from South Australia/Northern Territory, 8.5% from Western Australia and 4.3% from the Australian Capital Territory. In total, 23.4% of graduates in 2000 were women.

Table 36 also indicates that over the next five years it is expected that the number of graduates from the training program will be 180 (on average 36 per year). This represents a per annum, average decrease of one on the number who graduated in the preceding three years.

Table 36: Radiodiagnosis trainee program completions (RANZCR), by State/Territory, 1998 to 2005

Year	NSW	Vic	Qld	SA/NT	WA	Tas	ACT	Aust.
1998	10	13	2	6	4	-	1	36
1999	11	5	5	2	2	1	2	28
2000	11	18	7	5	4	-	2	47
2001[a]	5	12	5	3	4	2	2	41
2002[a]	10	12	6	5	2	-	-	35
2003[a]	11	9	5	5	3	1	2	36
2004[a]	12	13	4	2	3	2	1	36
2005[a]	8	11	3	5	4	-	1	32

a - estimates
Source: RANZCR

The RANZCR 2000 survey of radiodiagnosis trainees found that, in the short term (viz., 1-2 years following completion of training), a large percentage of trainees planned to undertake additional advanced training, either in Australia, or overseas (Table 37).

Table 37: Short-term (1-2 years following completion of training) work plans of radiodiagnosis trainees (RANZCR), 2000

Type of work	Number of trainees (n=108)	Percentage of respondents*
Additional advanced training, research or higher degree; in Australia	46	42.6
Additional advanced training, research or higher degree; overseas	50	46.3
Clinical practice of radiology in the private sector	32	29.6
Clinical practice of radiology in the public sector	35	32.4
Other or not sure	8	7.4

*total adds to more than 100% because respondents were permitted to indicate more than one option
Source: RANZCR 2000 survey of radiodiagnosis trainees

Table 38 shows that in the longer term (viz., at least 5 years following completion of training), the majority of radiodiagnosis trainees plan to work in Australia, with 70.4% of trainees planning to work some of the time in the public sector, 72.2% planning to work some of the time in the private sector and 14.8% planning to work some of the time in an academic setting.

Table 38: Long-term work plans (viz., at least 5 years following completion of training) of radiodiagnosis trainees (RANZCR), 2000

Type of work	Number of trainees (n=108)	Percentage of respondents*
Clinical practice of radiology in the private sector, in Australia	76	70.4
Clinical practice of radiology in the public sector, in Australia	78	72.2
Teaching and research in an academic setting in Australia	16	14.8
Other or not sure	13	12.0

*total adds to more than 100% because respondents were permitted to indicate more than one option
Source: RANZCR 2000 survey of radiodiagnosis trainees

As indicated above, survey respondents were able to give more than one response to the questions related to Tables 37 and 38, and were able to nominate a percentage time commitment for each option. Using a weighting factor, based on this nominated percent time commitment, it was possible to obtain an indication of preferred work setting. With respect to short-term plans, training overseas and in Australia were the preferred options, followed by work in the public sector. In relation to longer term plans, public and private sector work settings were equally popular. This may indicate a trend toward a preference for the public sector work setting, given the current work setting arrangements for qualified radiologists.

Table 39 indicates that the largest group of trainees (56.5%) plan to work in general radiology with an area of interest, 21.3% plan working as a subspecialised radiologist and 11.1% as a generalist radiologist, while 11.1% were undecided. ‘Subspecialising’ was defined as a greater than 50% time commitment in a given modality or area of clinical interest.

Table 39: Type of clinical practice that radiodiagnosis trainees expect to be doing five years after completion of their training (RANZCR), 2000

Type of work	Number of trainees	Percentage of trainees
General radiologist with area of interest	61	56.5
Sub-specialised radiologist	23	21.3
Generalist radiologist	12	11.1
Do not know	12	11.1
Total	**108**	**100.0**

Source: RANZCR 2000 survey of radiodiagnosis trainees

The RANZCR 2000 survey found that 79.6% of radiodiagnosis trainees anticipated that their radiology practice would be primarily in a capital city, 4.6% anticipated being in an 'other' metropolitan area and only 5.6% anticipated being in a large rural centre, while 10.2% were undecided (Table 40). However, a total of 46.3% of trainees anticipate being involved in the provision of services to rural areas (eg e-health/teleradiology and visiting (non-resident) rural services).

Table 40: Geographic setting in which radiodiagnosis trainees anticipate primarily practising radiology five years after completion of training (RANZCR), 2000

Type of work	Number of trainees	Percentage of trainees
Capital city	86	79.6
'Other' metropolitan area	5	4.6
Large rural centre	6	5.6
Do not know	11	10.2
Total	**108**	**100.0**

Source: RANZCR 2000 survey of radiodiagnosis trainees

Main Characteristics of the Specialist Radiology Workforce

Radiology is a relatively large specialist workforce, representing 5.9% of all medical specialists in Australia. The Working Party estimates that currently there are 1,148 specialist radiologists in active practice in Australia. This represents 5.9 radiologists per 100,000 population and an estimated SPR of 1:16,800. During the past decade the workforce has grown steadily from 975 specialist radiologists in 1992 to 1,148 in 2000 (a compound annual growth of 2.1%).

The distribution of the workforce by State/Territory is reasonably consistent with the distribution of the Australian population. Data from the RANZCR 2000 workforce survey indicated that 39.5% of radiologists were involved in the provision of services to rural areas either as a resident rural specialist or on a visiting basis or via some other approach (eg e-health/teleradiology).

A comparatively large proportion (30.1%) of radiologists gained their basic medical overseas. This compares with 19.7% of all specialists. The average age of specialist radiologists is 49 years, with 37.2% of the workforce aged between 35 and 44 years and a further 28.3% aged between 45 and 54 years. In total, 30% of the workforce are 55 years of age or more. Women account for 16% of the specialist radiologist workforce and their representation is expected to increase given that 29.2% of trainee radiologists are female and the majority of radiologists nearing the age of retirement (ie 65 years and over) are predominantly male.

The average number of hours worked per week by specialist radiologists is 45. On average, female specialist radiologists work 38.4 hours per week and male radiologists work 46.6.

The RANZCR training program requires a minimum of five years training and approximately 90% of trainees complete their training within this time. In March 2001, there were 195 radiodiagnosis trainees and 200 RANZCR accredited and funded training positions. The largest group of trainees (31.3%) was located in Victoria and a further 27.7% were located in New South Wales. Using population distribution as the benchmark, States with fewer trainees than indicated by population share were New South Wales and Queensland.

ADEQUACY OF THE CURRENT SPECIALIST RADIOLOGY WORKFORCE

There are a number of indicators of the adequacy of a medical workforce. No single measure can provide a definitive assessment, however, by examining each of the following it is possible to gain an indication of whether the workforce is adequately meeting current demand or if there is a significant shortfall or oversupply. The indicators considered by the Working Party were:

- specialist:population ratio;
- specialist radiologist satisfaction with workload;
- State/Territory members of the RANZCR Workforce Committee assessment;
- State/Territory health department assessment;
- public hospital vacancies
- GP assessment; and
- BreastScreen Australia assessment.

Specialist Radiologist:Population Ratio

As previously indicated, the RANZCR considers that ideally, at least three radiologists should be available within a population catchment area. Population catchments of 100,000 or more are associated with practices with these characteristics. The RANZCR recognises that solo radiologists may provide services in rural centres with population catchments of less than 100,000. However, for a sustainable service it is considered that it is best if these radiologists are part of a larger regional or urban based service from which they are rotated to the smaller centre and from which they receive support. Furthermore, the RANZCR advised that the nature of radiology practice is such that a resident specialist service is not essential for the provision of a quality service.

Table 41 indicates that in 2000, nationally, there was one radiologist to 1:16,809 persons (5.9 radiologists per 100,000 persons), with variation by State/Territory. States/Territories with below average representations of specialist radiologists in 2000 were Tasmania and Queensland. The Working Party was advised that the supply of radiologists in the Northern Territory is based primarily on a rotating roster from South Australia (although there is a resident component to the service provision in Darwin). These radiologists provide services to Darwin, Alice Springs and environs. It is estimated that the supply of radiologists to the Northern Territory amounts to approximately 4 FTEs. The RANZCR 2000 workforce survey indicated that there were approximately 27 radiologists involved in the provision of services in the Northern Territory, the majority of whom were from South Australia.

Table 41: Distribution of specialist radiologists (SPRs) (RANZCR), by State/Territory, 2000

State/Terr.	NSW	Vic	Qld	SA/NT	WA	Tas	ACT	Aust.
SPR	16,824	16,374	17,792	16,408	16,653	18,096	13,878	16,809
Per 100,000 persons	5.9	6.1	5.6	6.1	6.0	5.5	7.2	5.9

Sources: RANZCR, ABS

The radiologist-to-population ratio in Australia in 2000 was similar to the situation in Canada. For example, the radiologist-to-population ratio in Canada in 1999 was 1:16,763 (ie 6 radiologists per 100,000 persons). This level of supply was considered as less than optimal by the Canadian Association of Radiologists (Sibbald 1999),

which recommended a radiologist-to-population ratio of 1:13,000 (ie 7.7 radiologists per 100,000).

The Working Party concluded that international comparisons suffer because of variations in definitions of specialists and in style and scope of practice and health systems. The Working Party believes that the value of the specialist radiologist SPRs lies in their use as tools of comparison between States/Territories and for comparisons over time. Table 4 calculated SPRs using RANZCP, Medicare and AIHW data to examine differences between States and Territories. Medicare and ABS data are used in this section to provide some comparisons over time.

Table 42 indicates that over the last decade the number of specialist radiologists per head of population claiming under Medicare increased from 1:20,176 (5 per 100,000 population) in 1984-85 to 1:16,017 (6.2 per 100,000) in 1999-00. It should be noted that these ratios are not based on FTEs in that they include all specialist radiologists who provided at least one Medicare service during the relevant year.

Table 42: Specialist radiologist:population ratio (Medicare), by selected years, 1989-90, 1994-95 and 1999-00

Year	Specialist radiologists	Population	Population per specialist radiologist	Specialist radiologists per 100,000
1989-90	851	17,169,600	1:20,176	5.0
1994-95	1,065	18,023,100	1:16,923	5.9
1999-00	1,184	18,963,615	1:16,017	6.2

Note: Population figures are based on ABS estimates
Sources: DHAC, ABS

Table 43 uses Medicare data and ABS population estimates for the relevant years and shows that between 1989-90 and 1999-00 the number of specialist radiologists providing Medicare services per capita increased from 1:20,176 to 1:15,659, with wide variation between States and Territories. Increases in the number of specialists per head of population are evident in all States and Territories with marked increases in Western Australia and Victoria. However, despite these increases the SPRs for three States/Territories (viz., Queensland, Tasmania and the Northern Territory) remained below the national SPR of 1:15,659, respectively, 1:17,302, 1:18,087 and 1:38,576. States/Territories particularly well supplied with Medicare billing radiologists were New South Wales (1:14,946), South Australia (1:13,698) (although South Australian based radiologists supply services to the Northern Tertitory) and the Australian Capital Territory (1:12,924).

Table 43: Radiology specialist:population ratio (Medicare), by State/Territory, 1989-90 and 1999-00

Year	NSW	Vic	Qld	SA	WA	Tas	NT	ACT	Aust
				1989-90					
Radiologists	323	181	126	88	93	19	3	18	851
Population	5,862,500	4,400,700	2,928,700	1,438,900	1,624,400	464,400	165,000	285,000	17,169,600
SPR 1:	1;18,150	1:24,313	1:23,244	1:16,351	1:17,467	1:24,442	1:55,000	1:15,833	1:20,176
No./100,000	5.5	4.1	4.3	6.1	5.7	4.1	1.8	6.3	5.0
				1999-00					
Radiologists	429	281	203	109	134	26	5	24	1,211
Population	6,411,680	4,712,173	3,512,356	1,493,074	1,861,016	470,261	192,882	310,173	18,963,615
SPR 1:	1:14,946	1:16.769	1:17,302	1:13,698	1:13,888	1:18,087	1:38,576	1:12,924	1:15,659
No./100,000	6.7	6.0	5.8	7.3	7.2	5.5	2.4	7.7	6.4

Sources: DHAC, ABS

Volume of Radiology Work – International Benchmarks

In 1999, the Board of the Faculty of Clinical Radiology of the Royal College of Radiologists (RCR), United Kingdom, reviewed different approaches to determining the relationship between workforce supply and radiologist workload. The aim of the review was to provide a guide to workforce planners. They concluded that the total annual workload for each radiologist will vary widely depending on the number of clinical notional half-days (NHDs) worked and the type of work undertaken (eg mainly routine reporting vis-à-vis mainly interventional radiology). Interestingly, they noted that 'with a mixed general job including reporting sessions, ultrasound, and some CT or fluoroscopy based on seven clinical sessions, would deliver a workload similar to the RCR's 1993 recommendation of 12,500 examinations per radiologist per year' (p 11). This RCR report also noted that in the United States, the annual average workload per FTE diagnostic radiologist was 11,600 imaging procedures. The United States also use a Relative Value Unit (RVU) system than can be used to measure radiologist workload, and which allows for procedural complexity.

Based on these international workload benchmarks and estimates of the number of imaging procedures performed per radiologist per year in Australia, it would appear that, nationally, workforce supply is adequate (it should be noted, however, that procedural volume comparisons are relatively crude, in that similar work complexity and modality mix settings must be assumed). For example, data from DHAC indicated that in 1999-00 (Table 24), 1,211 specialist radiologists provided 10,359,000 Medicare billed imaging services (on average, 8,715 services per radiologist). The Working Party estimated that, on average, between 30-40% of imaging services provided by radiologists are for non-Medicare billed services, such as BreastScreen Australia services, third party insurers, Department of Veteran Affairs services, and public sector services. It follows that, on average, the 1,148 specialist radiologists in Australia in 2000 provided between 13,000 to 14,000 ([10,359,000/0.65]/1,148) imaging services per radiologist per year.

As with international comparisons of SPRs, the Working Party concluded that international comparisons based on volume of radiology imaging work suffer because of variations in definitions of specialists and in style and scope/complexity/modality mix of practice and health systems. In the following sections the views of key stakeholders are presented, including, members of the RANZCR Workforce Committee, general practitioners, State/Territory health authorities, BreastScreen Australia and members of the specialist radiology workforce.

RANZCR Consultation with State/Territory Members of the RANZCR Workforce Committee

As indicated in the introduction, the RANZCR consulted with State/Territory members of the RANZCR Workforce Committee to gain their views on the adequacy of the current supply of radiologists and factors influencing the supply of, and the demand for, specialist radiologists (Appendix B).

There was considerable variation in the responses received from members of the RANZCR Workforce Committee from each State/Territory. The response from New South Wales noted that in this State the workforce situation in the private sector appeared to be satisfactory. However, in the public sector, there was variability among organisations in their ability to attract and retain radiologists, with metropolitan centres generally not experiencing any problems, while, fringe urban areas were reported as having problems.

Victoria reported that there was an undersupply of radiologists in the private and public sector, with 4 public sector positions unfilled and a high demand for radiologists in the private sector. Furthermore, they noted that only a few positions were being made available in the public sector and that there was a requirement for more experienced radiologists (eg with experience in interventional radiology, MRI, and nuclear medicine). This makes it difficult for recent graduates to obtain a hospital appointment. The Victorian response also indicated that supply to rural regions was poor because recent graduates preferred to stay in the cities. As a consequence it is difficult for the country group to attract radiologists.

The primary limiting supply factor in Queensland was reported as a lack of registrar training positions and a decline in public hospital funding for registrar training positions. The situation was reported as being exacerbated by a shortage of College accredited staff specialists in public hospitals, which has resulted in difficulties in gaining accreditation for new registrar positions or for positions that may exist outside the traditional centres. The Queensland respondent noted that ‘There seems to be a general lack of effective interaction and cooperation between the public and private sector in generating the required number of registrar training positions.

Western Australian indicated that there were some problems in recruiting ‘mammologists’ to screening facilities and that there were perennial problems in attracting and retaining radiologists to rural and remote areas.

Tasmania reported difficulty in recruiting resident radiologists, both public sector and private sector.

General Practitioner Assessment of the Need for Specialist Radiologists

The AMWAC 2000 survey of Divisions of General Practice found that 66.7% of responding Divisions considered access to radiologists was about right, while 31.8% considered the supply of radiologists to be inadequate. An association between the geographic location of Divisions was observed with more rural Divisions indicating that there was a short supply of radiologists in their area. In total, 11 rural Divisions of General Practice indicated a requirement for 16 additional resident radiologists, with most of these positions required by rural Divisions in Victoria, Queensland and South Australia (Table 44). Rural Divisions also indicated requirements for an additional 22 visiting radiologists and 21 teleradiology services (Table 44).

Table 44: Rural based Divisions of General Practice assessment of requirements for additional specialist radiologists (AMWAC), 2000

Type of radiologist required	NSW	Vic	Qld	SA	WA	Tas	NT	Aust.
Resident	1	4	3	3	1	3	1	16
Visiting	5	4	7	3	1	-	-	22
Teleradiology	4	13	2	1	1	-	-	21

Source: AMWAC 2000 survey of Divisions of General Practice

Comments provided by Divisions of General Practice to inform the Working Party indicated:

- variation in the adequacy of the supply of specialist radiologists by State/Territory and geographic location;
- dissatisfaction with the non-availability of local radiology services in some areas, especially ultrasound, CT and MRI;
- limited after hours and weekend access to radiology services in some areas;
- a shortage of public sector radiology services in some locations; and
- variability in the supply of teleradiology services.

GPs also noted the importance of the inter-relationship of specialist radiologists to GP radiology and the importance of support for GP radiology services. For example, one Divisions noted ‘In small towns it is not financially feasible for radiologists to provide a 24 hour service. Acute hospitals, however small, need a 24 hour service. This service is provided by GPs for very inadequate remuneration’.

State/Territory Health Department Assessment of the Adequacy of the Supply of Specialist Radiologists

In brief, the findings from the AMWAC 2000 survey of State/Territory health authorities indicated variation by State/Territory in the perceived adequacy of the supply of specialist radiologists in the public sector (Appendix D). For example, the response from Western Australia indicated that supply was adequate, while most other States and the Northern Territory expressed problems recruiting and retaining specialist radiologists in the public sector. This situation was thought to be due to financial and lifestyle disincentives associated with work in the public sector and the personal income discrepancy associated with working in the public sector and working in the private sector.

In New South Wales retaining and recruiting radiologists in the public sector were major issues for both staff specialist positions and visiting medical specialist

positions. New South Wales also reported that they had vacancies for radiologists in some tertiary level facilities that do not have facilities for MRI. Furthermore, as at 12 June 2001, there were 16 approved area of need positions for specialist radiologists in this State, 7 unfilled positions, and 9 filled positions.

Victoria indicated that, while it did not currently collect data on patient waiting times for individual specialties in the public sector, the Department had received five requests from rural and regional centres to support temporary visas for overseas trained radiologists in the past two years.

Queensland Health and the Northern Territory indicated that there were shortages of radiologists in large rural centres. As a result, workloads for public sector radiologists in some of these areas were too high.

South Australia reported that two public teaching hospitals did not have a radiology department and that they contracted radiology services from private firms. Nuclear medicine and MRI were reported as being offered by two of the eight teaching hospitals with most nuclear medicine studies done on an outpatient basis and with some MRI services conducted as emergency cases. It was said that this situation was posing difficulties for the hospitals that have to transfer unstable patients, sometimes up to 40 kilometres. Apart from MRI, other radiology services were reported as generally adequate. South Australia, like most other States, noted that most public hospitals were having difficulty in attracting and retaining medical staff due to pay differences between public and private radiology. It also indicated that there was evidence of increasing stress on the remaining staff due to increased complexity of examination and workload. Waiting times for radiology services in South Australia varied by type of imaging, with no waiting time for X-ray examinations, patients waiting 1-2 weeks for ultra-sound, CT scan and MRI, 4 weeks for MRI scan and 1-8 weeks for angiography (Appendix D, Table D1).

In rural South Australia, as in metropolitan South Australia, there were no waiting times for X-ray examinations, however, in rural areas the reporting may take some time. Most rural hospitals refer patients to the larger regional hospitals or private firms for ultrasound. Waiting time for ultrasound ranges from 0-14 days, with an average of 15 patients waiting per region. This State also commented that the provision of services by private firms in rural areas was generally unable to guarantee ‘on-call’ services due to difficulty in getting staff to reside in the country. Recruitment difficulties were noted for radiographers, sonographers and radiologists.

In Tasmania inability to recruit qualified staff specialists had resulted in a significant reliance on radiology registrars in the two main public hospitals. Adequate staffing of public hospitals by full time specialists would assist these hospitals to improve functions such as:

- training and supervision of registrars;
- research;
- undergraduate and postgraduate teaching;
- equipment assessment and planning;
- administration;
- consultation with the clinical specialists ordering investigations; and
- quality improvement.

Most States with shortages had plans to enhance services to rural areas through the implementation of new electronic transmission and reporting systems (eg PACS) and the expansion of existing teleradiology networks and the types of examinations that are reported using teleradiology.

Public Hospital Vacancies

In August/September 2001 AMWAC surveyed State/Territory health authorities to gain information about the number of vacancies for medical specialists. A vacancy was defined as an unfilled funded position for which recruitment action had been undertaken and been unsuccessful or for which recruitment action was underway. This survey found that there were 37 FTE funded vacancies for specialist radiologists.

BreastScreen Australia Assessment of the Need for Specialist Radiologists

As indicated in the introduction to this report, to gain additional views on the adequacy of the supply of specialist radiologists, AMWAC surveyed all State/Territory program managers of BreastScreen Australia in consultation with the BreastScreen Australia Workforce and Training Group. Responses were received from programs in all States/Territories. These responses indicated that programs in four States (New South Wales, Victoria, Queensland and Western Australia) and the Australian Capital Territory consider that the availability of specialist radiologists is inadequate. On the other hand, two States (South Australia and Tasmania) considered that access was adequate to meet current demand for BreastScreen Australia services. In the main, the assessment provided by Breast Screen Australia programs were consistent with the assessments provided by State/Territory health authorities, with the exception of Western Australia. The Western Australian Department of Health reported that the supply of specialist radiologists in the public sector was adequate, while the BreastScreen program considered that the supply of radiologists was insufficient to meet current demand (Appendix E).

The Working Party concluded that the level of perceived shortage evident in the responses from BreastScreen Australia Program Managers was not an indicator of an overall national undersupply of specialist radiologists. It did, however, indicate that, nationally, there is no oversupply. Furthermore, the Working Party concluded that there is a definite shortage of radiologists in Queensland. In other States the reported shortages are more likely to reflect the fact that some radiologists do not find this work attractive. It was believed that the work may be perceived by some radiologists as being of low status. For many radiologists the provision of breast screening services tends to be an add-on job that they do after their regular work hours. It was also thought that it could be a gender issue for some radiologists.

Specialist Radiologists' Satisfaction with Workload

As previously indicated, the RANZCR 2000 survey indicated that specialist radiologists work, on average, 45 hours per week and the comparative figure from the AIHW 1998 survey was 48 hours. The AIHW data also indicated that 13.4% of radiologists work less than 35 hours per week and 12.1% work more than 65 hours per week. The RANZCR 2000 workforce survey indicated that, 55.8% of radiologists were satisfied with their hours of work and 21.9% were dissatisfied, while 22.3% were neither, satisfied or dissatisfied (Table 45).

The RANZCR 2000 survey also indicated that, 6.4% of specialist radiologists were very satisfied with the amount of work they did and a further 49.3% were satisfied, 20.5% were either dissatisfied or very dissatisfied, while 23.8% were neither satisfied nor dissatisfied (Table 45). In total, 78.5% of specialist radiologists indicated that their workload was sufficient to maintain income, 6.8% were dissatisfied with this aspect of their work and 14.7% were neither, satisfied or dissatisfied.

Measures of workforce adequacy included satisfaction with availability of medical imaging specialists, skilled nursing staff and allied health personnel. Table 45 indicates that 65.6% of radiologists were satisfied with the availability of medical imaging specialists, 62.3% with the availability of skilled nursing staff and 59.2% with the availability of allied health personnel.

Table 45: Radiologist professional satisfaction (RANZCR), 2000

Attribute	Very satisfied	Satisfied	Neither satisfied or dissatisfied	Dissatisfied	Very dissatisfied
The work itself					
Opportunity to use abilities	19.5	57.8	11.5	9.9	1.3
Sufficient work to maintain competence	19.3	60.8	11.8	7.5	0.6
Workload					
Hours of work	7.0	48.8	22.3	19.2	2.7
Amount of work	6.4	49.3	23.8	17.8	2.7
Sufficient work to maintain income	16.5	62.0	14.7	5.4	1.4
Sufficient work to maintain competence	19.3	60.8	11.8	7.5	0.6
Workforce adequacy					
Availability of medical imaging specialists	13.5	52.0	20.3	10.5	3.8
Availability of skilled nursing staff	8.9	53.4	26.6	9.3	1.8
Availability of allied health personnel	7.2	52.0	19.1	16.1	5.6
Overall satisfaction					
Overall satisfaction with specialist practice	11.1	66.5	12.6	8.1	1.7

Source: RANZCR 2000 workforce survey

Table 46 shows that 33.7% of radiologists consider that their 'overall imaging workload' (ie all components of the job) is too heavy, while 63.9% report it is about right and 2.4% consider it to be too light. On the other hand, 74% of radiologists consider that their current imaging procedural workload (ie diagnostic imaging studies) is about right, 21.1% consider it to be too heavy and 4.9% thought is was too light.

Table 46: Assessment of workload by radiologists (RANZCR), 2000

	Too heavy	About right	Too light
Current imaging procedural workload	21.1	74.0	4.9
Overall imaging workload	33.7	63.9	2.4

Source: RANZCR 2000 workforce survey

Conclusions on Adequacy of the Current Specialist Radiology Workforce

The Working Party concluded that, overall, the workforce was undersupplied. This conclusion was based on the number of specialist radiology public hospital vacancies, the relatively high number of approved area of need positions for specialist radiologists in the public sector, the number of overseas trained radiologists entering the workforce per year and the number of additional resident radiologists that Divisions of General Practice indicated they required. Clearly, there are problems in the supply of specialist radiologists in Queensland and New South Wales and to a lesser extent Tasmania.

The Working Party concluded that there is variation in the distribution of specialist radiologists between the private sector and public sector with some States experiencing problems in recruiting and retaining radiologists to work in the public sector. In some situations where there are problems in filling funded vacancies in the public sector, these were thought to be related to the inability of the public sector to offer competitive remuneration packages rather than to an overall shortage in the supply of radiologists. In other situations these problems were related to relatively poor working conditions in the public sector (eg a lack of MRI facilities, run-down equipment and heavy workloads).

Similarly, shortages of radiologists to provide services to BreastScreen Australia programs in most States/Territories were thought to reflect the inability of some BreastScreen programs to offer a competitive level of remuneration and the fact that some radiologists did not find this work attractive.

The Working Party concluded that while some rural areas had problems in accessing radiology services, nationally, the provision of services to rural areas was adequate. It was also noted that the nature of radiology practice is such that a resident specialist service is not essential for the provision of a quality service. However, this assumes the provision of radiology services by GPs and other providers in rural locations with acute hospitals where a sustainable specialist resident radiology service is not viable. Some Divisions of General Practice expressed a need for improved support and recognition for GPs who provide radiology services.

Factors taken into consideration in making this assessment were:

- the Canadian SPR benchmark;
- the UK and USA volume of work benchmark;
- problems in some States/Territories (particularly Queensland, Tasmania and New South Wales) in filling funded vacancies in the public sector;
- findings arising from consultation with members of the RANZCR Workforce Committee and responses received from State/Territory health authorities; and
- findings arising from survey of practising radiologists, Divisions of General Practice and BreastScreen Australia programs.

PROJECTIONS OF REQUIREMENTS

Population

Australia has a growing and ageing population. The 2000 population was estimated at 19.1 million, and the population is projected to increase to 20.0 million by 2005 and to 21.0 million by 2011. Between 2000 and 2011, the overall increase is estimated to be 9.9%, a compound annual increase of 0.9%.

Estimates of population growth vary substantially between State/Territories (ABS 1998). For example, between 1997 and 2011, the highest average annual rates of population growth are projected to occur in the Northern Territory (2.2%), Queensland (1.7%) and Western Australia (1.6%), while the population of Tasmania is projected to decline by 0.2%. Similarly, there are wide variations in the median age of the population among States/Territories and in life expectancy at birth. For example, the median age of the population in the Northern Territory is 28 years, while in South Australia it is 35.9 years. Life expectancy at birth in the Northern Territory is 69.2 years for males and 75 years for females, while comparative figures for the Australian Capital Territory are 76.6 years for males and 81.6 years for females.

Table 47 indicates variation in population growth rates by age group. For example, between 1997 and 2010, while the estimated growth of the total population is 0.9%, the number of children aged 0-9 years is expected to decrease by 0.2% and the population aged 60 to 69 years is expected to increase by 3.5%.

Table 47: Estimated average annual growth in population between 1997 and 2011 (ABS), by age group, 1998

Age	Male	Female	Total population
0 - 9 years	-0.2	-0.2	-0.2
10 - 19 years	0.3	0.3	0.3
20 - 29 years	0.2	0.1	0.1
30 - 39 years	0.1	0.01	0.05
40 - 49 years	0.7	0.9	0.8
50 - 59 years	2.8	3.2	3.0
60 - 69 years	3.6	3.4	3.5
70 - 79 years	1.5	0.7	1.1
80+ years	4.7	1.6	2.0
Total	0.9	0.9	0.9

Source: ABS 1998 (Catalogue No. 3222.0)

The ABS (1998) estimates that the median age of the Australian population will rise from 34 years in 1997 to 35.5 years in 2001 and to 38.3 years in 2011. As a proportion of the total population, those aged 65 years and over represented 12.1% (2.2 million) in 1997, and will increase to 12.4% (2.4 million) in 2001 and to 14% (3.0 million) in 2011.

Trends in Service Provision

Ageing of the Population

A significant factor contributing to increases in service utilisation across all medical specialities is the ageing of the population and this demographic trend implies a shift in service provision for all specialties from care of the young to care of the elderly. The ageing of the population is expected to add 0.4% per year to the demand for medical services. When this estimated growth in demand is added to the ABS population growth estimate of 0.9% per annum it provides a combined growth indicator of 1.3% per annum.

Medicare Services

Between 1989-90 and 1999-00, the provision of Medicare radiology services by specialist radiologists increased by 55%, which represented a compound average annual increase of 4.5%. During this same period, the average number of services per provider increased by 9.0%, with a compound average annual increase of 1.0% (Table 48).

Table 48: Specialist radiology Medicare service provision trends, 1989-90 to 1999-00

	1989-90	1994-95	1999-00	% change	CAA increase* %
Number of services	6,811,222	8,875,515	10,554,122	55.0	4.5
Average services per provider	7,994	8,334	8,715	9.0	1.0

*Compound average annual increase
Source: DHAC

State/Territory Members of the RANZCR Workforce Committee Perceptions of Issues Affecting Workforce Requirements

Responses from State/Territory members of the RANZCR Workforce Committee indicated that broad health system change and rumour of change was leading to uncertainty about future workforce requirements. For example, the respondent from Victoria noted that 'Demand in the private sector was high at present. But the private sector is transforming, with merging or selling'. This respondent also noted that 'There are only a few positions in the public sector being made available. They require more experienced radiologists, eg interventional, MRI, nuclear medicine. This makes it difficult for recent graduates to obtain a hospital appointment'. The comment was also made that 'It is very difficult for the country group to attract radiologists'.

The respondent from Queensland stated that 'Future requirements appear to be increased because of population ageing and increasing population as with a number of other States'. Other factors thought to be increasing demand for radiology services were the increase in value ascribed to diagnostic radiology enhanced by advances in technology, the role of radiology in defensive medical practice, and an increasingly knowledgeable population demanding increasing number of non-invasive diagnostic investigations. As with the response from Victoria, the Queensland group referred to the currently unknown effect of current changes to the structure of many radiology practices. It was also suggested that it may result in accelerated rates of retirement.

Growth in population from interstate and overseas migration and the ageing of the population were considered to be factors likely to increase requirements for radiologists in Western Australia. It was also noted that the new accreditation guidelines for nuclear medicine, which appear to require the mandatory attendance of a nuclear medicine specialist on site (assuming no rural/provincial exemption applies) and that this will likely increase requirements for 'nuclear specialised' radiologists, as will positron emission tomography (PET) services. The latter are to be introduced across Australia in the next 12-18 months and will require resourcing. Other factors increasing requirements for radiologists were the rapid expansion of invasive procedures undertaken by diagnostic radiologists both in public and private institutions. These procedures increased the demands on the radiologist's time and as a result additional radiologists were required to cope with the changing work pattern. As with the other States, one of the Western Australian respondents indicated that the effect of corporatised radiology on requirements for radiology services is unknown. Also in common with Victoria, was the comment that Western Australia has 'perennial difficulties attracting and retaining rural and remote radiologists'.

The respondent from Tasmania considered that the ageing of the population in this State will effect requirements for radiologists more than the mild decline in the State's population.

Demand side factors of importance in the Australian Capital Territory included the requirement for a radiologist to be on site, the ageing of the population, the increased use of imaging to reduce litigation and increased consumer demand for imaging. The latter was associated with increased patient awareness of the availability of new imaging technologies, such as musculoskeletal imaging. Also noted were reduced Medicare rebates, falling incomes and the possibility that radiologists will be required to work for longer hours.

State/Territory Health Department Perceptions of Issues Affecting Workforce Requirements

State/Territory health authorities indicated that in recent years there had been an increase in the demand for ultrasound services. Driving this growth in demand is the increased use of ultrasound as a first-line diagnostic tool for many medical and obstetric conditions in country practice. Rural hospitals were also reported to be using ultrasound to help them decide on the most appropriate mode of transport for patients requiring referral to a tertiary centre.

Most States with shortages of radiologists in rural areas had plans to enhance the provision of radiology services to these areas through the implementation of new electronic transmission and reporting systems (eg PACS) and the expansion of existing teleradiology networks and the types of examinations that are reported using teleradiology. However, some States indicated that any expansion plans were reliant upon the funds being available and this was a major limiting factor. Some health authorities indicated that they were exploring contracting with private providers for the provision of radiology services to some rural areas and also for the expansion of MRI services.

BreastScreen Australia Perceptions of Issues Affecting Workforce Requirements

The AMWAC 2000 survey of BreastScreen Australia Programs found that in all States/Territories, apart from the Northern Territory, demand for specialist radiologist services was expected to increase. Factors influencing this expected increase in demand were population growth and ageing, increased client participation in the breast screening program and BreastScreen Australia National Accreditation Requirements. These changes are expected to increase the number of initial screens and re-screens required and the number of diagnostic imaging procedures required.

The Impact of New Technologies on Workforce Productivity and Workforce Requirements

Sage (2001) advised the Working Party that the introduction of new technologies is likely to lead to an increase in demand for medical imaging and therefore an increase in the demand for radiologists.

Currently PET is being introduced into clinical practice for the first time but this is unlikely to have a major effect on the radiology workforce, at least in the short term. However, the ongoing technical improvement in the current modalities of CT, MRI and ultrasound will increase the utilisation of these modalities.

Increase in utilisation

Initiatives such as accreditation, clinical guidelines and capping of medical imaging expenditure are unlikely to have a major effect on the utilisation of medical imaging. This reflects the fact that it is now recognised that an imaging modality may be superior to clinical examination in many situations. For example it is hard to argue that CT is not superior to clinical examination in the assessment of headache or abdominal pain and therefore it is difficult not to perform such an examination in the presence of these symptoms. The value of a negative CT in such circumstances should not be overlooked. If an increase in utilisation of medical imaging can be justified on clinical grounds in most circumstances, this obviously has legal implications if such examinations are not performed.

Complex imaging studies

Advances in technology have expanded the role of both MRI and CT, leading to more complex examinations for a single patient episode. For example an MRI examination for a ‘stroke’ may now include a routine T1 and T2 examination, an echo-planar diffusion study and an magnetic resonance angiography (MRA) study and the additional information provided by such a complex imaging examination may lead to further involvement by radiologists in the performance of intra-arterial thrombolysis or the placement of a stent. In the case of CT, new technology has led to the introduction of CT colonoscopy and CT angiography, both of which involve a significant time commitment by both a radiographer and a radiologist when compared with a routine CT examination.

Interventional procedures

Until recently, most interventional radiology procedures were performed by a select number of radiologists. However, in recent years because of the clear anatomical detail provided by CT, more and more radiologists are being asked to carry out an

increasing number of minor interventional procedures such as fine needle aspiration (FNA) biopsies, the placement of intravascular catheters, the drainage of pleural fluid and ascites and the placement of intra-abdominal feeding tubes. The demand for FNA biopsies continues to increase while radiologists are taking over some of the minor procedures previously performed by other specialists. There has also been an expansion of the role of radiologists in the management of spinal diseases with an increasing demand for nerve root 'blocks' and facet joint injections. The recent introduction of new CT technology such as CT fluoroscopy is likely to increase the demand for radiologists to carry out such procedures.

The advances in medical imaging technology during the past twenty years has increased the role of medical imaging in both the diagnosis and management of patients. Although recent advances have decreased the time required for certain of these examinations, at the same time such advances have also made certain examinations more complex and therefore time consuming. Even if expenditure on medical imaging is capped at a government level, clinical justification will ensure that there is no reduction in utilisation, certain examinations will become more complex and radiologists will continue to expand their role in interventional procedures. Therefore the introduction of new technologies is likely to lead to an increase in demand for medical imaging and therefore an increase in the demand for radiologists.

International Trends

A review of the literature indicated that three countries (viz., the United Kingdom, Canada and the United States) expect requirements for specialist radiologists to increase as a result of population ageing, changes in medicine and medical imaging, changes in technology in medical imaging and changes in hospital funding arrangements. For example, the Canadian Medical Imaging Technology Roadmap Steering Committee (2000) drew attention to a pending shortage of radiologists and to the poor status of medical imaging infrastructure in Canadian hospitals and clinics. It concluded that there was a need for policy makers to 1) repair the results of years of under funding of capital investment and infrastructures, 2) plan for an increased capacity for imaging in the future, and 3) develop strategies to address the human resource shortage. The Board of the Faculty of Radiologists, London (1999) stated that the complexity of radiological investigations had increased considerably over the last few years due to the introduction of ultrasound, computed tomography and MRI. There had also been a dramatic increase in the involvement of clinical radiologists in interventional, diagnostic and therapeutic procedures, including angioplasty, vascular embolisation and stent procedures, abscess drainage and percutaneous biopsy. Furthermore, changes in the health system have resulted in a transfer of resources to primary care with a consequent increase in demand from primary care providers. At the same time, the quantum of orthopaedic work undertaken in hospitals has increased with a subsequent increase in requirements for radiologists.

Summary and Conclusions on Radiology Requirements

There is general uncertainty among the workforce, health authorities and other providers (eg GPs) as to the likely future effects of transformations occurring in the structure of radiology practice due to consolidation of practices, the selling of practices to corporations and the globalisation of radiology. There is general agreement that requirements for the services provided by specialist radiologists are

expected to increase as a result of population growth, ageing of the population, increases in the demand for invasive complex images, which demand greater radiologist time per imaging procedure, increased demand for imaging to reduce the risk of medical litigation, and increased patient demand for imaging as community awareness grows about the availability of new imaging technologies (eg musculoskeletal imaging).

The Working Party estimated that these trends provided a combined growth in workforce requirements indicator of 1.5% per annum for the next decade, with population growth contributing 0.9%, population ageing 0.4%, and 0.2% for the impact of increasing complexity in imaging modalities.

PROJECTIONS OF SUPPLY

Entry Into the Workforce

Based on the number of radiodiagnosis trainees in the RANZCR training program as at March 2001 and their progression status, the number of new entrants to the workforce is estimated to average 36 per year during the next four years (Table 36).

Overseas Trained Doctors

On average, it is estimated that 8 overseas qualified radiologists have entered the permanent workforce per year during the past seven years, ranging between 18 in 1998 and 5 in 2000. It is assumed that the number of additions to the workforce from migration will continue at this level (ie 8 per year). At the same time, the RANZCR estimates that, on average, one Australian radiologist migrates overseas per year, with a net annual gain to the Australian workforce of 7 specialist radiologists. This estimate does not take into account overseas qualified radiologists entering the Australian specialist radiology workforce on a temporary visa.

Retirements

The RANZCR 2000 survey indicated that over the next decade 213 radiologists expect to retire, on average, 21 per year. Based on a 60% response to the RANZCR 2000 survey, the Working Party estimated that the number of expected retirements during the next decade would therefore be approximately 298 (on average, 30 per year). Traditionally, the RANZCR has used 2.5% as the basis for calculating workforce attrition (ie loss due to death and retirement). On this basis, 29 specialist radiologists would be expected to be lost from the workforce in the baseline year. This figure was used in projecting future workforce requirements.

The expected age of retirement of specialist radiologists ranged from 45 to 99 years for men and 45 to 75 years for women, with an average age of expected retirement of 63.4 years for men and 61.2 years for women. However, RANZCR members of the Working Party advised that many specialist radiologists work beyond this age and Medicare data indicated that 7.9% of radiologists providing Medicare services were aged 70 years and over. On balance it would seem that the use of 65 to 75 years as a retirement age is appropriate for projection purposes.

Female Participation in the Workforce

The representation of women in the workforce is 15.8%. It is expected that the proportion of women in the workforce will increase, as the number of female trainees continues to increase and the predominantly male cohort of radiologists aged 55 years and over progressively retires. Currently, 38.6% of radiologists aged less than 35 years are women and 29.2% of radiodiagnosis trainees are women. These figures compare with 36.5% of all medical specialists and 35.1% of all specialists-in-training as indicated by the AIHW 1998 Medical Labour Force survey. As previously indicated the RANZCR 2000 survey indicated that female radiologists, on average, worked 38.4 hours per week and male radiologists 46.6 hours. The AIHW Labour Force 1998 survey indicated that the comparative figures for all medical specialists were 42.9 and 53.4 hours per week, respectively.

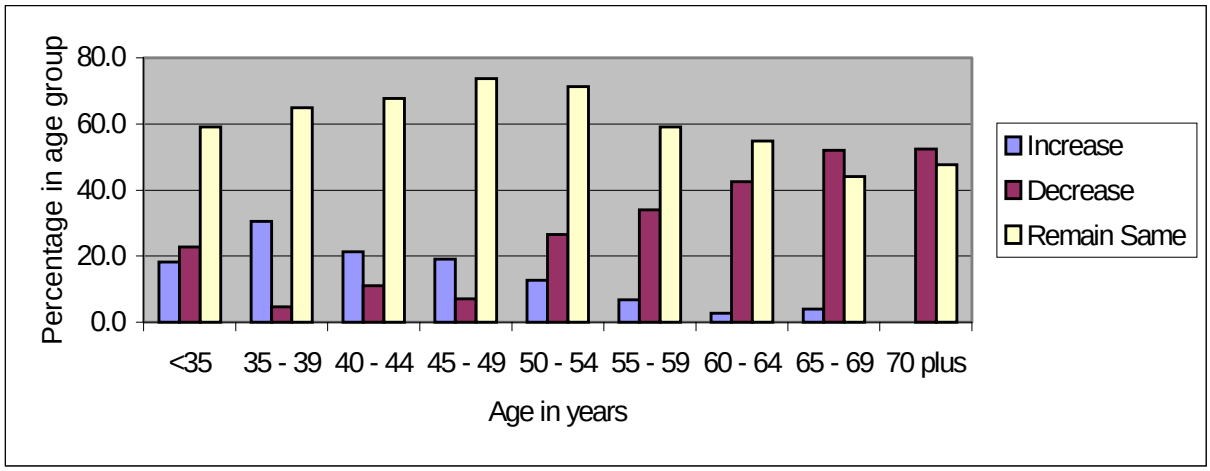
Expected Changes in Work Hours

The RANZCR 2000 workforce survey indicated that 64.3% of radiologists expected their work hours (over the next 3 years) to remain the same, 15.8% expected their work hours to increase and 19.9% expected their work hours to decrease, with no variation based on gender. The main reasons (survey respondents were able to nominate more than one option) given for an anticipated change in work hours were:

- lifestyle preference (23.6% of responses);
- workplace change (16.8% of responses);
- family considerations (13.3% of responses);
- retirement (11.5% of responses);
- personal health (6.3% of responses); and
- to build practice income (6.3% of responses).

Not unexpectedly, Figure 6 shows that the majority of radiologists who anticipate a reduction in their work hours are 50 years of age and over, while those who anticipate an increase in their work hours are predominantly in the younger age groups (ie less than 55 years of age).

Figure 6: Expected changes in work hours over the next three years (RANZCR), by age of specialist radiologists, 2000



Source: RANZCR 2000 workforce survey

Adjustments Required to Trainee Numbers

In total, 28.7% of respondents to the RANZCR workforce survey considered there should be an increase in the number of Australian radiodiagnosis trainees, with a mean increase of 14.9%. On the other hand, 6.2% of respondents thought there should be a decrease in the number of trainees, with a mean decrease of 15.4%.

Provision of Services in the Public Sector

The RANZCR 2000 survey indicated that 27.6% of radiologists worked in the public sector as their primary work setting and 71% worked in the private sector as their primary work setting. Of the 56.6% (333/588) of radiologists who indicated they had a second work setting, 63.4% indicated that it was in the public sector and 31.8% indicated it was in the private sector.

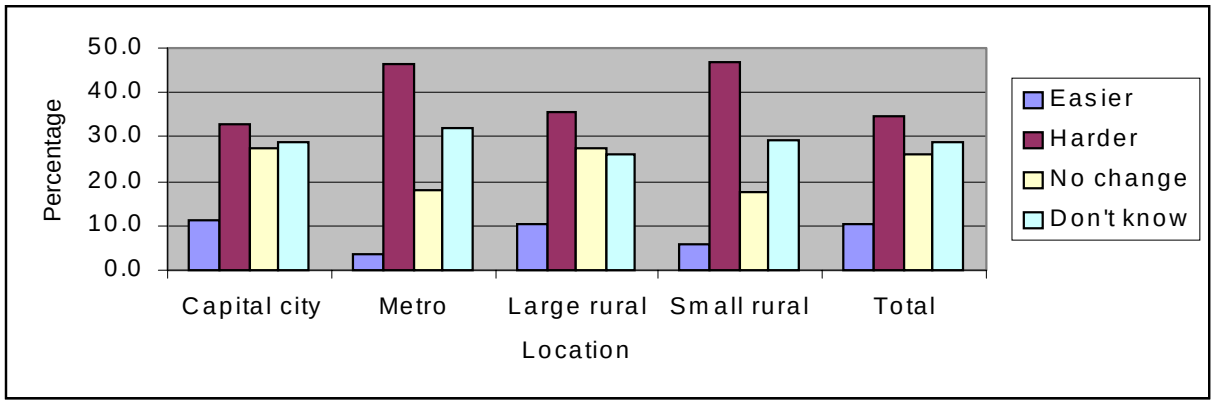
A common theme running through the responses from State/Territory health authorities was the problem of recruiting and retaining radiologists to work in the public sector. Factors associated with this problem included the personal income differential between private and public sector radiology practice and a lack of resources to make the work environment in the public sector sufficiently attractive to recruit and retain radiologists. A lack of MRI facilities in a number of tertiary public sector hospitals was seen as a deterrent to recruitment, while increased workloads were reported as leading to increased levels of stress.

Provision of Services in Rural and Remote Areas

As previously indicated, data from the RANZCR 2000 workforce survey demonstrates that of the 39.5% of specialist radiologists that indicated some involvement in the provision of rural services, 24.8% of these provided resident rural services, 58.1% provided visiting services, 58.9% provided e-health/teleradiology and 43% were involved in the delivery of studies from rural sites (Table 27). The survey also asked radiologists as to whether it was easier or harder to recruit radiologists today than it was five years ago. In total, 34.4% of respondents thought it was harder, 10.2% thought it was easier, 26.3% indicated that there had been no change and the remaining 29.1% expressed no opinion. Figure 7 shows some variation in responses to this question by geographic location (range 32.8% to 47.1%), with a greater proportion of radiologists outside of capital cities indicating that it was now harder to recruit radiologists. The Working Party considered these perceived recruitment difficulties, and raised the possibility that some of these perceptions could relate to difficulties in attracting radiologists to work in some rural locations on a long-term resident basis. However, it was drawn to the attention of the Working Party that an increasing amount of rural radiology services are being rendered on a rotating roster/visiting basis, by a large network of radiologists.

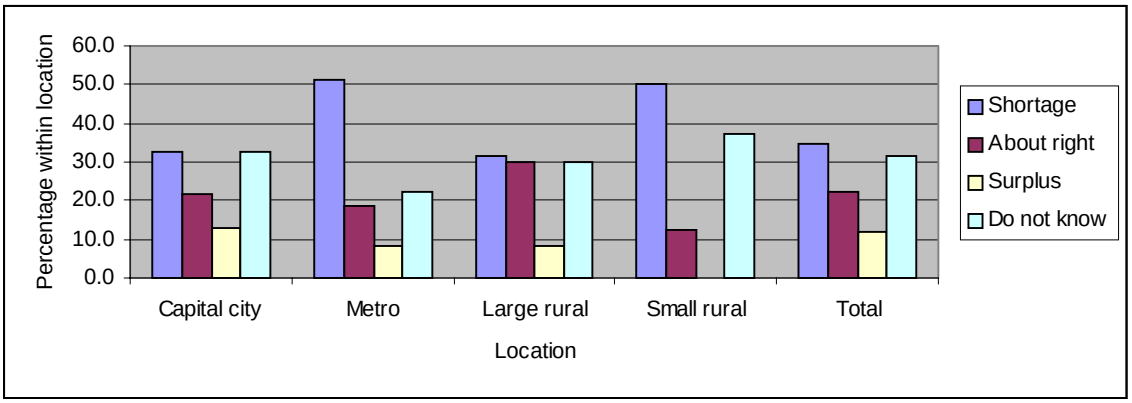
Similarly, 34.2% (range 31% to 51.7%) of respondents to the RANZCR 2000 workforce survey think there will be a shortage of qualified radiologists in 3-5 years with a greater proportion of radiologists in non-capital city urban areas and small rural locations (ie population catchments of 10,000 to 25,000) anticipating a shortage (Figure 8).

Figure 7: Radiologists' perceptions of whether it is easier or harder to recruit qualified diagnostic radiologists compared with five years ago (RANZCR), by geographic location of current practice, 2000



Source: RANZCR 2000 workforce survey

Figure 8: Radiologists' perceptions as to whether there will be a shortage, surplus, or satisfactory supply, of qualified radiologists in 3-5 years (RANZCR), by geographic location of current practice, 2000



Source: RANZCR 2000 workforce survey

Medicare data (Table 28) showed that, per 1,000 persons, the rural population received fewer diagnostic imaging services than did the metropolitan population (viz., 569.9 services per 1,000 in metropolitan areas and 487 services per 1,000 in rural areas).

Data from State/Territory health authorities indicated that specialist radiology services in rural areas are mainly limited to large regional hospitals or private firms in large regional rural centres. However, most State/Territories had plans to enhance the provision of services to rural areas using new electronic transmission and reporting systems and through the expansion of existing teleradiology networks and the types of examinations that are reported using teleradiology. These initiatives were supported by the needs expressed in the responses from rural Divisions of General Practice.

Potential for Substitution

Responses from State/Territory health authorities and from Divisions of General Practice indicated that in many rural areas GPs provide basic radiology and radiography services. In small towns it is not financially feasible for specialist radiologists to provide a 24-hour service. The provision of these services by GPs obviates the need for rural patients to travel long distances for minor problems. However, recent licensing requirements obligate GPs to undertake quality assurance activities with the aim of ensuring service quality. Both health authorities and GPs support these requirements and perceive a need for greater involvement by radiologists in the provision of training and refresher courses (Appendices C and D). The view was expressed that new licensing requirements should not result in a reduction of services to patients in rural areas. Hence, it was imperative that rural GPs in all States/Territories had access to appropriate educational quality assurance activities.

BALANCING SUPPLY AGAINST REQUIREMENTS

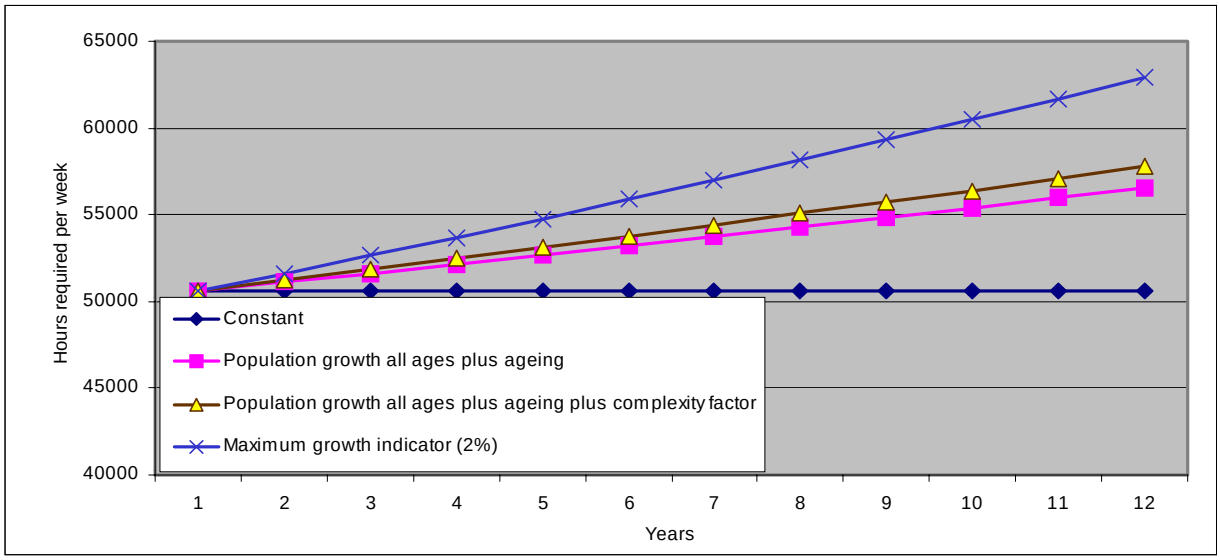
The standard AMWAC specialist medical workforce projection model has been used to project a specialist radiologist supply and requirements scenario to 2011. On the supply side, the model takes into account expected entrants to the workforce and those leaving, converts the number of specialists to a full time equivalent (FTE) figure using the average hours worked per week by age and gender. On the requirements side, the likely trend in demand for radiology services is included, based on the Working Party's assessment of the expected trend in requirements (AMWAC, 2000).

Both supply and requirements have been projected over a ten year period. It is recognised that a ten year projection period is a long time frame for assumptions to remain valid. However, this time frame was chosen because five years was considered to be too short for any impact on training numbers to move through, given that the radiology training program is a minimum five years.

Requirement Trends

The Working Party assessed various indicators as the basis for estimating future requirements for specialist radiologists (Figure 9). These included ABS population growth estimates and the impact of an ageing population on demand for medical services (1.3% growth per annum compounded), population growth and ageing plus 0.2% estimate for increasing complexity in imaging modalities (1.5%), and a maximum growth in requirement estimate of 2% per annum.

Figure 9: Requirement projections for specialist radiologists based on hours currently worked per week using selected growth indicators (AMWAC), 2001



Source: AMWAC

Requirement projections for specialist radiologists, as outlined above, have been converted to FTE hours per week using the estimated average hours worked by specialist radiologists in 2000 of 45 hours per week. Conversion of the data to hours worked per week allows comparisons to be made with projected supply data, which has been similarly converted.

The productivity of specialist radiologists as measured in hours worked will vary from time to time and by age group as not all specialists work a uniform full time working week, so it is appropriate to measure services provided in hours instead of by head count. In 2000, the 1,148 specialist radiologists provided an estimated total of 50,606 hours of services per week. The Working Party concluded that, nationally, the current workforce was inadequate with a shortage of at least 37 FTE specialist radiologists. The workforce was also maldistributed between States/Territories.

Supply Trends

The RANZCR data were considered by the Working Party to provide a reasonably accurate profile of the age and gender profile of the specialist radiologist workforce given that the College holds data for all specialist radiologists in Australia (ie not just College members). Hence, workforce requirements and supply projections were calculated based on these data.

The supply of specialist radiologists was projected by ageing the 2001 supply through each year of age, subtracting expected retirements and attrition and adding to the workforce the expected number of new Fellows entering the workforce per year from the RANZCR training program and from migration.

Projection modelling included converting the current supply of specialist radiologists to hours per week by applying the average number of hours worked per week by male and female radiologists in each major age cohort. In this way the projection model takes into account the increase in female participation in the specialist radiologist workforce and any differences in hours worked associated with gender and age. Underpinning these projections, is the assumption that the pattern of workforce participation of the current workforce provides a suitable basis on which to project future workforce supply requirements.

Number of workforce entrants from the RANZCR training program

Over the next five years 180 new radiologists are expected to enter the workforce, on average, 36 per year. As indicated in the introduction to this report, the projections assume that the minimum length of the RANZCR training program continues to be five years and that trainees in the future progress through the training program at a similar rate to previous trainees. This assumption has been necessary in the absence of any definitive data on average training program completion times. There is evidence that suggests that completion times for some trainees may be longer than five years in the future. Currently, 7.7% of trainees are beyond their fifth year of training and the RANZCR 2000 survey of radiodiagnosis trainees (Table 37) indicated that some trainees plan to spend one to two years post Fellowship undertaking additional advanced training. The potential impact of these expressed intentions is to lengthen the training period for these trainees from five years to six to seven years. The extent to which trainees enact these intentions should be

monitored annually by the RANZCR so that supply projections can be amended if necessary.

Number of workforce entrants from migration
As previously indicated, the net gain from migration is expected to continue to average around 7 per year and workforce projections for radiologists have been modelled using this level of supply from migration. However, the Working Party also considered the impact of an increase and a decrease in supply from this source on RANZCR training program requirements.

Retirements
Data from the RANZCR 2000 survey indicated that the expected average age of retirement was 63.4 years, while Medicare data indicated that many radiologists continue to work beyond the age of 70 years. For projection purposes it was assumed that most radiologists would retire between the ages of 65 and 75 years. In 2000, 29.7% of the workforce were aged 55 years or over, with 13.4% aged 55-59 years and a further 16.3% aged 60 years or more.

The RANZCR survey data indicated that, on average, 29 radiologists could be expected to retire per year over the next decade. This estimate is consistent with a workforce attrition rate of 2.5% per year, which is the level of attrition normally used by the RANZCR to estimate future workforce supply.

Changing workforce demographics
RANZCR data also showed that 84.2% of the workforce were men and 15.8% were women. Among radiologists aged less than 50 years, women accounted for 18.7% compared with 8.7% of radiologists aged 50 or more years. Furthermore, 29.2% of radiodiagnosis trainees in 2000 were women.

Projected supply to 2005 based on status quo
The supply projections show that based on the estimated number of RANZCR training program completions over the next five years (on average 36 per year) and seven additions from migration, supply will increase from the estimated 2001 level of approximately 50,606 FTE hours per week to an estimated 53,263 FTE hours per week in 2005 (Table 49).

Table 49: Projected supply of specialist radiologists, by FTE hours worked per week[a] (AMWAC), **2001 to 2006**

Year	Expected entrants into the workforce from the RANZCR training program	Estimated FTE hours For the total radiology workforce
2001	41	50,606
2002	35	51,367
2003	36	52,015
2004	36	52,667
2005	32	53,263

a – assumes 2.5% attrition rate, 7 new entrants from migration per year; a FTE working week of 45 hours; 99% of RANZCR trainees graduate and enter the workforce
Source: AMWAC and van Konkelenberg

Projected Balance

Using the three selected growth indicators (ie 1.3% per annum, 1.5% and 2% per annum) to project workforce requirements (Figure 9) and the estimated supply of specialist radiologists (Table 49), an indication of the expected shortage or oversupply within the workforce can be calculated for the years 2001 to 2006. This is outlined in Table 50 and shows a workforce shortage in 2001 of 3.2%, with an estimated undersupply of 2.5% in 2006 under the 1.3% requirement scenario, an undersupply of 3.5% under the 1.5% requirement scenario and an undersupply of 7.6% under the 2% growth scenario.

Table 50: Projected supply of, and requirements for, specialist radiologists (FTE hours per week) (AMWAC), 2001 to 2006[a]

Year	Proj. supply	Proj. require-ments (1.3%)	Est. under-supply (%)	Proj. require-ments (1.5%)	Est. under-supply (%)	Proj. require-ments (2%)	Est. under Supply (%)
2001	50,606	52,237	3.2	52,237	3.2	52,237	3.2
2002	51,367	52,767	2.7	52,871	2.9	53,282	3.7
2003	52,015	53,303	2.5	53,513	2.9	54,348	4.5
2004	52,667	53,842	2.2	54,162	2.8	55,435	5.3
2005	53,263	54,388	2.1	54,820	2.9	56,543	6.2
2006	53,624	54,939	2.5	55,485	3.5	57,674	7.6

a – assumes: shortage of 37 FTE radiologists in 2001; 2.5% attrition rate due to retirements etc; 7 new entrants from migration per year; a FTE working week of 45 hours; 99% of RANZCR trainees graduate and enter the workforce

Source: AMWAC and van Konkelenberg

Scenario 1

Table 51 indicates that when projections are based on estimated growth in population (0.9%) plus 0.4% for the impact of population ageing, 47 new entrants into the specialist radiologist workforce are required from the year 2007 onwards to move to a balance in workforce supply and requirements by the year 2011. This represents, on average, 11 more graduates than in previous years. This scenario was rejected by the Working Party because it was considered that demand would increase at a greater rate than that indicated by growth in population plus population ageing.

Table 51: New RANZCR Fellows required to move projected supply into balance with projected requirements (1.3% growth per year) (AMWAC), by hours worked per week, 2006 to 2011[a]

Year	Number of new graduates	Projected Supply (FTEs hrs/week)	Projected requirements (FTEs hrs/week)	Balance shortage (oversupply)	% shortage/ (oversupply)
2007	47	54,318	55,496	1,178	2.2
2008	47	55,223	56,058	836	1.5
2009	47	56,087	56,627	539	1.0
2010	47	56,917	57,201	284	0.5
2011	47	57,717	57,781	64	0.1
2012	47	58,490	58,366	(124)	(0.2)

a – assumes: shortage of 37 FTE radiologists in 2001; 2.5% attrition rate due to retirements etc; 7 new entrants from migration per year; a FTE working week of 45 hours; 99% of RANZCR trainees graduate and enter the workforce
Source: AMWAC and van Konkelenberg

Scenario 2

Table 52 indicates that when projections are based on estimated growth in requirements of 2%, 77 new entrants into the specialist radiologist workforce are required from the year 2007 onwards to move to a balance in workforce supply and requirements by the year 2011. This scenario was rejected by the Working Party because it was considered that demand would increase at a more moderate rate.

Table 52: New RANZCR Fellows required to move projected supply into balance with projected requirements (2% growth per year) (AMWAC), by hours worked per week, 2006 to 2011[a]

Year	Number of new graduates	Projected Supply (FTEs hrs/week)	Projected requirements (FTEs hrs/week)	Balance shortage (oversupply)	% shortage/ (oversupply)
2007	77	54,318	58,828	4,510	8.3
2008	77	56,523	60,004	3,481	6.2
2009	77	58,695	61,204	2,510	4.3
2010	77	60,842	62,428	1,587	2.6
2011	77	62,970	63,677	707	1.1
2012	77	65,084	64,951	(134)	(0.2)

a – assumes: shortage of 37 FTE radiologists in 2001; 2.5% attrition rate due to retirements etc; 7 new entrants from migration per year; a FTE working week of 45 hours; 99% of RANZCR trainees graduate and enter the workforce
Source: AMWAC and van Konkelenberg

Scenarios 3 and 4

Using the 1.5% growth indicator, Scenario 3 is based on increasing the number of commencing trainees in the RANZCR training program. This scenario involves a large increase in the number of training positions in 2002. However, because of the

practical difficulties (eg availability of resources) associated with achieving a large increase in the number of training positions within one year and because of the limited time left to implement new training positions and recruit new commencing trainees for 2002 a further scenario is explored. Scenario 4 explores the effect of staging the increase in the number of new training positions to achieve 60 new positions by 2004.

Scenario 3: A large increase in 2002 in the number of RANZCR commencing radiodiagnosis trainees

Scenario 3, Table 53 and Figure 10 show that when the 1.5% per annum growth indicator is used, one way to address future workforce requirements is to increase the number of new entrants into the workforce from the RANZCR training program to 52 from 2007 to 2012. This represents 16 more graduates than the average of 36 in previous years and requires the addition of 60 new training positions.

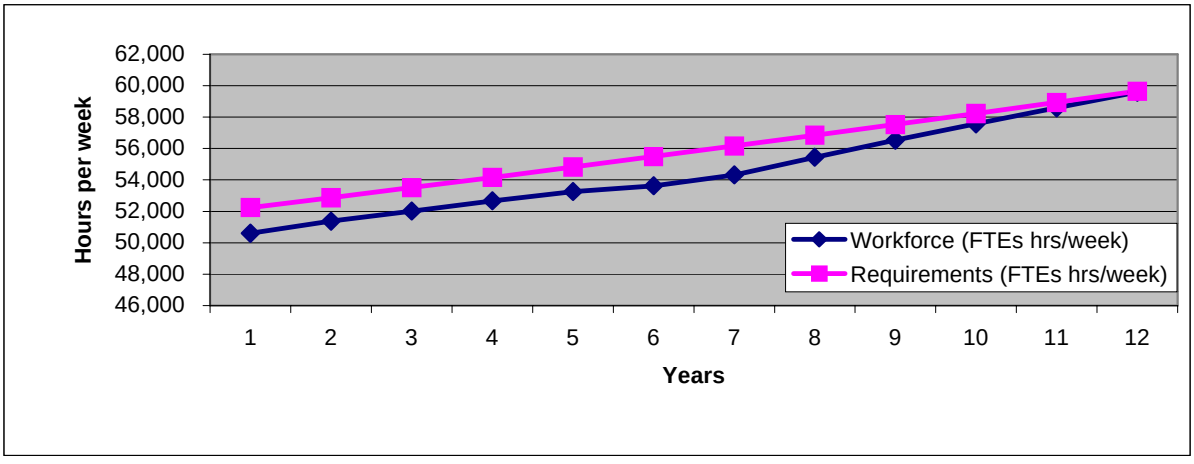
Table 53: New RANZCR Fellows required to move projected supply into balance with projected requirements (1.5% growth per year) (AMWAC), by hours worked per week, 2007 to 2012[a]

Year	Number of graduates	Projected Supply (FTEs hrs/week)	Projected requirements (FTEs hrs/week)	Balance shortage (oversupply)	% shortage/ (oversupply)
2007	52	54,318	56,158	1,841	3.4
2008	52	55,440	56,840	1,400	2.5
2009	52	56,522	57,530	1,008	1.8
2010	52	57,571	58,228	657	1.1
2011	52	58,592	58,935	343	0.6
2012	52	59,589	59,650	61	0.1

a – assumes: shortage of 37 FTE radiologists in 2001; 2.5% attrition rate due to retirements etc; 7 new entrants from migration per year; a FTE working week of 45 hours; 99% of RANZCR trainees graduate and enter the workforce

Source: AMWAC and van Konkelenberg

Figure 10: Specialist radiologist workforce supply and requirements based on a 1.5% growth in requirements and 52 new RANZCR Fellows from 2007 to 2012



a – assumes: shortage of 37 FTE radiologists in 2001; 2.5% attrition rate due to retirements etc; 7 new entrants from migration per year; a FTE working week of 45 hours; 99% of RANZCR trainees graduate and enter the workforce

Source: AMWAC and van Konkelenberg

Scenario 4: A staged approach to increasing the output from the RANZCR training program

Using the 1.5% growth indicator, Scenario 4, Table 54 and Figure 11 show the effects on workforce supply of a staged increase in the number of training positions with 20 new positions per year across three years (viz., 2002, 2003 and 2004). Obviously, with this approach it will take longer (ie until 2013) to reduce the imbalance in workforce requirements and supply to zero than is the case with the previous scenario (Scenario 3). As already indicated, this approach has been canvassed because of the practical difficulties associated with appropriately resourcing a large number of new positions and recruiting additional commencing trainees within a short timeframe.

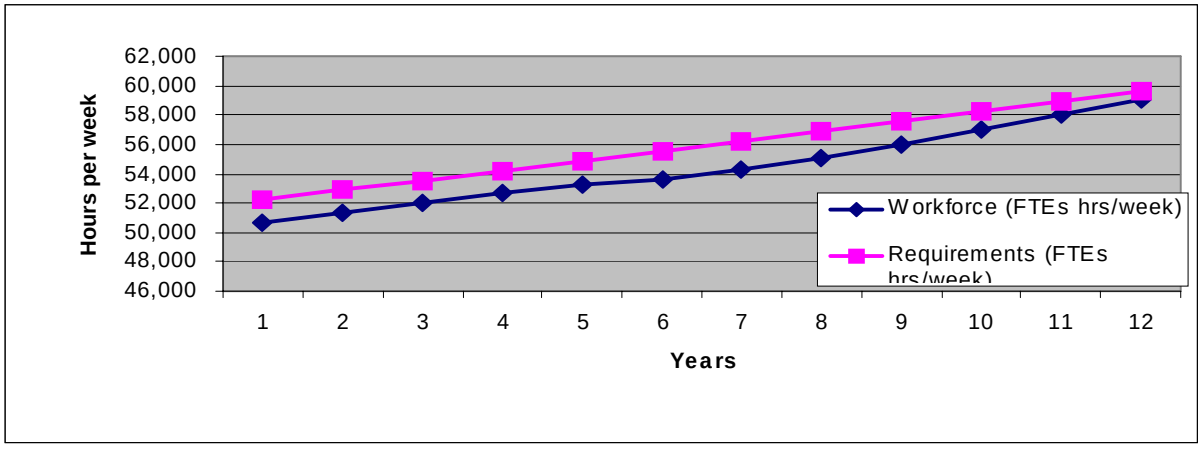
Table 54: New RANZCR Fellows required to move projected supply into balance with projected requirements (1.5% growth per year) (AMWAC), by hours worked per week, 2007 to 2012[a]

Year	Number of graduates	Projected Supply (FTEs hrs/week)	Projected requirements (FTEs hrs/week)	Balance shortage (oversupply)	% shortage/ (oversupply)
2007	44	54,318	56,158	1,841	3.4
2008	48	55,093	56,840	1,747	3.2
2009	52	56,000	57,530	1,530	2.7
2010	52	57,046	58,228	1,182	2.1
2011	52	58,062	58,935	873	1.5
2012	52	59,054	59,650	596	1.0

a – assumes: shortage of 37 FTE radiologists in 2001; 2.5% attrition rate due to retirements etc; 7 new entrants from migration per year; a FTE working week of 45 hours; 99% of RANZCR trainees graduate and enter the workforce

Source: AMWAC and van Konkelenberg

Figure 11: Specialist radiologist workforce supply and requirements based on a 1.5% growth in requirements and a staged increase in the number of training positions (viz., 20 new training positions in 2002, 2003 and 2004) [a]



a – assumes: shortage of 37 FTE radiologists in 2001; 2.5% attrition rate due to retirements etc; 7 new entrants from migration per year; a FTE working week of 45 hours; 99% of RANZCR trainees graduate and enter the workforce

Source: AMWAC and van Konkelenberg

Scenario 5: Recruit overseas trained specialist radiologists and a moderate increase in the number of new entrants from the RANZCR training program

One way to rapidly address the current workforce shortage and to meet future workforce requirements is to recruit a number of overseas trained specialist radiologists immediately and to have a moderate increase in the output from the RANZCR training program. Table 55 and Figure 12 show that when the 1.5% per annum growth indicator is used and 37 overseas trained specialist radiologists are recruited in 2001, that the average annual output from the RANZCR training program needs to increase to 44 from 2007 to 2012. This represents, on average, 8 more graduates per year from the training program than has been the case over the past six years. Of course this scenario assumes that it is possible to recruit this number of specialist radiologists from overseas. The RANZCR has evidence to suggest that the Australian public hospital system is not as popular a destination for overseas trained specialist radiologists as thought to be as desirable a place of as it once was.

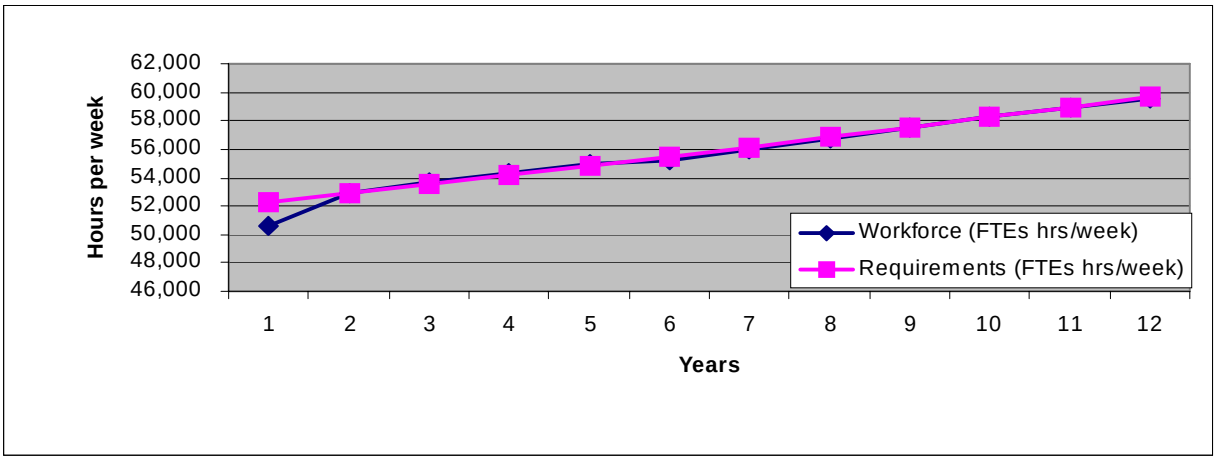
Table 55: New RANZCR Fellows required to move projected supply into balance with projected requirements (1.5% growth per year) (AMWAC), by hours worked per week, 2007 to 2012[a]

Year	Number of graduates	Projected supply (FTEs hrs/week)	Projected requirements (FTEs hrs/week)	Balance shortage (oversupply)	% shortage/ (oversupply)
2007	44	55,989	56,158	170	0.3
2008	44	56,781	56,840	59	0.1
2009	44	57,531	57,530	(2)	(0.0)
2010	44	58,246	58,228	(17)	(0.0)
2011	44	58,927	58,935	8	0.0
2012	44	59,579	59,650	71	0.1

a – assumes: shortage of 37 FTE radiologists in 2001; 2.5% attrition rate due to retirements etc; 7 new entrants from migration per year; a FTE working week of 45 hours; 99% of RANZCR trainees graduate and enter the workforce

Source: AMWAC and van Konkelenberg

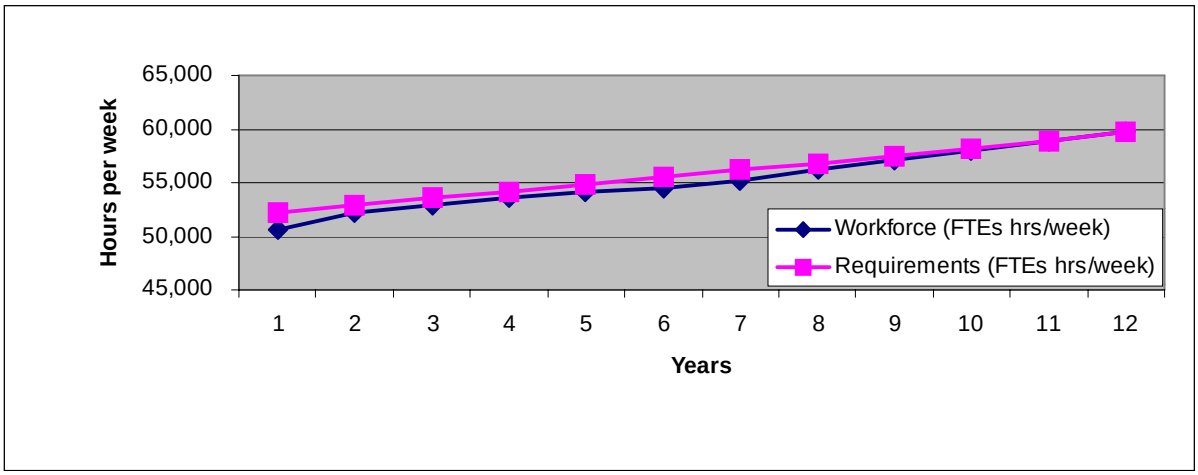
Figure 12: Specialist radiologist workforce supply and requirements based on a 1.5% growth in requirements, 37 OTD entrants in 2001, and 44 new RANZCR Fellows from 2007 to 2012[a]



a - assumes: a shortage of 37 FTE radiologists in 2001; 2.5% attrition rate due to retirements etc; 7 new entrants from migration in all years except 2001 (27 OTD entrants); a FTE working week of 45 hours; 99% of RANZCR trainees graduate and enter the workforce
Source: AMWAC and van Konkelenberg

A further example based on this mixed model of recruiting overseas trained specialist radiologists and increasing the training program output, would be to recruit 20 specialist OTDs in 2001 and to increase the average annual RANZCR training program output to 48 from 2007 (Figure 13). This represents, on average, 12 more graduates per year from the training program than has been the case over the past six years.

Figure 13: Specialist radiologist workforce supply and requirements based on a 1.5% growth in requirements, 20 OTD entrants in 2001, and 48 new RANZCR Fellows from 2007 to 2012[a]



a - assumes: a shortage of 37 FTE radiologists in 2001; 2.5% attrition rate due to retirements etc; 7 new entrants from migration in all years except 2001 (27 OTD entrants); a FTE working week of 45 hours; 99% of RANZCR trainees graduate and enter the workforce
Source: AMWAC and van Konkelenberg

It should be noted that the AMWAC projection model is sensitive to the chosen requirement indicator, to the hours worked by each age and sex cohort, to workforce entrants from migration, and to the number of new Fellows estimated to be entering the workforce from the training program between the years 2001 and 2007. If there is a significant change in any of these estimates then the model will need to be updated with these new scenarios. Hence, these issues require monitoring. This monitoring process is particularly important in terms of workforce growth estimates given the high degree of uncertainty in these estimates arising from the changes occurring in the funding and organisation of radiology services. Furthermore, workforce additions from migration are relatively high based on data from the Australian Medical Council. Between 1993 and 2001, only two other specialties had a higher number of approvals of overseas trained specialists (viz., anaesthesia and obstetrics and gynaecology). The Working Party, therefore, believes that it is imperative that the number of additions to the permanent specialist radiologist workforce from migration be monitored so that supply projections can be amended if necessary.

Following consideration of the above workforce scenarios, the Working Party has based its recommendations on Scenario 4, viz a staged approach to the implementation of 60 new training positions to achieve, on average, 52 new workforce entrants per year from the RANZCR training program from 2009 to 2012. This represents, on average, 16 additional entrants from the RANZCR training program per year. This recommendation assumes that all existing training positions will be filled.

The mixed model approach of recruiting overseas trained specialists and increasing the RANZCR training program output is not recommended because it is not consistent with Australia's policy of workforce self-sufficiency. Nevertheless, the recruitment of overseas trained radiologists on a one off basis remains an option should health authorities and the RANZCR consider it impractical to increase the number of training positions required to achieve a training program output of 52 by 2009.

Ideally, the number of new commencing trainees and training positions should be increased proportionately more in the comparatively undersupplied States of Queensland, New South Wales and Tasmania and kept roughly in line with projected State/Territory population shares in 2011. Respectively, these three states currently have 5.6 and 5.9 radiologists per 100,000 population. This compares with 6.1 per 100,000 in Victoria and South Australia/Northern Territory and 7.2 per 100,000 in the Australian Capital Territory.

A suggested distribution of the 60 new training positions is shown in Table 56. The final distribution of the additional positions should be determined through negotiations between the RANZCR and State/Territory health departments. This distribution ensures that Queensland and New South Wales, who currently have a noticeably lower share of training positions than their respective population shares, are bought into line with 2008 population share. Such a distribution will assist in reducing the maldistribution within the workforce, although it is recognised the workforce is mobile and may move between states once training is completed.

The recommended number of training positions for each State/Territory should be regarded as a minimum number. The key factor of course with any increase in training positions is that new training positions require an appropriate infrastructure to ensure that trainees gain adequate supervision, experience and support. The Working Party recognises that the suggested increases in New South Wales and Queensland are significant and that it may be necessary to increase positions in other states to ensure the national increase is achieved. In this context it may mean that the additional places for new commencing trainees are provided where there are suitable supervisors and infrastructure. This will be a matter for state/territory health departments and RANZCR to consider.

Table 56: Suggested distribution of RANZCR training positions and comparison with projected State/Territory 2008 population shares (AMWAC), 2001 and 2004

State/Terr.	2001 training positions	2002 training positions	Projected 2008 pop. (%)	2001 share of training positions (%)	2004 share of training positions (%)
NSW	56	**84**	33.2	28.0	**32.3**
Victoria	61	**63**	24.1	30.5	**24.2**
Queensland	27	**50**	19.8	13.5	**19.2**
SA/NT	25	**25**	8.7	12.5	**9.6**
West. Aust.	21	**27**	10.3	10.5	**10.3**
Tasmania	5	**6**	2.3	2.5	**2.3**
ACT	5	**5**	1.6	2.5	**1.9**
Australia	200	**260**	100.0	100.0	**100.0**

Sources: ABS, AMWAC

Table 57 shows the number of FTE qualified radiologists currently available to supervise the 195 radiodiagnosis trainees, by State/Territory. Nationally, the ratio of training positions to qualified specialist radiologist supervisors, as at March 2001, was 1:1.3, with variation by State/Territory. Queensland had the least number of supervisors per training positions (1:1), while Western Australia, Tasmania and the Australian Capital Territory had greater than average numbers, viz., 1.6 supervisors for each training position. As at March 31, 2001, there were five unfilled, funded training positions, two in both New South Wales and Queensland and one in the Australian Capital Territory.

Table 57: Number of FTE qualified radiologists currently available to supervise radiodiagnosis trainees (RANZCR), by State/Territory, 2001

State/Terr.	2001 training positions	2001 trainees occupying training positions	FTE qualified radiologists to supervise trainees	Ratio of qualified radiologists to training positions
NSW	56	54	79.3	1.4
Victoria	61	61	73.0	1.2
Queensland	27	25	26.9	1.0
SA/NT	25	25	33.1	1.3
West. Aust.	21	21	33.0	1.6
Tasmania	5	5	8.0	1.6
ACT	5	4	8.0	1.6
Australia	200	195	258.3	1.3

Source: RANZCR

As has been noted, maldistribution of the workforce exists between States/Territories, with shortages reported in the public sector in Queensland, New South Wales and Tasmania. Urban and rural areas in these States expressed difficulty filling positions and in some situations overseas trained radiologists have been recruited to fill positions under area of need conditions. For example, as at June 2001, 16 area of need specialist radiologist positions had been approved in New South Wales, nine of which had been filled by overseas trained doctors (permanent residents) and seven of which were unfilled.

A common theme running through the responses from State/Territory health authorities to the AMWAC 2000 survey was the problem of recruiting and retaining radiologists to work in the public sector. Factors associated with this problem included a lack of MRI facilities in a number of tertiary public sector hospitals, increased workloads were reported as leading to increased levels of stress among radiologists and the personal income differential between private and public sector radiology practice. The New South Wales Department of Health commented that public sector work can only be attractive if the work environment is adequately resourced with modern technology and assuming that the terms and conditions of employment are perceived by the respective individual to be fair and adequate. The report of the New South Wales Greater Metropolitan Services Implementation Group (GMSIG) (2001) concluded that 'improved diagnostic capability available to radiography had come at a significant cost to the health system and had increased the disparity in the levels of service across the State' (p 68). This report recommended a statewide strategic approach to addressing these issues.

Like State/Territory health authorities, most BreastScreen Australia programs reported problems in recruiting specialist radiologists. The Working Party concluded that these finding reflect a definite shortage of radiologists in Queensland, while in other States/Territories the shortages are more likely to reflect the fact that some radiologists do not find this work attractive. For many radiologists the provision of breast screening services tends to be an add-on job that they do after their regular

work hours and for some it is ascribed a low status. Demand for breast screening services is expected to increase due to population growth and ageing and increased client participation in the BreastScreen Australia program. As a result the number of initial screens and re-screens is expected to increase and with this, the number of diagnostic imaging procedures to be performed is expected to increase. Given the importance of this public health program, it is imperative that strategies be developed to address problems in the recruitment of specialist radiologists.

The Working Party believes that existing inequities in access to radiology services are likely to increase unless State/Territory health authorities and the RANZCR develop effective strategies. Strategies are needed to address problems of recruitment and retention of specialist radiologists in the public sector, including breast-screening services. These strategies will also be important if the recommended increased in trainee output is to address the current shortfall identified in the public hospital vacancy survey.

In some States strategies are also required to address access problems for patients and GPs in rural areas. In total, 51% of rural Divisions of General Practice considered access to specialist radiology services to be inadequate compared with only 6.9% of metropolitan Divisions. Furthermore, rural GPs advised the Working Party that in small rural towns with an acute hospital it is not feasible for a resident specialist radiologist to provide a 24 hour service. In these situations acute radiology and radiography services are largely provided by GPs. This obviates the need for long distance travel for patients with relatively minor problems. These GPs require the support of consultant radiologists, including equitable access to quality assurance programs.

RECOMMENDATIONS

The following recommendations recognise that radiology is a specialty that is particularly dependent on the availability of appropriate facilities, support staff and equipment. It is therefore important that workforce supply and the availability of essential equipment and facilities proceed in tandem.

Underpinning the recommendations of the Working Party are certain assumptions that were used in modelling future workforce requirements and supply. The main assumptions are summarised on page 5 of this report. The recommendations may need reviewing if changes are made to the key assumptions and/or if adjustments to the main inputs to the model do not occur in line with expectations. For example updating of the conclusions may be necessary if:

- major changes occur in radiology practice and organisation (See Appendix F); and
- entrants to the workforce from migration increase or decrease substantially.

The Working Party recommends:

1. That there be an increase in the number of commencing radiodiagnosis trainees to match an expected future growth in requirements of 1.5% per year and that the number of funded radiodiagnosis training positions be increased accordingly.

2. That State and Territory health departments undertake negotiations with the Royal Australian and New Zealand College of Radiologists for the accommodation of 60 new training positions in specialist radiology with the additional positions and commencing trainees to be introduced across three years and to be located where suitable supervision, support and training experiences are available as approved by the Education Board of the RANZCR. This is a relatively large increase in the number of training positions and is based on all current accredited training positions being filled as from 2002. Table 58 outlines the suggested location of the new training positions based on estimated State/Territory population share in 2008 as indicated in Table 56.

Table 58: Current and suggested additional RANZCR training positions (AMWAC); by State/Territory, 2002 and 2003

State	Total 2001 (current)	Total 2004 (suggested)	Total Increase	2002 Increase	2003 Increase	2004 Increase
NSW	56	**84**	28	10	10	8
Victoria	61	**63**	2	1	1	-
Queensland	27	**50**	23	9	8	6
SA/NT	25	**25**	-	-	-	-
West. Aust.	21	**27**	6	2	2	2
Tasmania	5	**6**	1	1	-	-
ACT	5	**5**	-	-	-	-
Australia	200	**260**	60	23	21	16

Source: AMWAC

(A more immediate adjustment to supply could involve the recruitment and employment of appropriately qualified overseas trained radiologists. To pursue this approach, the Commonwealth Department of Health and Aged Care should co-ordinate a meeting of Commonwealth/State/Territory health departments and RANZCR to consider if this approach would be preferable and practical. Any increase in supply from overseas would require an appropriate adjustment to the recommended increase in radiology training positions.)

3. That State/Territory health departments and the RANZCR explore innovative approaches to recruiting and training radiologists, including, public/private work arrangements with a view to recruiting and retaining specialist radiologists in the public system.

4. That specialist radiologist workforce requirements and supply projections be monitored on an annual basis so that they can be amended if new trends emerge, with a formal review in five years.

5. That this monitoring be coordinated by the RANZCR and AMWAC and the results incorporated into the AMWAC annual report to AHMAC.

APPENDIX A: RURAL, REMOTE AND METROPOLITAN AREAS CLASSIFICATION

The Commonwealth Departments of Health and Family Services and Primary Industries and Energy, Rural, Remote and Metropolitan Areas classification, has been used to classify the geographic location of the job of responding medical practitioners in the following seven categories.

Metropolitan areas:

1. *Capital cities* consist of the State and Territory capital cities of Sydney, Melbourne, Brisbane, Perth, Adelaide, Hobart, Darwin and Canberra.

2. *Other metropolitan centres* consist of one or more statistical subdivisions which have an urban centre of population of 100,000 or more in size. These centres are: Newcastle, Wollongong, Queanbeyan (part of Canberra-Queanbeyan), Geelong, Gold Coast-Tweed Heads, Townsville-Thuringowa.

Rural zones:

3. *Large rural centres* are statistical local areas where most of the population reside in urban centres of population of 25,000 to 99,999. These centres are: Albury-Wodonga, Dubbo, Lismore, Orange, Port Macquarie, Tamworth, Wagga Wagga (NSW); Ballarat, Bendigo, Shepparton-Mooroopna (Vic); Bundaberg, Cairns, Mackay, Maroochydore-Mooloolaba, Rockhampton, Toowoomba (Qld), Whyalla (SA); and Launceston (Tas).

4. *Small rural centres* are statistical local areas in rural zones containing urban centres of population between 10,000 and 24,999. These centres are: Armidale, Ballina, Bathurst, Broken Hill, Casino, Coffs Harbour, Forster-Tuncurry, Goulburn, Grafton, Griffith, Lithgow, Moree Plains, Muswellbrook, Nowra-Bombaderry, Singleton, Taree (NSW); Bairnsdale, Colac, Echuca-Moama, Horsham, Mildura, Moe-Yallourn, Morwell, Ocean Grove-Barwon Heads, Portland, Sale, Traralgon, Wangaratta, Warrnambool (Vic); Caloundra, Gladstone, Gympie, Hervey Bay, Maryborough, Tewantin-Noosa, Warwick (Qld); Mount Gambier, Murray Bridge, Port Augusta, Port Lincoln, Port Pirie (SA); Albany, Bunbury, Geraldton, Mandurah (WA); Burnie-Somerset, Devonport (Tas).

5. *Other rural areas* are the remaining statistical areas within the rural zone. Examples are Cowra Shire, Temora Shire, Guyra Shire (NSW); Ararat Shire, Cobram Shire (Vic); Cardwell Shire, Whitsunday Shire (Qld); Barossa, Pinnaroo (SA); Moora Shire, York Shire (WA); George Town, Ross (Tas); Coomalie, Litchfield (NT).

Remote zones:

These are generally less densely populated than rural statistical local areas and hundreds of kilometres from a major urban centre.

6. *Remote centres* are statistical local areas in the remote zone containing urban centres of population of 5,000 or more. These centres are: Blackwater, Bowen, Emerald, Mareeba, Moranbah, Mount Isa, Roma (Qld); Broome, Carnarvon, East

Pilbara, Esperance, Kalgoorlie/Boulder, Port Hedland, Karratha (WA); Alice Springs, Katherine (NT).

7. *Other remote areas* are the remaining areas within the remote zone. Examples are: Balranald, Bourke, Cobar, Lord Howe Island (NSW); French Island, Orbost, Walpeup (Vic); Aurukun, Longreach, Quilpie (Qld); Coober Pedy, Murat Bay, Roxby Downs (SA); Coolgardie, Exmouth, Laverton, Shark Bay (WA); King Island, Strahan (Tas); Daly, Jabiru, Nhulunbuy (NT).

APPENDIX B: RANZCR SURVEY OF STATE/TERRITORY MEMBERS OF THE RANCR WORKFORCE COMMITTEE

METHODOLOGY

The RANZCR surveyed State/Territory members of the RANZCR Workforce Committee to obtain their views on the adequacy of the current supply of radiologists and factors influencing the supply of, and requirements for specialist radiologists. A response was received from representatives of the Workforce Committee in all State/Territories.

RESULTS

The results are presented in two sections. First, responses to the question about the adequacy of the current supply of radiologists are presented. These are outlined in Table B1 by State/Territory to enable similarities and variations to be examined. Secondly, comments about factors influencing requirements for specialist radiologists are summarised, also by State/Territory in Table B2.

Supply Side Issues

In brief, the responses provided by State/Territory RANZCR Workforce Committee members indicate that:

1. Most States/Territories have problems recruiting and retaining specialist radiologists to work in rural areas and in some outer metropolitan areas. Overseas qualified radiologists are being employed to work in some of these hard to fill situations.
2. Salary differentials between private sector and public sector practice are putting strain on the recruitment of radiologists in the public sector in some States;
3. Changes occurring in the practice of radiology are resulting in radiologists nearing retirement age contemplating retirement within the next few years;
4. Some States have particular supply problems. For example, in Queensland there is a shortage of training positions and of RANZCR accredited qualified radiologists to provide appropriate supervision. Tasmania has problems recruiting and retaining both registrars and qualified radiologists. Western Australia indicated problems in recruiting radiologists to provide breast-screening services.

Table B1: Workforce supply-side issues raised by members of the RANZCR Workforce Committee

New South Wales
▪ Within New South Wales there are variable degrees of difficulty recruiting radiologists in the public sector. Generally, the metropolitan centres do not have a problem. On the other hand, fringe urban areas are having problems attracting and retaining staff. Several overseas trained doctors have been recruited. One hospital has also had problems recruiting radiologists with subspecialty skills and has a roster of interventional radiologists from other hospitals covering the service.
▪ The situation in the private sector is adequate.

Table B1: Contd.

Victoria

- There is an under supply of radiologists in private practice and in the public sector, with four funded positions in the public sector not filled.
- Recruitment of radiologists to work in rural regions is very difficult, as recent graduates tend to stay in the cities.
- Recent graduates tend to think that working in the public sector is more interesting, rewarding, and challenging and that it enables them to enhance their skills. Quite a number of the private radiology groups have been, or are in the process of being sold to larger corporations. There is no offer of partnership to attract young radiologists into the private sector. However, should there be a large salary differential between the public and private sectors the situation could change.
- A lot of recent graduates like to do further fellowship studies either locally or overseas after their basic training. This temporarily reduces the supply of radiologists. It is uncertain what the impact will be on the supply of radiologists when these people finish their fellowship and enter the workforce.

Queensland

Registrar training appears to be the primary limiting workforce supply factor. Due to increasing pressure on the State health budget there has been a significant decline in public hospital funding for registrar positions. The situation has been exacerbated by a shortage of College accredited staff specialists in public hospitals. This has led to difficulties in gaining fellowship training accreditation for new registrar positions or positions that may exist outside the traditional centres. There seems to be a general lack of effective interaction and cooperation between the public and private sector in generating the required number of registrar training positions. It should be noted that overseas trained radiologists employed in the public sector under area of need provisions must sit the RANZCR examination (viz., the full second examination). Once recognised they are available for training accreditation purposes.

South Australia/Northern Territory

Because supply depends on the number of radiologists currently in practice, the number of radiology residents and the rate at which radiologists leave work via retirement or maternity leave, the increasing number of female radiologists is relevant.

Western Australia

- There are some difficulties recruiting radiologists to provide breast-screening services;
- There are perennial difficulties attracting and retaining radiologists to work in rural and remote areas.
- There has been a rapid expansion of invasive procedures undertaken by diagnostic radiologists both in public and private institutions and this has increased the demands on the radiologist's time. As a result there is a shortage of radiologists and a need for additional radiologists to cope with the changing work pattern. Currently, Western Australia is not training a sufficient number of trainees to cope with the expected increase in demand.
- Other supply side issues include the pending retirement of up to 14 radiologists over the next 1-4 years.
- There are some difficulties in retaining junior trainees on the training program. It was noted that this will have some flow-on effect to the expected output of the training program in a few years.

Tasmania

Factors affecting the supply of radiologists in Tasmania were identified as:

- Difficulty recruiting local residents;
- Difficulty attracting radiologists;
- The department is perceived as unstable/unhappy;
- Registrars from interstate tend not to stay the course or leave once trained;
- Historically, Tasmania has a 'bad image' and has had to rely there being an 'overflow' from the mainland;
- Salaries at the Royal Hobart Hospital are approximately a third of those available in the private sector. However, the private sector is also experiencing recruitment problems;
- Corporatisation has resulted in one radiologist retiring, another dropping sessions and another returning to public practice.

Table B1: Contd.

Australian Capital Territory Factors increasing the supply of radiologists in the Australian Capital Territory include: ▪ A steady increase in the number of registrar positions and registrars entering the workforce; and ▪ Overseas qualified radiologists entering the workforce. Factors reducing the supply or delaying the supply of specialist radiologists in the Australian Capital Territory include: ▪ An ageing radiologist population with the number of retirements greater than the number of newly qualified radiologists entering the workforce; ▪ An increasing number of trainees undertaking Fellowships after the fifth year of training. This delays entry into the workforce; ▪ Occasional overseas sabbaticals being undertaken by qualified radiologists (ie to gain experience or undertake Fellowships etc., in areas such as intervention radiology or musculoskeletal radiology).

Source: RANZCR survey of State/Territory members of the RANZCR Workforce Committee

Factors Influencing Requirement for Specialist Radiologists

There is general agreement that the ageing of the population will increase requirements for imaging and for specialist radiologists. Other factors increasing requirements for radiologists include:

- increases in the demand for invasive complex images. These images demand greater radiologist time per image;
- increased demand for imaging to reduce the risk of medical litigation;
- increased patient demand for imaging as community awareness grows about the availability of new imaging technologies (eg musculoskeletal imaging); and
- the trend for registrars to extend their training period beyond 5 years by undertaking an overseas Fellowship.

There is general uncertainty among the workforce as to the likely future effects of transformations occurring in the structure of radiology practice due to mergers, the selling of practices and corporatisation.

Table B2: Factors influencing requirements for radiologists noted by members of the RANZCR Workforce Committee

Victoria ▪ Only a few positions are being made available in the public sector. It is difficult for recent graduates to obtain a hospital appointment. They require more experienced radiologists (eg interventional, MRI, nuclear medicine). ▪ In the private sector, demand is high at present. However, the private sector is transforming with mergers and selling of practices. The final impact of these changes on demand is uncertain (ie when only a few groups/corporates remain).
Queensland The impact on requirements for radiologists is difficult to predict because of the changes occurring in the structure of many radiology practices and in employment arrangements. Accelerated rates of retirements have been suggested as a possible outcome.
South Australia Factors influencing requirements for radiologists in the future will be related to any new technological advancements, changes in population and demography, changes in the health care system, the amount of imaging performed by non-radiologists and pressure to supply 24 hour on-site coverage at hospital sites.

Table B2 Contd.

Western Australia Factors influencing future requirements for radiologists include: ▪ Growth in the population (ie net increase in migration into the State from other States and from overseas migration); ▪ Ageing population; ▪ Accreditation guidelines for nuclear medicine where mandatory attendance on the patient seems to be required. A sunset period for radiology practices/non-nuclear imaging specialists expires in 2004; ▪ Positron Emission Tomography services will be introduced across Australia in the next 12-18 months and will require resourcing; and ▪ Further expansion of invasive procedures undertaken by diagnostic radiologists both in public and private institutions is likely to increase requirements for radiologists.
Tasmania The ageing of the population in this State will increase requirements for radiologists. This is not likely to be offset by the mild decline in the population.
Australian Capital Territory Factors likely to increase requirements for radiologists include: ▪ The requirement for the radiologist to be on-site; ▪ Ageing of the population on whom more imaging will be performed; ▪ Increased imaging to reduce the risk of litigation; ▪ Increased imaging as a result of patients demanding imaging as expectations increase and awareness of musculoskeletal imaging increases in the community; ▪ More complex and time consuming imaging.

Source: RANZCR survey of State/Territory members of the RANZCR Workforce Committee

APPENDIX C: AMWAC SURVEY OF DIVISIONS OF GENERAL PRACTICE

METHODOLOGY

To obtain information about the adequacy of the supply of specialist radiologists throughout Australia, AMWAC administered a mailed survey of all Divisions of General Practice between October 2000 and January 2001.

RESULTS

Response

Out of a total of 124 Divisions, 71 responded to the survey (a response of 57.3%), and 70 Divisions completed questionnaires.

Of the 70 completed questionnaires, 64.3% were from New South Wales, Victoria and Queensland, while 31.4% were from South Australia and Western Australia, and the remaining 4.3% were from Tasmania and the Northern Territory. Above average responses were received from Western Australia (80.0%), South Australia (71.4%) and Tasmania (66.7%) (Table C1). The response rate from Queensland (47.6%) was well below average.

Table C1: Number of Divisions of General Practice that responded to the survey, by total number surveyed and by State/Territory, 2000

	NSW	Vic	Qld	SA	WA	Tas	NT	ACT	Aust
Number completing questionnaire	19	16	10	10	12	2	1	-	70
Number surveyed	37	31	21	14	15	3	2	1	124
% response	51.4	51.6	47.6	71.4	80.0	66.7	50.0	-	56.5
Unable to complete questionnaire	-	-	-	-	1	-	-	-	1

Source: AMWAC 2000 survey of Divisions of General Practice

Distribution of Respondents

Table C2 shows that 53.6% of responding Divisions were located in a rural area while 46.4% were located in a metropolitan area. This response represents a bias toward rural Divisions given that throughout Australia, 52.8% of all Divisions are metropolitan based and 47.2% are located in a rural area.

New South Wales and Western Australia were the only States in which the representation of metropolitan Divisions was greater than that of rural Divisions.

Table C2: Distribution of responding Divisions of General Practice, by State/Territory and geographic location, 2000

	NSW	Vic	Qld	SA	WA	Tas	NT	Aust
No. of responding Divisions	*19*	*15*	*10*	*10*	*12*	*2*	*1*	*69*
Metropolitan %	63.2	40.0	30.0	40.0	58.3	-	-	46.4
Rural %	36.8	60.0	70.0	60.0	41.7	100.0	100.0	53.6
Total %	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
% of all Divisions located in a rural area	43.2	40.0	52.4	64.3	46.7	66.7	50.0	47.2

Source: AMWAC 2000 survey of Divisions of General Practice

Population Catchment

The majority (68.7%) of Divisions were located in geographic areas with populations of between 50,000 and 200,000 people, 13.4% of Divisions were located in areas with small populations between 15,000 and 50,000, and a further 17.9% were located in areas with populations of between 200,000 to 380,000 (Table C3).

Table C3: Size of the population catchment covered by Divisions of General Practice, by State/Territory, 2000

	NSW	Vic	Qld	SA	WA	Tas	NT	Aust
No. responding Divisions	*18*	***15***	*10*	*10*	*11*	*2*	*1*	*67*
Size of population	***Percentage of Divisions within State/Territory***							
15,000 – 50,000	5.6	-	10.0	40.0	18.2	-	100.0	13.4
>50,000 – 100,000	22.2	40.0	20.0	20.0	36.4	-	-	26.9
>100,000 – 200,000	38.9	46.7	60.0	30.0	27.3	100.0	-	41.8
>200,000 – 380,000	33.3	13.3	10.0	10.0	18.2	-	-	17.9
Total %	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Source: AMWAC 2000 survey of Divisions of General Practice

Size of Divisions

In total, 52.2% of Divisions had between 11 and 100 GPs associated with their Division, 25.4% had between 101 and 200, and 22.4% had more than 200 (Table C4). Of the 70 responding Divisions, 67 provided details of the number of GPs associated with their Division. A total of 8,910 GPs were associated with these Divisions.

Table C4: Number of general practitioners associated with responding Divisions of General Practice, by State/Territory, 2000

	NSW	Vic	Qld	SA	WA	Tas	NT	Aust
No. responding Divisions	*18*	*15*	*10*	*10*	*11*	*2*	*1*	*67*
Number of GPs	*Percentage of Divisions*							
11 – 50	16.7	-	10.0	40.0	36.4	-	100.0	19.4
50 – 100	22.2	60.0	40.0	20.0	18.2	50.0	-	32.8
101 – 200	27.8	13.3	50.0	10.0	27.3	50.0	-	25.4
201 – 300	22.2	26.7	-	20.0	18.2	-	-	17.9
301 – 686	11.1	-	-	10.0	-	-	-	4.5
Total %	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Source: AMWAC 2000 survey of Divisions of General Practice

Supply of Specialist Radiologists

Resident

Not surprisingly, Table C5 shows that the average number of resident radiologists in a given geographic location increases with the size of the population served by the Division. For example, in areas with population catchments of between 50,000 and 100,000, the average number of resident radiologists was 2, while in locations with populations of between 200,000 and 300,000, on average, the were 11.6 radiologists. However, these estimates should be interpreted with caution as some Divisions had commented that it was difficult to provide accurate estimates of the supply of resident radiologists in their area. Furthermore, there was variation in the way that GPs responded to the question. For example, some Divisions provided the actual number of resident radiologists, while others provided the number of radiology group practices.

Table C5: Estimated average number of resident radiologists providing services to people cared for by Division GPs, by size of the population served by the Division and by State/Territory, 2000

Size of population	NSW	Vic	Qld	SA	WA	Tas	NT	Aust
	Average number of resident radiologists							
15,000 – 50,000	0.0	-	0.0	0.0	3.0	-	0.0	0.4
>50,000 – 100,000	2.0	2.3	3.5	1.0	1.0	-	-	2.0
>100,000 – 200,000	9.3	4.0	6.3	4.0	27.0	3.5	-	7.6
>200,000 – 380,000	14.0	15.0	6.0	8.0	8.5	-	-	11.6
Total	**8.4**	**4.1**	**5.1**	**2.0**	**9.6**	**3.5**	**0.0**	**5.7**

Source: AMWAC 2000 survey of Divisions of General Practice

Visiting

Table C6 shows that, on average, Divisions estimate that there are 5.3 radiologists providing visiting services in their area, with the number increasing by size of population (ie from 1.6 in locations with populations of 15,000 to 50,000 to 11.4 in locations with populations between 200,000 to 300,000). As with responses about the supply of resident radiologists, these estimates should be interpreted with caution because of the problems that some GPs expressed in providing estimates of the number of visiting radiologists and variations in the way people responded to the question.

Table C6: Estimated average number of visiting radiologists providing services to people cared for by Division GPs, by size of the population served by the Division and by State/Territory, 2000

Size of population	NSW	Vic	Qld	SA	WA	Tas	NT	Aust
				Average number of visiting radiologists				
15,000 – 50,000	1.0	-	0.0	1.4	1.5	-	1.0	1.6
>50,000 – 100,000	1.7	4.8	0.0	0.5	3.5	-	-	2.8
>100,000 – 200,000	18.0	3.1	4.2	2.5	50.0	1.0	-	7.5
>200,000 – 380,000	11.3	15.0	5.0	-	15.0	-	-	11.4
Total	**9.7**	**4.7**	**2.5**	**1.4**	**10.3**	**1.0**	**1.0**	**5.3**

Source: AMWAC 2000 survey of Divisions of General Practice

Teleradiology

Table C7 shows that, on average, Divisions reported that there was one radiologist providing teleradiology services in their area. As with responses about the supply of resident and visiting radiologists, these estimates should be interpreted with caution because of the problems that some GPs expressed in providing estimates of the number of visiting radiologists and variations in the way people responded to the question.

Table C7: Estimated average number of radiologists providing teleradiology services to people cared for by Division GPs, by size of the population served by the Division and by State/Territory, 2000

Size of population	NSW	Vic	Qld	SA	WA	Tas	NT	Aust
				Average number of radiologists providing teleradiology				
15,000 – 50,000	1.0	-	0.0	0.8	-	-	1.0	0.7
>50,000 – 100,000	0.0	-	5.0	0.0	1.3	-	-	1.3
>100,000 – 200,000	0.0	1.75	0.0	0.0	0.0	0.5	-	0.6
>200,000 – 380,000	1.0	1.2	0.0	-	-	-	-	0.7
Total	**0.6**	**1.3**	**1.3**	**0.5**	**1.0**	**0.5**	**1.0**	**0.9**

Source: AMWAC 2000 survey of Divisions of General Practice

Adequacy of Access

In total, 31.8% of Divisions of General Practice considered that specialist radiologist services were either in short supply or totally inadequate (3% indicated that it was totally inadequate) (Table C8). In all, 66.7% of Divisions considered that access was about right, while one metropolitan based Division in New South Wales thought there was an oversupply. There was an association between the geographic location of Divisions and perceptions of adequacy of access to specialist radiologists, with rural based Divisions more likely to consider access to services in short supply than metropolitan based Divisions ($p<0.01$).

Table C8: Adequacy of access to specialist radiologists by Divisions of General Practice, by State/Territory and metropolitan/rural location, 2000

State	Oversupply	About right	Short supply	Totally inadequate	Total
		Percentage of Divisions within State/Territory			
NSW (n=18)					
▪ Metroplitan	5.6	50.0	5.6	-	61.1
▪ Rural	-	22.2	11.1	5.6	38.9
Vic (n=15)					
▪ Metroplitan	-	40.0	-	-	40.0
▪ Rural	-	40.0	20.0	-	60.0
Qld (n=10)					
▪ Metroplitan	-	20.0	-	10.0	30.0
▪ Rural	-	20.0	50.0	-	70.0
SA (n=10)					
▪ Metroplitan	-	40.0	-	-	40.0
▪ Rural	-	20.0	40.0	-	60.0
WA (n=10)					
▪ Metroplitan	-	50.0	-	-	50.0
▪ Rural	-	20.0	30.0	-	50.0
Tas (n=2)					
▪ Metroplitan	-	-	-	-	-
▪ Rural		50.0	50.0	-	100.0
NT (n=1)					
▪ Metroplitan	-	-	-	-	-
▪ Rural	-	100.0	-	-	100.0
Aust (n=66)					
▪ Metroplitan	1.5	39.4	1.5	1.5	43.9
▪ Rural	-	27.3	27.3	1.5	56.1
Australian Total	**1.5**	**66.7**	**28.8**	**3.0**	**100.0**

Source: AMWAC 2000 survey of Divisions of General Practice

Additional Radiologists Required

Resident

A total of 11 rural based Divisions (15.7% of all responding Divisions) indicated a requirement for additional resident radiologists. In total, these Divisions required 16 additional radiologists, with most (62.5%) of these positions required by rural based Divisions in Victoria, Queensland and South Australia.

Table C9: Estimated number of additional resident radiologists required in rural areas covered by Divisions of General Practice, by State/Territory, 2000

	NSW	Vic	Qld	SA	WA	Tas	NT	Aust
Number of rural Divisions requiring additional radiologists	1	3	2	2	1	1	1	11
Total number of additional radiologists required	**1**	**4**	**3**	**3**	**1**	**3**	**1**	**16**

Source: AMWAC 2000 survey of Divisions of General Practice

Visiting

Table C10 indicates that a total of 10 responding Divisions (14.3% of responding Divisions) perceived a requirement for 21.6 additional visiting radiologists, with 81.5% of these additional positions required by Divisions in Queensland, New South Wales and Victoria. Nine of the 10 Divisions perceiving a requirement for additional visiting radiologists are rural based.

Table C10: Estimated number of additional visiting radiologists required in metropolitan and rural areas covered by Divisions of General Practice, by State/Territory, 2000

	NSW	Vic	Qld	SA	WA	Aust
Number of metropolitan Divisions requiring additional visiting radiologists	1	-	-	-	-	1
Number of rural Divisions requiring additional visiting radiologists	1	2	3	3	1	10
Total number of additional visiting radiologists required	**5.0**	**4.0**	**8.6**	**3.0**	**1.0**	**21.6**

Source: AMWAC 2000 survey of Divisions of General Practice

Teleradiology

A total of 9 rural based Divisions (12.9% of all responding Divisions) indicated a perceived requirement for additional radiologists providing teleradiology services. Table C11 indicates that responding Divisions perceived a requirement for 21 additional radiologists providing teleradiology services, with most (61.9%) of these additional positions required by rural based Divisions in Victoria.

Table C11: Number of additional radiologists providing teleradiology services required in rural areas covered by Divisions of General Practice, by State/Territory, 2000

	NSW	Vic	Qld	SA	WA	Aust
Number of rural Divisions requiring additional radiologists providing teleradiology services	2	3	2	1	1	9
Total number of additional radiologists required providing teleradiology services	**4.0**	**13.0**	**2.0**	**1.0**	**1.0**	**21.0**

Source: AMWAC 2000 survey of Divisions of General Practice

Additional Comments Provided by Divisions of General Practice to Inform the AMWAC Specialist Radiology Workforce Working Party

Divisions of General Practice were invited to comment on access to Radiologists in their area, including patient waiting times. In total, 60 Divisions provided comments and of these, 41.7% were metropolitan based and 58.3% were rural based. These comments were analysed by State and Territory and by geographic location. The main themes to emerge addressed issues of access, teleradiology, private sector monopolies, shortages of radiographers and ultrasonographers and concerns about

the role, remuneration and training of GP providers of radiology and radiography services in rural areas.

The following selected comments provided by Divisions of General Practice elucidate these themes:

Issues of access to specialist radiology services

New South Wales

- Waiting times for MRI access is unacceptably long - months for people with Multiple Sclerosis (metropolitan Division).
- Most services are visiting which makes follow-up or GP inquiries difficult (rural Division).
- Reporting time is too long (rural Division).
- The population in this Division is not lucrative for radiologists as it consists of public patients. Often patients wait over 24 hrs for results, 72 hrs for a weekend test. No tuition or CME is available to GPs. Films are often not read by the same person. In general, the population served by this Division is highly unwell. There is a high incidence of heart disease, diabetes, trauma, and bleeds (rural/remote Division).
- There is a need for ultrasound availability especially for emergency work. Elective CT and MRI are very difficult to access at the Base hospital, which is not in the Division area, and travel time can be up to 3 hours for patients. Private radiology is available in the Base hospital town but this service is not available to public in-patients. There is no ultrasound available in most towns (rural Division).
- No high quality gynaecological ultrasound is available, otherwise the supply of radiologists is adequate. Waiting times are acceptable but patient transport to access services is a problem (metropolitan Division).

Victoria

- There are two CT scanners in the Division - one of which is still being installed so not yet operational. These get limited use due to visiting radiologist on only two half days a week. No MRI facilities. Minimal interventional radiology done. The mammography facility is only used on a part-time basis. For ultrasound, patients may have to travel outside the district for urgent scans. Some sites have no visiting radiologist or teleradiology. All films are sent away for reporting (rural Division).
- Ultrasonography is only available 1-2 half days per week in a small number of centres and daily in one centre. CT scanning is only available in 1 centre daily and a different centre on weekends. Interventional radiology is only available in one centre 3 - 4 hrs per day for 3 days per week (rural Division).
- After hours there is very limited and sporadic access to plain radiological services in some centres (rural Division).
- GPs in smaller towns have no access to after hours and weekend radiography/radiology services. Most of the GPs have remote area exemption because they are running small acute hospitals as VMOs. They frequently need to do routine type x-rays. They have enrolled at the Australian College of Remote & Rural Medicine for the Continuing Medical Education/Quality Assurance requirement.

- There is poor after hours cover. There is no competition. Provision of service cannot be responsive enough to urgent or semi-urgent situations due to an insufficient radiology workforce.

Queensland

- Once GPs are outside of the city of Mackay the services are totally inadequate (rural Division).
- Public waiting times for MRI etc. are much longer than private (North Queensland).
- There are only visiting services to Ayr and Ingham from Townsville, and visiting services to Mt Isa 2 days per week from Brisbane. An ultrasonographer visits from Townsville 2 - 3 days per week.
- There is a totally inadequate service after hours and on weekends. A service could easily be provided by teleradiology if it was set up well and was convenient to use (Far North Queensland).
- Private radiology fees are an access barrier for some patients and discounts are not common. Private radiology fees which leave patients out of pocket by $70 to $80 are a barrier to access for some patients.

South Australia

- Visiting services often have a radiographer without a radiologist so films have to go to Adelaide for reporting and then sent back. This increases the potential for films and reports to be lost (rural Division).
- A private group of radiologists provides most x-ray/ultrasound/CT scans and nuclear medicine investigations. Full time resident radiographers are available full time including after hours on-call-back. Radiologists visit only Tuesday, Wednesday, and Thursday each week (rural Division).
- The general feeling is that regionally it would be good to have access to a radiologist on a daily basis rather than 0.4 FTE as it currently stands. Patient waiting times are reasonable (rural Division).
- There is only a GP service, patients have to travel to access other service (rural Division).
- GPs need better access to CT (rural Division).
- No bone density or CT scans are available (rural Division).
- No MRI services are available (rural Division).
- Improvement in the quality of obstetric ultrasound reporting and provision of diagnostic imaging especially CT scan is required in the regional centre (rural Division).
- There is no difficulty in getting access to a private radiologist. It is more difficult to get radiology operators in the public hospital (rural Division).

Western Australia

- Radiology services are provided by the Health Department of Western Australia under a contract with a Perth based radiology provider. Regular 4 - 6 week visits by a radiologist for procedural radiology occur in the more major towns. This is generally adequate as is the reporting time on x-rays and ultrasound sent to Perth but on occasions of increased demand or urgent cases, improvement would be desirable. A resident radiologist would be nice (rural Division).

- Access is good in Geraldton but rural areas have limited access and lots of travel is involved.

Northern Territory
- Often places fill up quickly and people are then forced to travel to Adelaide (Central Australia).
- Tennant Creek has a visiting radiologist and ultrasonographer on a monthly basis only.
- Presently, the Alice Springs Hospital is serviced by a private service provider from Adelaide. Specialists arrive about mid-day on Monday and leave Alice Springs on Friday at about the same time. Mammograms need to be done and read on Tuesdays to Thursdays in case further films are requested. CT scans done on weekends are read by surgeons or physicians in the emergency department. Ultrasonographers are excellent and they are available after hours for emergency scans. Fortunately we have excellent radiographers and ultrasonographers which are resident in Alice Springs and are likely to remain in this area.
- CT scans are available but patients must travel to Adelaide or Darwin for MRI (Central Australian).
- Access to radiology services in Alice Springs Hospital is available from Monday to Friday only.

<u>Teleradiology services - variability in supply and quality</u>

Victoria
- There is occasional use of teleradiology at two sites in South Gippsland although in theory it is available 24 hours a day at these sites.

Queensland
- Teleradiology would be of immense assistance.

South Australia
- Teleradiology is available but slow and awkward especially for GPs and hospitals that are remote from the regional centre.

Western Australia
- After hours reporting of specialised scans is done by teleradiology and can cause problems because of reduced resolution.
- Better teleradiology would provide some improvement in services.
- Improvements in teleradiology must continue.

<u>Concerns about private sector service provider monopolies</u>

New South Wales
- For the future, the only concern is lack of competition with only 2 service providers, namely public sector and one private sector group. There is some concern that the price of services could go up and that this would impact on access.
- There is much concern regarding the monopoly on services that exists in our area. I believe the lack of competition has resulted in the loss of MRI facilities. An MRI is desperately needed not only to address patient needs but to sustain and recruit doctors both specialists and GPs.

Victoria

- There is currently a radiology service provider monopoly. It would be better to have more competition that would encourage greater flexibility in service provision.

Tasmania

- Our understanding of the Australian Competition and Consumer Commission ruling is that the service cannot be amalgamated to provide a single monopoly. Such an arrangement would, however, alleviate some of the difficulties that our current provider faces in covering for leave, sickness, retirement etc and in capital investment for new technology, training, etc.

Inadequate supply of radiographers and ultrasonographers in some areas

New South Wales

- The area has difficulty with recruiting ultrasonographers.

Victoria

- Of greater concern than the supply of specialist radiologists is the availability and recruitment of radiographers and ultrasonographers, especially in smaller towns.
- The main problem is the shortage of ultrasonographers and radiographers in the public system.
- Access to more radiographers is an area of greater concern than radiologists to read films.

Western Australia

- The main problem is access to competent ultrasonographers in specialised areas such as obstetrics.

The role, remuneration and training of GP providers of radiology and radiography services in rural areas

- In some small rural towns basic radiology services are provided by GPs and considered appropriate in terms of access, workload, and cost etc.
- Many local rural GPs provide radiology and radiography services to patients to obviate long distance travel for minor problems. Requirements of licencing due to come into effect on 1/1/01 will obligate such GPs to undertake quality assurance (QA) activities. This QA program is good but the financial burden of this imposed QA activity requirement should be looked at in the context of service provision to remote patients. Specific funding should be set aside and administered by State Board organisations such as the General Practice Divisions of Victoria to reimburse GPs willing to provide this service. Maintaining quality is of course an administrative goal, reducing services should not be the consequence.
- The inter-relationship of specialist radiologists to GP radiology has been ignored by Government. Last year fees for general radiology services (other than CT scans) were all reduced following agreement with the College of Radiologists. No consultation occurred with rural GP radiologists. Now rural and remote patients and rural/remote GP radiologists receive lower Medicare Benefits Schedule rebates. This has reduced rural people's access to radiology services. AMWAC should consider GP radiology services in its deliberations and recommendations. To only request information about specialist radiologists is adding to the decline of rural health services.
- In small towns it is not financially feasible for specialist radiologists to provide a 24 hour service. Acute hospitals, however small, need a 24 hour service. This service is provided by GPs for very inadequate remuneration.

Suggestions for improving service provision and access to radiology services

Victoria

- Most general practices in the division are becoming fully computerised and demanding e-mail transfer of radiological reports. Could be more use of teleradiology.
- Teleradiology is improving reporting turnaround in smaller centres for plain radiography.
- GPs should be able to directly refer their patients for MRI.

Queensland

- With Telemedicine facilities being installed into local hospitals, it is likely that this technology will be used for the occasional difficult film that needs an urgent report.

Western Australia

- Assess referral patterns. Enhanced use of visiting sonographers and radiologists. X-ray interpretation training for rural solo GPs who have access to X-Ray machines that can provide limb and chest X-Rays. Sonographers could do country run to smaller towns for non-urgent ultrasound scans.

APPENDIX D: AMWAC SURVEY OF STATE AND TERRITORY HEALTH DEPARTMENTS

METHODOLOGY

AMWAC conducted a mailed survey of all State/Territory health departments in order to obtain information about the adequacy of access to specialist radiology services in the public sector. The survey was conducted between October and December 2000. The survey sought information about patient waiting times and any plans to enhance access to specialist radiology services for rural people. Seven of the eight States/Territories responded to the survey.

RESULTS

The results are summarised under four headings, namely, adequacy of access, services to rural areas, plans to enhance services to rural areas and problems of recruitment and retention.

Adequacy of Access

In brief the findings indicated variation by State/Territory in the perceived adequacy of the supply of specialist radiologists in the public sector. For example, the response from Western Australia indicated that supply was adequate, while most other States and the Northern Territory expressed problems recruiting and retaining specialist radiologists in the public sector. This situation was thought to be due to financial and lifestyle disincentives associated with work in the public sector, particularly, the income discrepancy between working in the public sector and working in the private sector.

In New South Wales retaining and recruiting radiologists in the public sector were major issues for both staff specialist positions and visiting medical specialist positions. There were funded vacancies for radiologists in some areas, with a tertiary level facility and in some cases these were attributed to the lack of MRI facilities.

In Victoria, regional hospitals were reported as not having identified radiology as a priority under the Commonwealth's Advanced Specialist Training Program. However, the Department of Human Services had received five requests from regional rural centres to support temporary visas for overseas trained radiologists in the past two years.

Queensland Health indicated that there were shortages of radiologists in large provincial hospitals with resultant heavy workloads, which made it difficult to service the reporting needs of smaller rural centres that feed into these hospitals.

In South Australia, nuclear medicine and MRI services are offered by two of the eight teaching hospitals with most nuclear medicine studies done on an outpatient basis, while some MRIs are conducted as emergency cases. This is posing difficulty for the hospitals that have to transfer unstable patients, sometimes up to 400 km to obtain services. These difficulties are reflected in the relatively long waiting times for MRI

patients and the number of patients waiting to receive these services (Table D1). Apart from MRI, the rest of the services in this State were reported as adequate.

Table D1: Average patient waiting times in the public sector for services provided by specialist radiologists, Metropolitan, South Australia, 2000

	Average waiting times	Average number of patients waiting
Xrays	0	0
Ultrasound	1 week	10
CT Scan	1-2 weeks	10
MRI Scan: Adult	4 weeks	25
Paediatrics	8 weeks without GA 8 weeks with GA	
Nuclear Medicine	1-2 weeks	10
Angiography	1-8 weeks depending on bed availability	25

Source: AMWAC 2000 survey of State/Territory health authorities

Western Australia reported that overall the State has an adequate supply of specialist radiologists. The average waiting time for Category 1 specialist radiology services was reported as 30 days and for Category 2 services was 90 days, with an average of 30 patients on the waiting list for Category 2 services. The latter was mainly attributed to a shortage of technicians. The supply of consultancy services to rural areas was also reported as adequate. No rural sites in this State provided radiotherapy services.

Tasmania reported that inability to recruit qualified staff specialists has resulted in a significant reliance on radiology registrars in the two main public hospitals. This has occurred despite the availability of income packages for radiologists of around $175,000 per annum. Adequate staffing of public hospitals by full time specialists would assist these hospitals to improve functions such as:

- training and supervision of registrars;
- research;
- undergraduate and postgraduate teaching;
- equipment assessment and planning;
- administration;
- consultation with the clinical specialists ordering investigations; and
- quality improvement.

The Northern Territory reported a shortage of radiologists and believed there was need for the training of additional radiologists. Darwin and Alice Springs hospitals were reported to outsource radiology services, not because it is cheaper, but because radiologists are not available in these remote regions. The workload for radiologists providing services in these regions is high. Patient waiting times for all radiology procedures in the Top End of the Territory were reported to be less than 4 weeks, usually less than 2 weeks. Some studies such as MRI and cardiac angiograms are not performed or are performed in a limited fashion in the Territory, hence, patients are transported interstate for these services. The Northern Territory has a single radiology practice in Darwin and is planning to install a new MRI and cardiac angiogram suite in Darwin within the next 3 months.

Provision of Services to Rural Areas

The response from South Australia provided a description of radiology services to rural areas and this is reported here as it provides insight into the provision of radiology services outside of metropolitan areas.

In South Australia, most rural hospitals have the ability to take basic x-rays. Accredited nursing staff and GPs usually do these. The x-rays taken on-site are then forwarded to larger regional hospitals or to private radiological firms for reporting. The main concerns raised by country hospitals were the need for radiologists to provide adequate training and refresher courses for their staff, as well as the need for feedback to technicians regarding the quality of the films taken and strategies for skill enhancement. Other concerns related to the maintenance and upgrading of x-ray machines.

For ultrasound, most rural hospitals refer their patients to the larger regional hospitals or private firms. The few smaller rural hospitals with their own ultrasound machine either have sonographers on site or have to contract private radiologists on site. Such private services, when available, are normally provided on a 1-4 days per week basis. In recent years, there has been an increasing demand for ultrasound services. Driving this increase in demand is the increasing use of ultrasound as a first-line diagnostic tool to many medical and obstetric conditions in country practice. It is also frequently used to help country hospitals decide on the most appropriate mode of transport for patients requiring referral to tertiary centres. On average, patients wait 1-14 days for ultrasound studies and the average number of patients waiting in rural regions is around 15.

Only the large regional rural hospitals in South Australia provide CT scans and no rural hospitals provide MRI or nuclear medicine services.

The Northern Territory indicated that it only has two cities with populations greater than 25,000 people. Hence, it is difficult to justify a resident radiologist in any other town besides Darwin. Sonographers visit some rural sites and perform ultrasound examinations for radiologists in the main sites to report.

Plans to Enhance the Provision of Services to Rural Areas

Most States with shortages of radiologists in rural areas had plans to enhance the provision of radiology services to these areas through the implementation of new electronic transmission and reporting systems (eg PACS) and the expansion of existing teleradiology networks and the types of examinations that are reported using teleradiology.

The response from New South Wales noted that there were limitations to the type of conditions that can be managed and treated appropriately and adequately at a rural location. For example, the majority of MRI scans are performed for neurological, neurosurgical and orthopaedic (back) conditions which often require intervention at a Level 6 service. Other States were limited by a lack of available funds for the expansion of these services.

Some health authorities indicated that they were exploring contracting with private providers for the provision of radiology services to some rural areas and also for the expansion of MRI services.

Tasmania reported that it had a program in place to provide training to rural GPs to enable them to take and read x-rays of extremities.

Recruitment and Retention

A common theme running through the responses from State/Territory health authorities was the problem of recruiting and retaining radiologists to work in the public sector. Factors associated with this problem included the personal income differential between private and public sector radiology practice with health authorities indicating that it was impossible for the public sector to compete on this basis. New South Wales commented that public sector work can only be attractive if the work environment is adequately resourced with modern technology and assuming that the terms and conditions of employment are perceived by the respective individual to be fair and adequate. A lack of MRI facilities in a number of tertiary public sector hospitals was seen as a deterrent to recruitment, while increased workloads were reported as leading to increased levels of stress among radiologists with associated retention problems.

APPENDIX E: AMWAC SURVEY OF BREASTSCREEN AUSTRALIA PROGRAMS

METHODOLOGY

AMWAC conducted a mailed survey of all State/Territory program managers of BreastScreen Australia in consultation with the BreastScreen Australia Workforce and Training Group. The objectives of the survey were to gain 'consumer' comment on:

- the number of specialist radiologists providing services for BreastScreen Australia programs;
- the type of specialist radiology services required by these programs;
- satisfaction with access to these services;
- the adequacy of the current supply of specialist radiologists; and
- anticipated future demand for services by BreastScreen Australia with particular reference to the impact of accreditation standards.

The survey was conducted between October 2000 and April 2001. All State/Territory Program Managers responded to the survey and the draft report of findings was circulated to Program Managers for their review and validation.

RESULTS

Type of Specialist Radiology Services Required by BreastScreen Australia Programs

In the main, the type of services required from specialist radiologists by BreastScreen Australia programs include:

- Reading and reporting of screening mammograms;
- Performance of diagnostic imaging procedures in BreastScreen assessment clinics and reporting of the same;
- Attendance and presentation at local multidisciplinary clinical review meetings;
- Participation in local pathology review correlation meetings;
- Review and development of BreastScreen clinical policies and procedures;
- Retrospective review of interval cancer films;
- Provision of advice on specific clinical issues to managers within the BreastScreen service;
- Participation in the delivery of components of statewide training;
- Professional supervision and training of other radiologists and radiographers within the BreastScreen service;
- Participation in accreditation processes for existing and new services. It is a BreastScreen Australia National Accreditation requirement that each service have a 'designated radiologist' responsible for those aspects of screening and assessment related to radiology including the quality assurance program; and
- In some situations, the chief radiologist has an administrative role as director of the BreastScreen service.

Number of Radiologists Providing BreastScreen Australia Services

Table E1 shows that throughout Australia 299 specialist radiologists were either employed on a part-time basis, or were contracted to provide sessions, by BreastScreen Australia.

Table E1: Number of radiologists employed or contracted in by BreastScreen Australia, 2001

State/Territory	Number of radiologists providing services	Employment status
NSW	129	All employed or contracted on a part-time or sessional basis
Victoria	61	All part-time
Queensland	49	1 full-time and the rest part-time
South Aust.	21	All part-time
West. Aust.	14	All part-time
Tasmania	6	All part-time
North. Terr.	6 to 8	All part-time
ACT	7	All part-time
Australia	**299**	**1 full-time and the remainder part-time**

Source: AMWAC 2001 survey of State/Territory program managers of BreastScreen Australia

In its response, BreastScreen Northern Territory noted that it operates under different conditions to anywhere else in Australia due to its geographical isolation, low numbers of eligible women and lack of resident specialist radiologists. The Territory relies on specialist radiologists from interstate programs, predominantly South Australia. Each of the local services has an agreement with a different group of radiologists to read films and provide radiological cover for assessment clinics. Darwin provides monthly assessment clinics (11 per year) and Alice Springs provides six per year.

Adequacy of Current Supply of Specialist Radiologists

Table E2 indicates that BreastScreen Australia programs in four States (New South Wales, Victoria, Queensland and Western Australia) and the Australian Capital Territory consider that the availability of specialist radiologists is inadequate. On the other hand two States (South Australia and Tasmania) consider that the supply of specialist radiologists is sufficient to meet the current demand for BreastScreen Australia services. In the main, the assessments provided by BreastScreen Australia Programs are consistent with the assessments provided by State/Territory health authorities (Appendix D) apart from Western Australia. Health Western Australian reported that the supply of specialist radiologists in the public sector was adequate, while the BreastScreen Program in this State reported that supply was insufficient to meet current demand. BreastScreen Northern Territory indicated that the costs associated with providing a visiting service were relatively high. Furthermore, because specialist radiologist services were provided on a visiting basis involvement in other activities, such as review and development of policy and procedures, was

either rushed or by electronic communication, and involvement in training activities was limited.

Table E2: Assessment by BreastScreen Australia Programs of the adequacy of the current supply of specialist radiologists, 2001

State/Territory	Current supply adequate to meet demand	Current supply inadequate to meet demand
NSW	4 out of 9 services (3 were Sydney-based and the other in a large metropolitan centre)	5 out of 9 services (1 Sydney-based and 4 were located in rural areas)
Victoria	-	Supply insufficient to meet demand
Queensland	-	Supply insufficient to meet demand
South Aust.	Supply sufficient to meet demand	-
West. Aust.	-	Supply insufficient to meet demand
Tasmania	Supply sufficient to meet demand	-
North. Terr	-	High cost associated with providing a visiting service
ACT	-	Supply insufficient to meet demand
Australia	**2.5 of 8 States/Territories**	**5 of 8 States/Territories**

Source: AMWAC 2001 survey of State/Territory BreastScreen Australia Programs

The response from BreastScreen New South Wales indicated that issues associated with an inadequate supply of specialist radiologists include:

- little flexibility to cover leave, third reading and occasional extra assessment clinics;
- increased demand for radiological services for BreastScreeen Services that have not yet reached target participation rates;
- difficulty attracting specialist radiologists to rural areas; and
- inability to access the required training in breast imaging procedures for radiologists to work in the BreastScreen Program.

Estimated Number of Additional Radiologists Required to Meet Current Demand

In total, BreastScreen Australia programs considered that 31 to 34 additional (part-time) specialist radiologists were required to meet the current demand for services (Table E3). New South Wales and Victoria indicated that they required an additional 21 radiologists (New South Wales 11 and Victoria 10), Queensland required 3 to 5, Western Australia 4 and the Australian Capital Territory 3 to 4.

Table E3: Requirements for additional specialist radiologists to provide services for BreastScreen Australia Programs, 2001

State	NSW	Vic	Qld	SA	WA	Tas	NT	ACT & south east NSW	Aust.
Number required	11	10	3 to 5	-	4	-	-	3 to 4	31 to 34

Source: AMWAC 2001 survey of State/Territory BreastScreen Australia Programs

Satisfaction with Access to the Services Provided by Specialist Radiologists

Table E4 indicates wide variation by State/Territory in levels of satisfaction with access to the services provided by specialist radiologists by sector (ie private sector and public sector). BreastScreen South Australia considered that access to services

was about right. In New South Wales, three to four screening and assessment services out of a possible nine also considered access to be about right, while six screening and assessment services were dissatisfied with access to public sector radiologists and five with respect to private sector radiologists. Similarly, in Victoria the BreastScreen Progam was dissatisfied with access to services from both sectors. BreastScreen programs in Queensland, Western Australia and Tasmania indicated the greatest dissatisfaction with access, particularly with respect to the public sector.

BreastScreen Northern Territory expressed dissatisfaction with the restrictions placed on the number of specialists radiological services provided per week (viz., 80 per week) because of the inconvenience caused to women users of the service. The Program believes that an increase in specialist radiological services for the Territory would enable a more equitable service to be provided to the women of the Territory. However, the program acknowledged that this would be at an increased cost and the cost-effectiveness of the service would need to be considered.

Table E4: Satisfaction with access to the services provided by specialist radiologists for BreastScreen Australia Programs, 2001

State/Territory	About right		In short supply		Totally inadequate	
	Public sector	Private sector	Public sector	Private sector	Public sector	Private sector
NSW (9 services)	3/9	4/9	6/9	5/9	-	-
Victoria	-	-	Yes	Yes	-	-
Queensland	-	-	-	Yes	Yes	-
South Aust.	Yes	Yes	-	-	-	-
West. Aust.	-	-	-	Yes	Yes	-
Tasmania	-	Yes	-	-	Yes	-
ACT	-	-	-	Yes	-	-

Source: AMWAC 2001 survey of State/Territory program managers of BreastScreen Australia

Comments provided by BreastScreen Programs in each State/Territory confirmed statements provided by State/Territory health authorities (Appendix D) with respect to the significant impact that the disparity in public sector and private sector levels of remuneration were having on their ability to recruit radiologists. As a result of this situation public sector services were experiencing problems in recruiting specialist radiologists. Other considerations include the risk of litigation, problems specific to rural services, such as not having specialist radiologists available to attend multidisciplinary assessment sessions and the comparatively high cost of contracting services to private radiology practices.

Future Demand for Specialist Radiologists by BreastScreen Australia

Table E5 shows that, in the main, BreastScreen Australia Programs expect demand for the services provided by specialist radiologists to increase. Most BreastScreen Programs anticipate an increased demand for their services and a shortage of specialist radiologists available to work in their services in the future. The exception to this was BreastScreen South Australia. Factors influencing an expected increase in demand for BreastScreen Australia program services include population growth and ageing and increased client participation in the BreastScreen Australia program. As a result the number of initial screens and re-screens is expected to increase and with this, the number of diagnostic imaging procedures to be performed is expected to increase.

Table E5: Expected future demand for radiologists to provide services for BreastScreen Australia Programs, 2001

State/Territory	Increase	Stay the same	Decrease
NSW (9 services)	6	3	-
Victoria	Yes	-	-
Queensland	Yes	-	-
South Aust.	Yes	-	-
West. Aust.	Yes	-	-
Tasmania	Yes	-	-
North. Terr.	Yes	-	-
ACT	Yes	-	-

Source: AMWAC 2001 survey of State/Territory program managers of BreastScreen Australia

The shortage of radiologists available to provide BreastScreen services in some rural areas is expected to increase due to the pending retirement of radiologists in these areas.

The likely consequences of expected shortages of radiologists to provide BreastScreen services include:

- inability to meet optimal client participation rates;
- increased waiting time between the time of screening and the time of screen reading by the radiologist with a resultant delay in providing screening results to clients and their GPs;
- increased waiting time for further assessment/diagnosis for women with screen-detected abnormalities;
- a possible decrease in client participation rates as clients drop out of the Program due to dissatisfaction with waiting times and availability of services;
- failure to meet BreastScreen Australia National Accreditation requirements regarding timeliness of service delivery;
- failure to meet BreastScreen Australia National Accreditation requirements regarding the level of training and experience required of radiologists working in the Program. This may occur if the screening and assessment services are unable to attract radiologists with the desired training and experience in mammography;
- increased workload and subsequent decreased job satisfaction of radiologists already working in the Program;
- restrictions on the capacity to provide the required screening and assessment services thereby reducing the Program's ability to meet required participation rates; and
- consideration of alternative models of service delivery.

Expected Impact of Accreditation Standards on the Services Provided by Specialist Radiologists for BreastScreen Australia Programs

Comments provided by BreastScreen Australia Programs about the likely impact of BreastScreen Australia National Accreditation Requirements indicated that where there is a current and expected future shortage of radiologists, these Programs anticipate experiencing difficulties in meeting accreditation requirements. The response from New South Wales outlined the BreastScreen Australia National Accreditation requirements that are directly influenced by the availability of radiologists as including:

- *95% of women to be notified of results of screening within 10 working days of the date of screening*
  A shortage of radiologists will result in time delays in screen reading and therefore delays in providing screening results to women.
- *Interval of <=10 working days for >90% of recalls*
  A shortage of radiologists will result in restricted capacity at recall/assessment clinics causing further delay in the diagnostic process.
- *For women requiring early review, there is a requirement that within six months, each woman must have an outcome*
  A shortage of radiologists and the resultant restrictions on capacity will result in delays in meeting the early review timeframe.
- *Radiologists responsible for screening mammography will have an acceptable level of formal training and experience in mammography*
- *A radiologist working at an accredited assessment centre/service will have an acceptable level of formal training in the radiological assessment of women with abnormal screening mammograms*
  An insufficient supply of radiologists with the desired skills and experience in mammography may influence the screening and assessment service's ability to maximise the detection rate of small breast cancers with a minimal assessment recall rate and minimal interval cancer rate.
- *In the BreastScreen Program, all screening films should be read independently by two readers, at least one of whom must be a radiologist, with the reports being combined into a single recommendation*
  Currently, eight out of nine BreastScreen New South Wales Screening and Assessment Services use two radiologists for screen reading. One service utilises a breast physician for one of the reads. Discordant calls by screen-readers may be resolved by a third radiologist reader or by consensus between the two readers. The use of two or three radiologists in the screen-reading process is acknowledged to be resource-intensive but necessary by Screening and Assessment Services for reasons relating to medical professional boundaries as well as mitigating medico-legal risk.

Additional Comments

Additional comments provided by BreastScreen Australia Program Managers to inform the Working party indicated that while these programs share common workforce supply problems, there is variation among State/Territories in the severity of the problem and in the way this issue is being addressed. Among the issues commented on were:

- Problems of recruitment of radiologists. In Western Australia these problems were associated with the low status ascribed to breast screening work by radiologists. This State proposed a compulsory 3 month registrar BreastScreen training requirement and clinic attendance to enhance the exposure of new radiologists to this work;
- The take over of private radiology services by large corporations and the inability of public sector providers to compete with the higher rates being paid to radiologists in the private sector;
- The low priority ascribed to funding breast screening services. In some rural areas, the services provided by BreastScreen Australia may not be considered a priority by health services whose resources are already stretched to provide more

basic or emergency radiological services or indeed by the specialist radiologists who are in such short supply in these areas;

- The unknown potential of teleradiology (using digital technology for screen-reading) to address radiologist supply problems in rural areas. For example, it could be that teleradiology could reduce the requirement that the radiologist physically attend the BreastScreen Service to perform screen-reading. New South Wales indicated that this may be particularly useful for rural Screening and Assessment Services. This State also noted that computer-assisted technology may reduce the requirement for two clinicians to perform screen-reading;
- Victoria indicated that there was a need for a strategic approach to workforce planning at the local level and also suggested that incentives should be considered for radiologists to provide BreastScreen services in rural areas. This State also suggested that the profile of the screening program may need to be lifted together with the important role that radiologists play;
- The medico-legal environment can be stressful for some radiologists in a screening program. As a result programs need to consistently provide professional development that ensures that radiologists are aware of the best risk management practices;
- A lack of control by BreastScreen Australia services over the workforce, or in workforce planning, eg holidays, sabbaticals etc. This arises because, for most radiologists, screening is a secondary role. Adequate rostering relies on advanced planning by service management including advanced liaison with providers;
- Tasmania noted that the program is currently reliant upon a single private practice for clinical services with the public sector suffering a shortage of radiologists in general. Because of this shortage the public sector does not currently have the specialised capacity to provide BreastScreen radiology services;
- The Northern Territory commented that there is potential for the accreditation process to be influenced by the current arrangement of specialist radiological cover. Special concessions are already being made due to remoteness (eg film reading time which incorporates two-way interstate transportation), the infrequency of assessment clinics (6-11 clinics per year) and associated infrequent clinical review meetings. Any minor disruption to the already compromised service can cause major problems to the service and its clients.

Conclusions

The Working Party concluded that the level of perceived shortage evident in the responses from BreastScreen Australia Program Managers was not an indicator of an overall national undersupply of specialist radiologists. It did, however, indicate that, nationally, there is no oversupply. Furthermore, the Working Party concluded that there is a definite shortage of radiologists in Queensland. In other States the reported shortages are more likely to reflect the fact that some radiologists do not find this work attractive. It was believed that the work may be perceived by some radiologists as being of low status. For many radiologists the provision of breast screening services tends to be an add-on job that they do after their regular work hours.

APPENDIX F: THE EFFECT OF CORPORATISATION AND GLOBALISATION ON THE RADIOLOGY WORKFORCE

During the past three years, many radiology practices throughout Australia and, to a lesser extent New Zealand, have been acquired by groups or corporations not previously associated with medical imaging: so-called corporatisation. Some of these groups were already listed on the stock exchange eg. Mayne, Sonic Health, others subsequently listed after acquisition eg. Medical Imaging of Australasia, while others have indicated the likelihood of listing some time in the future eg. I-Med. It is likely that this process will continue and within several years the majority of private radiology performed in Australia will be undertaken by such corporations with the possibility that they may also move into the public sector. There are many possible scenarios and therefore it is difficult to estimate the overall effect of this rapid change on the number of radiologists required in the immediate and long term future. The impact of medical imaging and healthcare consolidation/corporatisation on medical imaging utilisation is also very difficult to predict and is subject to many variables, including future healthcare delivery systems, funding mechanisms and regulatory factors.

There is a possibility that many of the older radiologists who have been corporatised may take the opportunity to retire in the near future. In most cases, such radiologists are committed to a five year period after corporatisation and this could lead to a significant number of radiologists retiring or reducing their contribution during the next three to five years. However, at the same time many older radiologists do continue to work part-time after retirement which could reduce the effect of this. There is also a possibility that corporations may expect individual radiologists to become more efficient and increase their productivity while the overall corporate structure may allow the more efficient utilisation of radiologists. On the other hand it is argued by some that corporatisation will lead to loss of incentive because of reduced control of standards, income etc. and therefore individual radiologists will be less willing to undertake the number of examinations currently performed.

Because of the likely total or partial retirement of many of the older corporate radiologists during the next few years, at least in the short term there is a likelihood of a shortage of radiologists available to provide the level of service expected in Australia and New Zealand. Therefore it would be inappropriate to reduce the number of training positions in Australia or New Zealand at least in the short term. In fact an increase may be appropriate. The experience in pathology suggests that corporatisation has led to a shortage of pathologists and in view of the overall greater input required from radiologists to each individual examination, the potential for a shortage of radiologists is even greater. Another possibility is the fact that the corporatisation of radiology may make it less attractive as a specialty for future graduates.

Currently a number of radiologists in Australia are in fact reporting medical imaging studies undertaken in the United States of America via teleradiology, representing a form of globalisation of medical imaging. Such radiologists currently require recognition by the American Board or Radiology. However the standard of training and practice of medical imaging in Australia is highly regarded internationally and this practice is likely to increase particularly in view of the current foreign exchange

rate making reporting in Australia and New Zealand cheap by United States standards. This practice therefore has the potential to further reduce the workforce but at present it is difficult to estimate the overall effect this would have. However, it does present another argument for not reducing the current number of training positions and perhaps supporting an increase in training positions, particularly in New South Wales, Western Australia and Queensland. The converse situation (ie. Australian sourced medical imaging procedures being interpreted overseas) is a possible scenario, but currently there is no data suggesting that this is happening to any significant degree.

Michael R. Sage
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