

Australian Medical Workforce Advisory Committee

THE ORTHOPAEDIC SURGERY WORKFORCE

IN AUSTRALIA

AN UPDATE: 1998 to 2009

AMWAC Report 1999.2

March 1999

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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
AMPCo	Australian Medical Publishing Company
AMWAC	Australian Medical Workforce Advisory Committee
AOA	Australian Orthopaedic Association
Aust	Australia
DHAC	Department of Health and Aged Care
HIC	Health Insurance Commission
ICD-9	International Classification of Diseases - version 9
NSW	New South Wales
NT	Northern Territory
Pop	Population
Qld	Queensland
SA	South Australia
SPR	Surgeon:Population ratio
Vic	Victoria
WA	Western Australia

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TERMS OF REFERENCE OF AMWAC AND THE AMWAC ORTHOPAEDIC SURGERY 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 held its first meeting in April 1995.

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 Orthopaedic Surgery Workforce Working Party Terms of Reference

The AMWAC Orthopaedic Surgery Workforce Working Party was established as a sub-committee of AMWAC and was asked to provide a report to AMWAC which updated the 1996 AMWAC report on the orthopaedic surgery workforce, providing information on the optimal supply and appropriate distribution of specialist orthopaedic surgeons across Australia, including projections for future requirements.

The Working Party held its first meeting in August 1998 and the report was accepted at the March 1999 meeting of AMWAC and the April 1999 meeting of AHMAC.

MEMBERSHIP OF AMWAC

Independent Chairman

Professor John Horvath Physician, Sydney

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Dr Lloyd Toft President, Medical Board of Queensland

Mr Robert Wells First Assistant Secretary, Office of the National
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Commonwealth Department of Health and Aged
Care

MEMBERSHIP OF THE AMWAC ORTHOPAEDIC SURGERY WORKFORCE WORKING PARTY

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Dr David Theile Surgeon, Brisbane

Members

Dr Brett Courtenay Orthopaedic Surgeon, Sydney and Secretary, Australian Orthopaedic Association

Mr Peter Fisher Assistant Secretary, Commonwealth Department of Health and Aged Care

Mr Paul Gavel Executive Officer, Australian Medical Workforce Advisory Committee

Mr John Harding Head, Labour Force Unit, Australian Institute of Health and Welfare

Dr Gary Speck Orthopaedic Surgeon, Melbourne

INTRODUCTION

Upon the establishment of AMWAC in 1995, one of the initial work priorities was to undertake a review of the orthopaedic surgery workforce. This review was completed in January 1996, using mostly 1994 data.

In recognition of the dynamic nature of the medical workforce one of the recommendations of the orthopaedic surgery report was to conduct a periodic review of the workforce using updated data and to incorporate any new service trends into the projection analysis.

In completing the first report one of the difficulties encountered was the availability of comprehensive service trend data, particularly in terms of data on hospital orthopaedic procedures. In the end use was made of casemix information from just New South Wales and South Australia. At the time of the drafting of the report a time series of detailed national hospital casemix data was not available.

In the intervening period, significant advances have been made in developing service data, particularly with the Australian Institute of Health and Welfare's (AIHW) development of the National Hospital Morbidity database. In turn, this now provides a useful time series of hospital service trend data.

This report provides an update of the key orthopaedic surgery workforce characteristics - the number of practising orthopaedic surgeons; their distribution, age, gender, and hours worked; and the orthopaedic services they provide. The report also includes a revised assessment of the adequacy of the current orthopaedic surgery workforce, and an updated projection analysis. As this report has been written as an update, much of the background information on orthopaedic surgery, the orthopaedic surgery training program and the merits of particular data sources has not been reproduced here. Readers will have to refer to the original report for this information.

Four key data sources have been used in compiling this update;

1. Information on numbers of orthopaedic surgeons and orthopaedic trainees from the Australian Orthopaedic Association (AOA);
2. Data from the AIHW 1997 national medical labour force survey;
3. Service data from the AIHW national hospital morbidity database for the years 1993-94 to 1996-97; and
4. Data from the Health Insurance Commission (HIC) Medicare database on the number of recognised surgeons providing orthopaedic services and details of their activity.

These data have been supplemented with other relevant data as appropriate.

In compiling this update, the same methodology has been used as in first orthopaedic surgery review. In particular, in projecting the workforce to 2009, the standard AMWAC workforce projection model has been used. The Working Party has also pursued a similar objective as in 1996, that is to promote an optimal supply and appropriate distribution of orthopaedic surgeons for the ten year period to 2009.

It should also be noted that in conducting this update, the Working Party has adopted the same definition of an orthopaedic surgeon as that used in the initial report:

A qualified surgeon who is conducting orthopaedic consultations, orthopaedic surgery, medico-legal consultations on orthopaedics or is in a full time or part time academic position relating to this specialty. This will included salaried positions and private practice. It does not include other practitioners, who for one reason or another, undertake orthopaedic work as a minor part of their practice; nor does it include the training registrars who hold positions in hospitals or any service registrars who work in orthopaedics but are not recognised as being in training positions (Callaghan 1994 and AMWAC 1996.2).

The original, 1996, review of orthopaedic surgery workforce estimated the total practising specialist workforce to be 674; assessed the current workforce as being adequate; but recommended an increase in the number of orthopaedic surgery training positions on the assumption that requirements would grow by an estimated 3% per annum. The report recommended an initial increase in orthopaedic training positions of 12, with an overall increase of 46 positions by 2006.

The AOA initially responded positively to the original report, however it has not followed through on the recommendations, only increasing total trainees by eight. In addition, there has not been the recommended initial increase in training positions of twelve. Indeed, where the modelling in the initial report suggested training output should ideally be 38, 39 and 40 in 1999, 2000 and 2001 respectively, it will in fact only be 30, 26 and 32.

In not acting in accordance with the recommendations, the AOA raised concerns about the scope of the data used to estimate service trends and the requirement growth targets used in the projection modelling; suggesting that the utilisation trends shown in New South Wales and South Australia may not have been representative of growth nationally, or in other States; and that requirements growth may not occur at the estimated 3% per annum. The AOA also contends that as sources of new surgeons include immigration as well as the training program, it needs to be noted that there has been an increase of at least seven overseas orthopaedic surgeons since the completion of the initial review. In the view of the AOA, this has taken the pressure off the need to increase training positions in line with the AMWAC recommendations.

SUMMARY OF FINDINGS AND RECOMMENDATIONS

This report describes the current orthopaedic surgery workforce, assesses the adequacy of that workforce, and projects workforce supply and requirements to 2009.

The report concludes that requirements are expected to grow by 2.7% per annum over the next ten years and that as a result the orthopaedic surgery training program will need to be expanded to provide for 38 first year trainees in 2000, increasing to 44 first year trainees from 2002 onwards.

Description of the Current Orthopaedic Surgery Workforce

Number of Practising Orthopaedic Surgeons

- The Working Party estimates the size of the practising orthopaedic surgery workforce in 1998 was 710 (Table 1). This compares to the 1994 estimate of workforce size of 674, and represents a growth of 1.3% per annum over the period 1994 to 1998.
- On a workforce of 710, the 1998 SPR estimate is 1:26,240 or 3.8 surgeons per 100,000 population.

Distribution

- South Australia has the highest number of orthopaedic surgeons relative to the population. The Northern Territory orthopaedic numbers are significantly lower than the average, and Tasmania's and Victoria's are marginally lower.
- The AIHW data showed that in 1997, 17.2% of the workforce had their main area of practice in a rural area. Whilst not in line with the rural/remote share of total population (26.8%), this is a noticeably higher proportion of rural based surgeons than many other specialties. It should also be noted that because of the resource requirements associated with the provision of a sustainable service, the proportion of orthopaedic surgeons located in a rural area cannot be expected to equate exactly with rural population share.

Age and Gender Profile

- The majority (63.6%) of orthopaedic surgeons are aged between 35 and 54 years. 30.2% of orthopaedic surgeons are in the middle decade (45 to 54 years), 33.4% are younger and 20.5% of the workforce is aged 55 to 64 years.
- 14.0% of the current workforce is aged 65 years and over. The proportion of the current workforce aged 65 years and over is above the national average for all medical practitioners of 10.0%.
- The average age of the Tasmanian and South Australian surgeons is slightly lower

than the national average and there are fewer surgeons aged 65 years and over than in the national average. More significant, however, is the data which shows that 43.1% of the orthopaedic surgeons in New South Wales and 43.5% of the orthopaedic surgeons in Western Australia are aged 55 years and over. The comparable figure for Australia as a whole is 34.6%.

- In 1997, the AIHW survey recorded seven (1.0%) female orthopaedic surgeons. The AOA has 14 female orthopaedic surgeons as members.

Hours Worked

- The AIHW survey estimates that in 1997, orthopaedic surgeons worked an average of 55.7 hours per week (Table 5). Other important data for 1997 are:
 - 80 (11.6%) orthopaedic surgeons worked less than 35 hours per week;
 - 216 (31.2%) worked 65 hours per week or more; and
 - 64 (9.2%) surgeons reported working 80 hours or more per week.
- The hours worked are fairly constant across all major age groups, except for surgeons aged 65 years and over. In 1997, orthopaedic surgeons in Victoria and Tasmania worked noticeably longer hours per week than those in the other States. The hours worked by orthopaedic surgeons in the various geographic locations do not vary significantly, although the hours on call and the number of surgeons on call are greater in rural areas.
- It should be noted that the figure of 55.7 hours worked per week in 1997 is a noticeable increase on the hours worked estimate in the initial report, which was 46 hours per week. The explanation for this lies in the fact that the previous estimate was taken from a 1994 survey of AOA members conducted by AOA and Bruce Callaghan and Associates. Hence, the comparison is between two different surveys which did not ask the question about hours worked in the same manner.

Orthopaedic Surgery Trainees

- In 1998, there were 117 orthopaedic surgery trainees across the four years of the orthopaedic surgery training program. There were eight female trainees (6.9%). The program is currently graduating between 26 and 30 new orthopaedic surgeons per year.
- The number of trainees has increased from 1996 by 7.3% in total, up from 109 to 117, reflecting an increase in trainee numbers in all States except South Australia.

Orthopaedic Services

- This is the one area where improved data has become available, providing both a national picture and the ability to analyse a time series of several years; allowing consideration of both Medicare and hospital utilisation data across a number of years.

- In 1996-97, 564,406 orthopaedic procedural services were delivered in Australian public and private hospitals. This indicates an average of 811 procedural services per practising orthopaedic surgeon. There were 342,533 principal procedures (average 492 per orthopaedic surgeon).
- The total of orthopaedic procedures in all Australian hospitals has increased by 23.9% between 1993-94 and 1996-97. The number of principal procedures increased by only 8.6% in the same three year period indicating greater complexity of operations or greater display of ICD-9 code numbers. This provides uncertainty about how truly total procedural numbers reflect the actual orthopaedic productivity and thus the number of principal procedures is thought to be a better indicator of orthopaedic workload. Principal procedures as a proportion of total procedures have decreased progressively over the period 1993-94 to 1996-97.
- The service trend for selected orthopaedic procedures, which were chosen by the Working Party because they reflect the span and core activities of orthopaedic surgery was also studied; and these procedures showed a 3.3% increase between 1995-96 and 1996-97. These same procedures were examined in the initial report.
- The number of orthopaedic procedures per 100,000 population is decidedly higher in South Australia where the surgeon numbers are high and decidedly lower in the Northern Territory where the surgeon numbers are correspondingly lower. Other States vary little in the rates of surgery.
- The rate of total orthopaedic hospital procedures shows no significant variation for the various geographic locations when the postcode of the recipient is used. Indeed, in 1995-96 slightly more orthopaedic procedures were provided to rural persons than to metropolitan citizens, and this observation is valid both for Australia as a whole and individual States/Territories.
- Between 1990-91 and 1996-97, orthopaedic services attracting Medicare benefits have increased by 2.3% per annum.

Adequacy of the Current Orthopaedic Surgery Workforce

Surgeons to Population and Orthopaedic Services per 100,000 Population

- The AOA suggests that the population catchment required to sustain an orthopaedic surgery service ranges between 22,000 and 30,000 depending on remoteness. In addition, in rural and remote areas it is generally preferable that there is a minimum of two to three surgeons, which naturally increases the size of the population catchment required for sustainability.
- The national SPR is estimated at 1:26,240. All States/Territories, with the exception

of South Australia, Tasmania and the Northern Territory, have a SPR within the 22,000 to 30,000 population range.

- The delivery of orthopaedic procedures to the community varies significantly from South Australia, the state with the highest relative surgeon supply, to the Northern Territory, which has the lowest number of surgeons and the lowest orthopaedic procedural delivery. The Working Party believes, but does not have documented evidence, that there is unmet need in the Northern Territory. Likewise, the Working Party does not have precise evidence which enables it to judge whether current overall service delivery to the Australian population is adequate or whether there is unmet demand which is being satisfied only in South Australia.

Public Hospital Employment Vacancies

- In both 1996 and 1997, the AMWAC survey of public hospital vacancies found there were 14 orthopaedic surgery vacancies. This equates to a vacancy rate of approximately 2.0%, which is generally considered to be acceptable.

Hours Worked

- There has been little change in the hours worked by orthopaedic surgeons over the four AIHW national medical labour force surveys. It is interesting to note, however, that the two States with lower relative supply than the national average (Victoria and Tasmania) also show above average hours worked per week (although this is not the case with the Northern Territory, which has the lowest surgeon supply).

Elective Surgery Waiting Times

- AIHW data on waiting times for orthopaedic surgery shows that in 1995-96 the median waiting time for urgent (category 1) patients was 7 days (average for all surgery 8 days) and for non urgent (category 2 and 3) patients was 55 days (average for all surgery was 36 days).

Conclusions

- Overall, the Working Party concluded that the weight of evidence still pointed to the current workforce adequately meeting requirements, particularly as none of the indicators examined provided evidence of dramatic shortage. SPRs, with the exception of South Australia, Tasmania and the Northern Territory are within the suggested sustainability benchmark; public hospital vacancies are not great; and whilst waiting times for non urgent surgery were above the average, average waiting times for urgent surgery were in line with the national average for all surgery. In the absence of more precise evidence, the Working Party can only derive impressions from this array of indicators of likely adequacy.

Projection of Supply and Requirements

- The standard AMWAC specialist medical workforce projection model has been used to project orthopaedic surgery supply and requirements to 2009. This is the same model that was used in the initial review.
- The most definable influence on future requirements is population change. In the next ten years, the Australian Bureau of Statistics estimates the Australian population will increase by 10.4%. Based on 1995-96 utilisation data this projection shows an expected increase in utilisation between 1998 and 2008 of 14.4% or approximately 1.2% per annum.
- The Working Party considered this to be the minimum growth that can be expected in orthopaedic services. At this level of growth the AMWAC projection model shows that the current average training program output of around 30 per year would be sufficient to meet an expected growth in requirements of 1.2% per annum. Under this scenario there would be no need to expand training positions.
- However, over recent years, the trend in orthopaedic services growth has been above 1.2% per annum. Table 21 shows that services growth has ranged between 1.9% and 8.0% per year; with the bulk of the service indicators indicating growth of between 1.9% and 3.3% per annum. Principal orthopaedic services have increased at an annual rate of 2.7% between 1993-94 and 1996-97 and this figure is likely to be a more accurate reflection of the trend in orthopaedic requirements over the next decade than the population and ageing data.
- The recommendations of the original orthopaedic surgery workforce review were based on an estimated growth in requirements of 3.0% per annum over the ten year period to 2006. On balance, it would seem that this requirement target remains broadly reasonable. However, in updating the recommendations in this report the Working Party agreed to use the slightly lower requirements growth indicator of 2.7% per annum.
- To achieve something approaching a balance between supply and requirements under a scenario of 2.7% growth in requirements per annum, training program output would need to increase to between 38 and 44 per year for at least the period 2003 to 2009.
- The Working Party has recommended a staged approach to the increase in the output of the orthopaedic surgery training program as this is considered preferable in terms of the ability to effect increases in training positions, which can take some time due to funding and infrastructure requirements. A staged approach will also enable the expected trend in requirements used in this analysis to be monitored and the recommended increases in output more easily adjusted if later analysis indicates this is necessary. In this respect, as with all AMWAC workforce reviews, it will be necessary to again re-examine the orthopaedic surgery workforce in several years

time (probably in 2002/2003), and as has occurred in this report, update the workforce data, include revised supply and requirements trend information and, if necessary, readjust the projection analysis and recommendations.

RECOMMENDATIONS

The Working Party recommends:

1. There be an increase in the number of funded orthopaedic surgery training positions and trainees to match an expected future growth in requirements over the next ten years of 2.7% per year.
2. That State and Territory health departments undertake negotiations with the Australian Orthopaedic Association (AOA) for the establishment of additional orthopaedic surgery training positions; with the increases in training program output to be staged and distributed as shown in the following table:

Orthopaedic surgery training program, by State/Territory, 1998 (actual first year intake) and 2001 and 2002 onwards (recommended first year intake for graduation in 2005 and 2006-2009)

State/ Terr.	1998 1st yr. tr.	% 1998	2001 1st yr. tr.	% 2001	2002- 2005 1st yr. tr.	% 2002- 2005	2008 pop.	% 2008 pop.
NSW/ACT	11	34.3	14	35.0	15	34.0	7,309.2	35.6
Vic.	7	21.9	10	25.0	11	25.0	5,045.6	24.6
Qld	7	21.9	9	22.5	9	20.5	4,026.0	19.6
SA	2	6.3	2	5.0	3	6.8	1,554.3	7.6
WA	5	15.6	4	10.0	5	11.4	2,119.7	10.3
Tas.	0	0.0	1	2.5	1	2.3	475.8	2.3
Aust.	32	100.0	40	100.0	44	100.0	20,530.6	100.0

Source: AMWAC

3. If necessary, to effect the adjustments to the training programs, State/Territory based orthopaedic surgery working groups, comprising AOA and State/Territory department of health representatives, be organised to co-ordinate the establishment of the new training positions and to oversee the introduction of any short term measures they may feel are necessary to meet localised service shortfalls (recognising that the increase in trainees will not make an effective contribution to the orthopaedic surgery workforce until 2003 at the earliest).
4. That orthopaedic surgery requirements and supply projections continue to be monitored regularly so that they can be amended if new trends in any of the

workforce characteristics or projection assumptions emerge, with a further review of the workforce to be undertaken in 2002.

5. That this monitoring be coordinated by AMWAC and the AOA, and the results incorporated into the AMWAC annual report to AHMAC. AMWAC will provide all necessary support.

DESCRIPTION OF THE CURRENT ORTHOPAEDIC SURGERY WORKFORCE

Number of Practising Orthopaedic Surgeons

The Working Party estimates the size of the practising orthopaedic surgery workforce in 1998 was 710 (Table 1). This compares to the 1994 estimate of workforce size of 674, and represents a growth of 1.3% per annum over the period 1994 to 1998.

The AOA records for 1998 indicate there are 710 practising members. The 1997 AIHW medical labour force survey estimated the orthopaedic surgery workforce to be 689 (main area of practise). In 1998, the HIC recorded 707 specialists who were recognised providers of orthopaedic services. The Australian Medical Publishing Company (AMPCo) recorded 715 practising orthopaedic surgeons in 1998. Each of the data sources has its acknowledged deficiencies in capturing the totality of the effective workforce; however all are around the 690 to 710 figure (Table 1).

In the previous report a process of reconciliation between each of the main data sources was conducted and the practising orthopaedic surgery workforce in 1994 was estimated at 674. The estimated surgeon to population ratio (SPR) from the previous report was 1:26,488. On a workforce of 710, the 1998 SPR estimate is 1:26,240 or 3.8 surgeons per 100,000 population.

A matrix of figures from various data sources is displayed in Table 1. The specific deficiencies of each data source are recognised but the trends over time allow estimates of apparent annual change in the orthopaedic workforce over the period 1994 to 1998. The apparent annual change is between 1.2% and 3.2% per annum (population increase over the period has been 1.1%), although in recent years the annual increases have generally been lower than the apparent change across the period 1994 to 1998.

Distribution

South Australia has the highest number of orthopaedic surgeons relative to the population. The Northern Territory orthopaedic numbers are significantly lower than the average, and Tasmania's and Victoria's are marginally lower (Table 2).

The data for the Australian Capital Territory also shows a high number of orthopaedic surgeons per population, however in interpreting the data for the Australian Capital Territory it should be borne in mind that this does not take into account the catchment area for orthopaedic services which includes southern New South Wales. As a result, specialist orthopaedic services are provided to a larger population (possibly in the order of 500,000) than just the Australian Capital Territory population (309,000).

Table 1: Orthopaedic surgeons in Australia, selected years, 1994 to 1998

Type of surgeon and data source	1994	1995	1996	1997	1998	Apparent annual change (%)
AIHW (total practising) ^a	654	683	696	707		2.7
AIHW (mainly in orthopaedics) ^a	636	665	678	689		2.7
AMPCo (total practising) ^b	633	687	717	723	715	3.2
AOA (practising members) ^c	647	665	687	696	710	2.7
HIC (total recognised) ^d	653	660	679	695	707	2.7
HIC (mainly orthopaedics) ^e			663	660	679	1.2
Reconciled estimate^f	674				710	1.3

Notes: a - Taken from the national medical labour force surveys; the apparent response rate from orthopaedic surgeons is estimated to have ranged from 78% to 85%. This will affect the reliability of the estimates from year to year.

b - The AMPCo estimates have been derived by subtracting training numbers from totals provided by AMPCo.

c - AOA estimates assume that 50% of life and senior members have retained registration and continue to practise; in 1998 there were 82 of these members.

d - Medical specialists recognised by the HIC as orthopaedic surgeons.

e - Medical specialists whose predominant Medicare activity was orthopaedic surgery.

f - Details of the reconciliation process are contained in the previous report AMWAC 1996.2.

Source: AIHW, AMPCO, AOA, DHAC

Table 2: Number of practising orthopaedic surgeons and surgeons to population, by State/Territory, 1997

State/Terr.	Number	% of total number	% pop.	SPR 1:	Number per 100,000 pop.
NSW	244	34.5	33.9	25,846	3.9
Victoria	152	21.5	24.8	30,443	3.3
Queensland	129	18.2	18.4	26,592	3.8
South Aust.	86	12.2	8.0	17,243	5.8
West. Aust.	64	9.1	9.7	28,299	3.5
Tasmania	14	2.0	2.5	33,699	3.0
ACT	14	2.0	1.7	22,071	4.5
North. Terr.	2	0.3	1.0	94,593	1.1
Australia	707	100.0	100.0	26,352	3.8

Source: AIHW and ABS

The AIHW data showed that in 1997, 17.2% of the workforce had their main area of practice in a rural area (Table 4). Whilst not in line with the rural/remote share of total population (26.8%), this is a noticeably higher proportion of rural based surgeons than many other specialties. It should also be noted that because of the resource requirements associated with the provision of a sustainable service, the proportion of orthopaedic surgeons located in a rural area cannot be expected to equate exactly with rural population share (AMWAC 1998.7). Table 17 also highlights that in 1995-96 slightly more orthopaedic services were provided to people from rural areas than metropolitan areas.

Table 3 illustrates the lower number of Medicare orthopaedic surgeons per 100,000 population in rural areas and that trends over time show that population increases have been fairly well matched by practitioner increases.

Table 3: Orthopaedic surgeons, geographic distribution, (Medicare data), 1990-91 to 1996-97

Year	Capital city	Other metropolitan	Rural
<i>1990-91</i>			
Population	10,957,215	1,558,155	4,768,666
Ortho. surgeons	442	66	74
Surgeons per 100,000 population	4.0	4.2	1.6
<i>1994-95</i>			
Population	11,450,326	1,629,310	4,983,664
Ortho. surgeons	506	69	85
Surgeons per 100,000 population	4.4	4.2	1.7
<i>1996-97</i>			
Population	11,741,304	1,670,714	5,110,310
Ortho. surgeons	501	75	89
Surgeons per 100,000 population	4.3	4.5	1.7

Source: DHAC

Age and Gender Profile

Orthopaedic surgeons have approximately a 30 year practice span with an average commencement age of 35 years. In 1997, the average age of the workforce was 50.3 years (Table 4).

The majority (63.6%) of orthopaedic surgeons are aged between 35 and 54 years. 30.2% of orthopaedic surgeons are in the middle decade (45 to 54 years), 33.4% are younger and 20.5% of the workforce is aged 55 to 64 years. This decreasing proportion of surgeons in each major age group, from younger to older, illustrates the progressive build up of the workforce that is underway (Table 4).

14.0% of the current workforce is aged 65 years and over. The proportion of the current workforce aged 65 years and over is above the national average for all medical practitioners of 10.0%.

The average age of the Tasmanian and South Australian surgeons is slightly lower than the national average and there are fewer surgeons aged 65 years and over than in the national average. More significant, however, is the data which shows that 43.1% of the orthopaedic surgeons in New South Wales and 43.5% of the orthopaedic surgeons in Western Australia are aged 55 years and over. The comparable figure for Australia as a whole is 34.6% (Table 4).

In 1997, the AIHW survey recorded seven (1.0%) female orthopaedic surgeons. The AOA has 14 female orthopaedic surgeons as members.

Table 4: Orthopaedic surgeons, selected characteristics (AIHW data), by State/Territory, 1997

Characteristics	NSW	Vic	Qld	SA	WA	Tas	ACT	NT	Aust	%
<i>Gender</i>										
Male	239	143	126	85	58	14	14	2	682	99.0
Female	1	6	-	-	-	-	-	-	7	1.0
Total number	240	149	126	85	58	14	14	2	689	100.0
<i>Age group (years)</i>										
< 35	5	3	4	-	2	-	-	-	13	1.9
35-44	75	47	50	27	15	6	7	1	230	33.4
45-54	56	58	33	34	15	7	4	-	208	30.1
55-64	63	19	24	15	17	1	2	-	141	20.4
65-74	34	22	13	10	5	-	1	1	86	12.4
75 +	6	-	2	-	4	-	-	-	12	1.7
Average age	51.4	50.1	48.7	49.7	52.0	46.9	47.6	53.0	50.3	-
% < 55	56.9	72.7	69.1	71.6	56.5	92.9	85.8	50.0	65.4	-
% 55-64	26.3	12.8	19.0	17.6	29.3	7.1	14.2	-	20.5	-
% 65 +	16.8	14.5	11.9	11.8	14.2	0.0	10.0	50.0	14.1	-
<i>Geographic location of main job</i>										
Capital city	173	116	62	85	54	7	14	1	506	73.4
Other metro.	29	8	24	-	-	-	-	-	65	9.4
Large rural	24	14	37	-	-	4	-	-	81	11.7
Other rural	14	11	3	-	4	3	-	1	38	5.5
% rural	15.8	16.8	31.7	0.0	6.9	50.0	0.0	50.0	17.2	-
<i>Geographic location of all jobs</i>										
Urban only	198	123	84	79	52	7	13	1	556	80.7
Rural only	34	24	40	-	4	7	-	1	114	16.6
Urban/rural	5	1	1	6	1	-	1	-	15	2.1
<i>Country of initial qualification</i>										
Australia	202	119	99	74	-	11	13	2	525	76.2
New Zealand	1	7	5	-	-	-	-	-	13	1.9
UK/Ireland	10	1	8	6	-	3	-	-	28	4.0
Asia	6	5	8	4	-	-	-	-	22	3.3
Other	19	4	5	2	-	-	-	-	33	4.8
Unknown	1	12	-	-	58	-	1	-	67	9.8

Source: AIHW

Hours Worked

The AIHW survey estimates that in 1997, orthopaedic surgeons worked an average of 55.7 hours per week (Table 5). Other important data for 1997 are:

- 80 (11.6%) orthopaedic surgeons worked less than 35 hours per week;
- 216 (31.2%) worked 65 hours per week or more; and
- 64 (9.2%) surgeons reported working 80 hours or more per week (Table 6).

The hours worked by orthopaedic surgeons are very similar to those worked by surgeons in all other disciplines (AIHW 1998).

The hours worked are fairly constant across all major age groups, except for surgeons aged 65 years and over (Table 5). In 1997, orthopaedic surgeons in Victoria and Tasmania worked noticeably longer hours per week than those in the other States (Table 6). The hours worked by orthopaedic surgeons in the various geographic locations do not vary significantly, although the hours on call and the number of surgeons on call are greater in rural areas (Table 7).

Table 5: Orthopaedic surgeons hours worked per week, by major age group and gender, 1997

Gender	< 35 yrs	35-44 yrs	45-54 yrs	55-64 yrs	65 yrs +	Total
<i>Total hours worked</i>						
Male	59.9	60.4	62.1	52.5	36.7	55.9
Female	-	47.5	-	-	20.0	42.0
Total	59.9	60.3	62.1	52.5	35.5	55.7
<i>Direct patient care hours worked</i>						
Male	56.4	54.6	54.1	46.5	34.8	40.2
Female	-	35.5	-	-	20.0	32.4
Total	56.4	54.0	54.1	46.5	35.0	50.2
<i>Hours on call not worked</i>						
Male	52.1	39.3	44.1	49.7	34.3	43.3
Female	-	36.3	-	-	-	36.3
Total	52.1	39.1	44.1	49.7	34.3	43.3

Source: AIHW

Table 6: Orthopaedic surgeons, hours worked per week, by State/Territory, 1997

Hours worked	NSW	Vic	Qld	SA	WA	Tas	ACT	NT	Aust	%
<i>Total hours worked per week</i>										
1-19	11	3	4	7	1	-	-	-	26	3.7
20-34	28	7	7	4	8	-	-	-	54	7.9
35-49	41	16	25	13	12	1	7	-	115	16.7
50-64	93	50	62	37	20	7	7	1	277	40.2
65-79	42	52	24	15	15	4	-	1	152	22.0
80 +	25	21	4	9	3	1	-	-	64	9.2
Total	240	149	126	85	58	14	14	2	689	100.0
Average	55.3	61.6	54.2	53.9	55.9	63.5	57.0	46.5	55.7	-
<i>Direct patient care hours worked</i>										
1-19	10	3	5	7	12	-	-	-	36	5.2
20-34	35	13	13	10	8	3	-	-	81	11.7
35-49	57	29	36	13	14	3	14	1	166	24.0
50-64	101	73	56	39	21	6	-	1	297	43.2
65-79	23	20	13	10	2	3	-	-	70	10.2
80 +	14	11	4	7	2	-	-	-	38	5.5
Total	240	149	126	85	58	14	14	2	689	100.0
Average	49.5	54.2	48.5	41.2	51.1	52.4	52.0	40.5	50.2	-
<i>Hours on call not worked</i>										
1-19	14	26	14	11	4	-	-	1	70	18.4
20-34	31	32	26	13	5	-	-	-	108	28.3
35-49	41	14	11	2	9	4	-	-	82	21.6
50-64	6	9	6	2	3	1	-	-	26	6.9
65-79	6	3	8	-	-	-	-	-	17	4.5
80 +	27	10	14	13	4	1	7	-	76	20.0
Total	125	93	79	41	25	7	7	1	380	100.0
Average	46.8	36.1	44.7	42.8	46.5	56.8	12.2	99.0	43.3	-
% on call	52.3	62.5	62.6	48.7	43.2	50.0	50.0	50.0	55.1	-

Source: AIHW

Table 7: Orthopaedic surgeons, hours worked, hours on call and average age, by geographic location of main job, 1997

	Capital city	Other metro.	Large rural	Small rural	Other rural	Total
Total hours worked	56.1	54.9	57.5	58.6	53.3	56.4
Direct patient care hours worked	49.7	50.5	49.8	48.4	44.8	48.5
Hours on call not worked	40.8	33.4	44.4	53.6	77.6	42.2
% surgeons on call	48.9	56.4	66.7	80.0	60.0	56.3
Average age (years)	50.8	50.2	49.1	44.5	52.4	50.3

Source: AIHW

It should be noted that the figure of 55.7 hours worked per week in 1997 is a noticeable increase on the hours worked estimate in the initial report, which was 46 hours per week. The explanation for this lies in the fact that the previous estimate was taken from a 1994 survey of AOA members conducted by AOA and Bruce Callaghan and Associates. Hence, the comparison is between two different surveys which did not ask the question about hours worked in the same manner.

Yet even though there is a discrepancy in hours worked compared with the previous report, analysis of the AIHW annual labour force survey shows that over the four years since 1993 there has been little change in the hours worked per week by orthopaedic surgeons (Table 8).

Table 8: Orthopaedic surgeons, average hours worked per week, 1993 to 1997

Age (years)	1993	1994	1995	1996	1997
< 35	57.5	55.9	63.2	64.1	59.9
35-44	63.1	62.2	61.2	61.0	60.3
45-54	62.7	57.9	59.4	60.4	62.1
55-64	52.8	48.1	51.3	52.3	52.5
65 +	42.0	36.0	36.7	36.8	35.5
Total	57.9	55.1	56.2	56.4	55.7

Source: AIHW

Orthopaedic Surgery Trainees

The orthopaedic surgery training arrangements were summarised in the initial report and there is no need to repeat that information here. Tables 9 and 10 summarise the characteristics of the 1998 trainees.

In 1998, there were 117 orthopaedic surgery trainees across the four years of the orthopaedic surgery training program. There were eight female trainees (6.9%). The program is currently graduating between 26 and 30 new orthopaedic surgeons per year (Tables 9 and 10).

The number of trainees has increased from 1996 by 7.3% in total, up from 109 to 117, reflecting an increase in trainee numbers in all States except South Australia (Table 11).

The AOA advised that as at March 1999, it expects output from the orthopaedic surgery training program to be 27 in 2001, 32 in 2002, 34 in 2003 and 34 in 2004.

Table 9: Orthopaedic surgery trainees, by year of training, gender and State/Territory, 1998

Year	Total trainees	Female trainees	NSW/ACT	Vic	Qld	SA	WA	Tas
4	28	3	12	6	5	2	3	0
3	30	2	10	8	7	2	3	0
2	26	0	11	6	5	1	2	1
1	33	2	11	7	7	2	5	0
Total	117^a	8	44	27	24	7	13	1

Note: a - includes one trainee overseas

Source: AOA

Table 10: Orthopaedic surgery trainees, by major age group, 1998

Year	under 30 years	31-35 years	36-40 years	over 40 years	Total
4	0	21	5	2	28
3	1	22	7	0	30
2	8	15	3	0	26
1	18	13	1	0	33
Total	27	72^a	16	2	117

Note: a - includes one trainee overseas

Source: AOA

Table 11: Orthopaedic surgery trainees, 1996 to 1998

State/Terr.	1996	1998	% change
NSW/ACT	42	44	4.8
Vic./Tas.	25	28	12.0
Queensland	22	24	9.0
South Australia	8	7	-12.5
Western Australia	12	13	8.3
Australia	109	117^a	7.3

Note: a - includes one trainee overseas

Source: AOA

Orthopaedic Services

This is the one area where significantly improved data has become available, providing both a national picture and the ability to analyse a time series of several years; allowing consideration of both Medicare and hospital utilisation data across a number of years.

Hospital Morbidity, 1993-94 to 1996-97

In 1996-97, 564,406 orthopaedic procedural services were delivered in Australian public and private hospitals. This indicates an average of 811 procedural services per practising orthopaedic surgeon. There were 342,533 principal procedures (average 492 per orthopaedic surgeon).

The total of orthopaedic procedures in all Australian hospitals has increased by 23.9% between 1993-94 and 1996-97. The number of principal procedures increased by only 8.6% in the same three year period indicating greater complexity of operations or greater display of ICD-9 code numbers (Table 12). This provides uncertainty about how truly total procedural numbers reflect the actual orthopaedic productivity and thus the number of principal procedures is thought to be a better indicator of orthopaedic workload. Principal procedures as a proportion of total procedures have decreased progressively over the period 1993-94 to 1996-97.

In the two year period 1994-95 to 1996-97 total procedures increased by 14.0%, principal procedures by 5.2%, the average number of procedures per orthopaedic surgeon increased from 734 to 811 and the average number of principal procedures increased from 483 to 492 (Table 13).

Table 12: Orthopaedic procedures, total and principal, (ICD-9-CM 77.00-84.99), public and private hospitals, 1993-94 to 1996-97

Procedure	1993-94	1994-95	1995-96	1996-97	Total
Total procedures	455,714	494,874	532,848	564,406	-
% change	-	8.5	7.7	5.9	23.9
Principal procedures	315,497	325,727	333,010	342,533	-
% change	-	3.2	2.2	2.9	8.6
Principal procedures as a proportion of total (%)	69.2	65.8	62.5	60.7	-

Source: AIHW

Table 13: Orthopaedic procedures, total and principal, (ICD-9-CM 77.00-84.99) per orthopaedic surgeon, 1994-95 to 1996-97

Year	Number of orthopaedic surgeons	Total orthopaedic procedures	Average procedures per surgeon	Principal procedures	Average principal procedures per surgeon
1994-95	674	494,874	734	325,727	484
1996-97	696	564,406	811	342,533	492
% change	3.3	14.0	10.4	5.2	1.9

Source: AMWAC and AIHW

The service trend for selected orthopaedic procedures, which were chosen by the Working Party because they reflect the span and core activities of orthopaedic surgery was also studied; and these procedures showed a 3.3% increase between 1995-96 and 1996-97 (Table 14). These same procedures were examined in the initial report.

Table 14: Selected orthopaedic procedures, principal and secondary, public and private hospitals, 1995-96 to 1996-97

Selected Procedure	1995-96	1996-97	% change
Arthroscopy knee	75,878	78,526	3.5
Arthroscopy wrist and hand	2,913	1,265	-56.6
Arthroscopy shoulder	6,739	7,817	16.0
Bunion operations	2,709	2,807	3.6
Tibial fractures with and without fibula	7,852	8,013	2.1
Ankle fractures	11,218	11,402	1.6
Talipes equinovarus	716	998	39.4
Femoral fractures not treated by replacement	10,940	11,477	4.9
Femoral fractures treated by hemi replacement	4,350	4,689	7.8
Total hip replacement	11,771	12,393	5.3
Total knee replacement	12,654	13,391	5.8
Revision hip replacement	2,687	2,849	6.0
Spinal fusion	2,578	2,469	-4.2
Total	153,005	158,096	3.3

Source: AIHW

Tables 15 and 16 show the growth in the selected orthopaedic services by State and Territory and the differences in procedures per 100,000 population. The data in these tables also raise some broad issues which are beyond the scope of the Working Party.

The number of orthopaedic procedures per 100,000 population is decidedly higher in South Australia where the surgeon numbers are high and decidedly lower in the Northern Territory where the surgeon numbers are correspondingly lower. Other States vary little in the rates of surgery (Table 15, 16 and 17).

The rate of total orthopaedic hospital procedures shows no significant variation for the various geographic locations when the postcode of the recipient is used. Indeed, in 1995-96 slightly more orthopaedic procedures were provided to rural persons than to metropolitan citizens, and this observation is valid both for Australia as a whole and individual States/Territories (Table 17).

Table 15: Selected orthopaedic procedures, principal and secondary, public and private hospitals, by State/Territory, 1995-96 and 1996-97

Selected Procedure	NSW/ACT	Vic.	Qld	SA/NT	WA	Tas.	Aust.
<i>1995-96</i>							
Arthroscopy knee	25,976	19,883	10,506	11,068	6,298	2,147	75,878
Arthroscopy wrist and hand	943	424	593	475	431	47	2,913
Arthroscopy shoulder	1,914	1,479	712	1,565	935	134	6,739
Bunion operations	766	832	312	402	349	48	2,709
Tibial fractures with and without fibula	2,817	1,704	1,698	755	690	188	7,852
Ankle fractures	4,272	2,512	2,212	975	915	332	11,218
Talipes equinovarus	250	183	132	65	64	22	716
Femoral fractures not treated by replacement	3,851	2,961	1,925	1,130	1,047	296	10,940
Femoral fractures treated by hemi replacement	1,424	1,238	637	490	422	139	4,350
Total hip replacement	4,295	3,333	1,627	1,146	954	416	11,771
Total knee replacement	5,244	2,479	2,254	1,300	1,014	363	12,654
Revision hip replacement	922	772	416	283	225	69	2,687
Spinal fusion	898	636	357	394	239	54	2,578
Total	53,302	38,436	23,381	20,048	13,583	4,255	153,005
<i>1996-97</i>							
Arthroscopy knee	25,856	21,663	11,363	10,388	7,074	2,182	78,526
Arthroscopy wrist and hand	499	150	206	239	160	11	1,265
Arthroscopy shoulder	2,208	1,882	980	1,676	954	117	7,817
Bunion operations	784	866	309	419	371	58	2,807
Tibial fractures with and without fibula	2,901	1,658	1,732	752	743	227	8,013
Ankle fractures	4,248	2,380	2,389	1,050	988	347	11,402
Talipes equinovarus	458	213	182	59	53	33	998
Femoral fractures not treated by replacement	3,778	3,023	2,156	1,150	1,078	292	11,477
Femoral fractures treated by hemi replacement	1,565	1,259	794	500	427	144	4,689
Total hip replacement	4,282	3,581	1,775	1,205	1,080	470	12,393
Total knee replacement	5,188	2,840	2,424	1,401	1,126	412	13,391
Revision hip replacement	894	815	454	337	248	101	2,849
Spinal fusion	842	623	401	373	150	80	2,469
Total	53,503	40,953	25,165	19,549	14,452	4,474	158,096
% change 1995-96 to 1996-97	0.4	6.5	7.6	-2.4	6.4	5.1	3.3

Table 16: Selected orthopaedic procedures per 100,000 population, principal and secondary, public and private hospitals, by State/Territory, 1996-97

Selected Procedure	NSW/ ACT	Vic.	Qld	SA/ NT	WA	Tas.	Aust.
Arthroscopy knee	394.8	472.9	337.0	625.2	397.0	460.2	426.2
Arthroscopy wrist and hand	7.6	3.3	6.1	14.4	9.0	2.3	6.9
Arthroscopy shoulder	33.7	41.1	29.1	100.9	53.5	24.7	42.4
Bunion operations	12.0	18.9	9.2	25.2	20.8	12.2	15.2
Tibial fractures with and without fibula	44.3	36.2	51.4	45.3	41.7	47.9	43.5
Ankle fractures	64.9	52.0	70.9	63.2	55.4	73.2	61.9
Talipes equinovarus	7.0	4.6	5.4	3.6	3.0	7.0	5.4
Femoral fractures not treated by replacement	57.7	66.0	63.9	69.2	60.5	61.6	62.3
Femoral fractures treated by hemi replacement	23.9	27.5	23.6	30.1	24.0	30.4	25.5
Total hip replacement	65.4	78.2	52.6	72.5	60.6	99.1	67.3
Total knee replacement	79.2	62.0	71.9	84.3	63.2	86.9	72.7
Revision hip replacement	13.7	17.8	13.5	20.3	13.9	21.3	15.5
Spinal fusion	12.9	13.6	11.9	22.4	8.4	16.9	13.4
Total	816.9	893.9	746.4	1,176.6	811.0	943.7	858.2

Source: AIHW

Table 17: Orthopaedic procedures per 100,000 population (ICD-9-CM 77.00-84.99), public and private hospitals, by geographic location of the patient and State/Territory, 1995-96

Location	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Aust
Capital city	2,793	2,806	2,433	3,018	4,329	3,170	2,506	1,842	2,912
Other metro.	3,148	2,675	2,826	2,995
Large rural	3,410	3,457	2,770	..	4,190	2,847	3,127
Other rural	2,965	3,439	2,518	2,812	4,453	2,937	..	2,232	3,067
Total	2,905	2,962	2,553	2,962	4,358	3,017	2,506	2,055	2,968

.. - not applicable

Source: AIHW

In 1995-96, 55.0% of orthopaedic hospital procedures were delivered to public patients

and 44.9% were provided to private patients (Table 18).

Table 18: Orthopaedic procedures (ICD-9-CM 77.00-84.99) undertaken on public and private patients, 1995-96

Patient type	Number of procedures	%
Public	293,095	55.0
Private	239,109	44.9
Unknown	634	0.1
Total	532,838	100.0

Source: AIHW

Services Attracting Medicare Benefits, 1990-91 to 1996-97

Between 1990-91 and 1996-97, orthopaedic services attracting Medicare benefits have increased by 2.3% per annum (Table 19). Over this same period the number of orthopaedic surgeons recognised by the HIC has increased from 582 in 1990-91 to 695 in 1996-97 an increase of 3.2% per annum (Table 1).

Table 19: Medicare specialist orthopaedic services, selected years 1990-91 to 1996-97

Year	Patients		Services		Operations	
	Number	% change	Number	% change	Number	% change
1990-91	573,570	-	975,390	-	205,350	-
1994-95	638,080	11.2	1,071,060	9.8	220,900	7.6
1996-97	664,750	4.2	1,111,640	3.8	232,040	5.0

Source: DHAC

Medicare orthopaedic services and operations per 100,000 population have increased also but not at the same rate as combined public and private hospital services. Between 1990-91 and 1996-97 Medicare orthopaedic operations per 100,000 population rose by 5.5%, orthopaedic services by 6.3% and patients by 8.2%; per annum the rises were 0.9%, 1.1% and 1.4% respectively (Table 20).

Table 20: Medicare specialist orthopaedic services per 100,000 population, by geographic location, selected years 1990-91 to 1996-97

Year	Capital city		Other metro.		Large rural		Other		Total	
	No.	% change	No.	% change	No.	% change	No.	% change	No.	% change
<i>Patients</i>										
1990-91	3,360	-	3,735	-	3,621	-	2,712	-	3,318	-
1994-95	3,583	6.6%	3,944	5.6%	3,828	5.7%	2,906	7.1%	3,532	6.4%
1996-97	3,614	0.9%	4,014	1.8%	3,976	3.9%	2,981	2.6%	3,589	1.6%
<i>Services</i>										
1990-91	5,797	-	6,731	-	6,053	-	4,152	-	5,643	-
1994-95	6,137	5.9%	6,794	0.9%	6,269	3.6%	4,399	5.9%	5,929	5.1%
1996-97	6,102	-0.6%	6,973	2.6%	6,635	5.8%	4,623	5.1%	6,001	1.2%
<i>Operations</i>										
1990-91	1,248	-	1,321	-	1,124	-	925	-	1,188	-
1994-95	1,278	2.4%	1,384	4.8%	1,178	4.8%	949	2.6%	1,223	2.9%
1996-97	1,304	2.0%	1,438	3.9%	1,241	5.3%	956	0.7%	1,253	2.3%

Source: DHAC

Summary of Orthopaedic Services Trends

Table 21 summarises the service trend data examined by the Working Party.

Table 21: Summary of orthopaedic surgery service trend data, selected years, 1990-91 to 1996-97

Service indicator	Annual increase (%)
Orthopaedic procedures, public and private hospitals, 1993-94 to 1996-97 (from Table 12)	8.0
Orthopaedic, principal procedures, public and private hospitals, 1993-94 to 1996-97 (from Table 12)	2.7
Selected orthopaedic procedures, public and private hospitals, 1993-94 to 1996-97 (from Tables 14 and 15)	3.3
Medicare services, 1990-91 to 1996-97 (from Table 19)	2.3
Medicare services, 1990-91 to 1994-95 (from Table 19)	2.5
Medicare services, 1994-95 to 1996-97 (from Table 19)	1.9

Source: AIHW, DHAC

ADEQUACY OF THE CURRENT ORTHOPAEDIC SURGERY WORKFORCE

The 1996 report judged the Australian orthopaedic workforce to be adequate in number. Since then, the number of orthopaedic surgeons has increased at a rate somewhat in excess of population growth and slightly in excess of population age-linked service requirements.

Surgeons to Population and Orthopaedic Services per 100,000 Population

The AOA suggests that the population catchment required to sustain an orthopaedic surgery service ranges between 22,000 and 30,000 depending on remoteness. In addition, in rural and remote areas it is generally preferable that there is a minimum of two to three surgeons, which naturally increases the size of the population catchment required for sustainability (AMWAC 1996.2, AMWAC 1998.7).

The national SPR is estimated at 1:26,240. Table 2 showed that all States/Territories, with the exception of South Australia, Tasmania and the Northern Territory, have a SPR within the 22,000 to 30,000 population range. This would tend to suggest that there is no widespread shortage of orthopaedic surgeons, but that there may, however, be some maldistribution between States and between urban and rural areas.

The delivery of orthopaedic procedures to the community varies significantly from South Australia, the state with the highest relative surgeon supply, to the Northern Territory, which has the lowest number of surgeons and the lowest orthopaedic procedural delivery (Tables 2 and 15 and 16). The Working Party believes, but does not have documented evidence, that there is unmet need in the Northern Territory. Likewise, the Working Party does not have precise evidence which enables it to judge whether current overall service delivery to the Australian population is adequate or whether there is unmet demand which is being satisfied only in South Australia.

In addition, Table 18 clearly indicates that orthopaedic services per 100,000 population varies to a greater extent from State to State than it does from region to region within a State, indicating that for service provision, State influence is the main determinant.

Public Hospital Employment Vacancies

In both 1996 and 1997, the AMWAC survey of public hospital vacancies found there were 14 orthopaedic surgery vacancies. This equates to a vacancy rate of approximately 2.0%, which is generally considered to be acceptable.

In 1996, Queensland recorded five vacancies and New South Wales and Victoria each four. In 1997, Queensland and Victoria each recorded five vacancies, Western Australia three and New South Wales one.

Hours Worked

As noted previously, there has been little change in the hours worked by orthopaedic

surgeons over the four AIHW national medical labour force surveys. It is interesting to note, however, that the two States with lower relative supply than the national average (Victoria and Tasmania) also show above average hours worked per week (although this is not the case with the Northern Territory, which has the lowest surgeon supply) (Tables 2 and 6).

Surgery Waiting Times

AIHW data on waiting times for orthopaedic surgery shows that in 1995-96 the median waiting time for urgent (category 1) patients was 7 days (average for all surgery 8 days) and for non urgent (category 2 and 3) patients was 55 days (average for all surgery was 36 days).

Table 22: Median waiting time (days) prior to admission, by urgency category and specialty of surgeon, 1995-96

Specialty	Category 1 ^a	Category 2 ^b	Category 3 ^b	Categories 2 & 3 ^a	All patients ^a
Cardiothoracic	7	28	19	27	13
ENT	8	56	70	57	36
General	8	27	46	29	17
Gynaecology	8	30	36	31	19
Neurosurgery	6	17	21	18	11
Ophthalmology	10	60	58	60	46
Orthopaedic	7	53	75	55	34
Plastic	9	33	57	37	24
Urology	12	30	41	32	22
Vascular	6	26	14	25	11
Other	1	7	40	8	3
All patients	8	35	50	36	21

Note: a - for patients admitted in New South Wales, South Australia and the Northern Territory; b - for patients admitted in South Australia and the Northern Territory

Source: AIHW

Similarly, when clearance times are examined, whilst category 1 clearance times are in what could be considered an acceptable range, the proportion of patients with extended waits was higher for orthopaedic surgery than most other surgical specialties. Clearance time is the theoretical time it would take to clear all patients from the waiting list at a point in time, ie., the time it would take to clear a list if no new patients were added to the list (Moon 1995).

Clearance times are determined by a range of factors, not just the number of surgeons. Other issues could include local management and resource decisions for example. It should also be noted that the data in tables 23 and 24 is for 1995-96 and so does not reflect the impact of any of the waiting list reduction initiatives pursued over the past two years. Whilst, the Working Party would have liked to have accessed more recent data, the 1995-96 data is the most recent nationally published information.

Table 23: Clearance time (months), by urgency category and specialty of surgeon, 1995 and 1995-96

Specialty	1995 ^a			1995-96 ^b		
	Category 1	Categories 2 & 3	All patients	Category 1	Categories 2 & 3	All patients
Cardiothoracic	0.5	1.5	1.1	0.4	1.7	1.1
ENT	0.7	4.7	4.0	0.9	5.0	4.1
General	0.5	3.0	2.2	0.6	2.7	1.9
Gynaecology	0.6	2.2	1.8	0.5	2.1	1.6
Neurosurgery	0.4	1.9	1.3	0.5	1.4	1.0
Ophthalmology	0.5	4.2	3.6	0.5	3.6	3.1
Orthopaedic	0.8	5.2	4.2	0.8	5.6	4.4
Plastic	0.8	5.0	3.8	0.9	4.3	3.0
Urology	0.8	3.7	2.9	0.8	3.1	2.4
Vascular	0.5	3.9	2.5	0.5	2.9	1.7
Other	0.2	1.4	1.0	0.2	1.7	1.0
All patients	0.6	3.5	2.7	0.6	3.4	2.5

Notes: a - all States and Territories except Queensland, January to June 1995; b - all States and Territories except Queensland and Victoria

Source: AIHW

Conclusions

Overall, the Working Party concluded that the weight of evidence still pointed to the current workforce adequately meeting requirements, particularly as none of the indicators examined provided evidence of dramatic shortage. SPRs, with the exception of South Australia, Tasmania and the Northern Territory, are within the suggested sustainability benchmark; public hospital vacancies are not great; and whilst waiting times for non urgent surgery were well above the average, average waiting times for urgent surgery were in line with the national average for all surgery. In the absence of more precise evidence, the Working Party can only derive impressions from this array of indicators of likely adequacy.

PROJECTION OF SUPPLY AND REQUIREMENTS

The standard AMWAC specialist medical workforce projection model has been used to project orthopaedic surgery supply and requirements to 2009. This is the same model that was used in the initial review (AMWAC 1996 and Theile et al, 1998).

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 figure using the average hours worked by age and gender, and factors in the expected average lower lifetime workforce contribution of female specialists.

The supply assumptions used in running this model are that the baseline supply in 1998 was 710; annual losses to 2009 are estimated at ten; annual intake from migration and re-entry are estimated at six; and annual intake from the training program is in accordance with expected graduations of 28 in 1999, 31 in 2000, 27 in 2001, 32 in 2002, 34 in 2003. It has also been assumed that the current average of 55.7 hours worked per week will continue.

On the requirements side, a likely trend in demand for orthopaedic surgery services is included, based on the Working Party=s assessment of the expected trend in requirements over the next ten years. Growth in requirements is influenced by multiple factors including health expectations, community demand, technological advance (which impacts both on community demand and surgeon productivity), incidence of disease and ageing of the population. The requirements assessments conducted in this report have been based on the services trend data summarised in Table 21 and the trend in population change.

The most definable influence on future requirements is population change. In the next 10 years, the Australian Bureau of Statistics estimates the Australian population will increase by 10.4%. Projections of hospital morbidity data using expected population growth for each of the major age categories are summarised in Table 24. Based on 1995-96 utilisation data this projection shows an expected increase in utilisation between 1998 and 2008 of 14.4% or approximately 1.2% per annum.

Table 24: Orthopaedic procedures in Australian hospitals, by major age group, 1996 and projections to 2008

Year	Age (years)								Total	% incr.
	0-14	15-24	25-34	35-44	45-54	55-64	65-74	75 +		
1996										
Pop. (>000)	3,896.2	2,694.9	2,870.2	2,792.9	2,317.2	1,534.6	1,294.3	910.4	18,310.8	-
Proced.	39,945	72,482	79,495	76,853	76,972	67,070	67,234	52,766	532,817	-
1998										
Pop. (>000)	3,943.0	2,659.2	2,917.9	2,879.5	2,470.8	1,616.9	1,294.5	981.9	18,763.7	2.5
Proced.	40,425	71,520	80,815	79,238	82,073	70,667	67,244	56,908	548,889	3.0
2008										
Pop. (>000)	4,070.6	2,771.1	2,824.3	3,025.7	2,885.3	2,399.1	1,454.7	1,278.1	20,709.0	10.4
Proced.	41,733	74,531	78,224	83,261	95,841	104,855	75,566	74,076	628,085	14.4

Source: AIHW and ABS

The Working Party considered this to be the minimum growth that can be expected in orthopaedic services. At this level of growth, the AMWAC projection model shows that the current average training program output of around 30 per year would be sufficient to meet an expected growth in requirements of 1.2% per annum. Under this scenario there would be no need to expand training positions.

However, over recent years, the trend in orthopaedic services growth has been well above 1.2% per annum. Table 21 shows that services growth has ranged between 1.9% and 8.0% per year; with the bulk of the service indicators indicating growth of between 1.9% and 3.3% per annum. Principal orthopaedic services have increased at an annual rate of 2.7% between 1993-94 and 1996-97 and this figure is likely to be a more accurate reflection of the trend in orthopaedic requirements over the next decade than the population and ageing data.

The recommendations of the original orthopaedic surgery workforce review were based on an estimated growth in requirements of 3.0% per annum over the ten year period to 2006. On balance, it would seem that this requirement target remains broadly reasonable. However, in updating the recommendations in this report the Working Party agreed to use the slightly lower requirements growth indicator of 2.7% per annum.

To achieve something approaching a balance between supply and requirements under a scenario of 2.7% growth in requirements per annum, training program output would need to increase to between 38 and 44 per year for at least the period 2003 to 2009. Table 25 summarises the expected outcome under a scenario of training program

output being progressively increased to 38 in 2004, 40 in 2005 and 44 per year from 2006 onwards. This means training program intake will need to increase immediately, that is from 1999; and that trainee intake in 1999 (that is output in 2003) will be at least 34, as previously advised by the AOA.

The Working Party has recommended a staged approach to the increase in the output of the orthopaedic surgery training program as this is considered preferable in terms of the ability to effect increases in training positions, which can take some time due to funding and infrastructure requirements. A staged approach will also enable the expected trend in requirements used in this analysis to be monitored and the recommended increases in output more easily adjusted if later analysis indicates this is necessary. In this respect, as with all AMWAC workforce reviews, it will be necessary to again re-examine the orthopaedic surgery workforce in several years time; and as has occurred in this report, update the workforce data, include revised supply and requirements trend information and, if necessary, readjust the projection analysis and recommendations.

This approach reflects both the dynamic nature of any medical workforce and the fact that the AMWAC projection model incorporates a range of assumptions which need regular monitoring. As highlighted earlier in this section, these key assumptions are the size of the current workforce, the hours worked per week by that workforce, its age and gender profile, expected retirements/migration and the likely trend in requirements.

The Working Party also recognises that any dramatic changes in the current orthopaedic care, caused by technological developments, or changes in Australian health care structures and financing will also necessitate a reassessment of the conclusions and projection scenarios outlined in this report.

Table 25: Proposed orthopaedic surgery training program output (requirements growth of 2.7% per annum), 1998 to 2009

Year	Training program output	Estimated supply (hours/week)	Estimated requirements (hours/week)	Shortage (%)
<i>Expected output</i>				
1998	28	40,231	40,231	-
1999	28	40,845	41,279	1.1
2000	31	41,478	42,353	2.1
2001	27	42,265	43,456	2.8
2002	32	42,896	44,587	3.9
2003	34	43,764	45,748	4.5
<i>Recommended output</i>				
2004	38	44,744	46,939	4.9
2005	40	45,928	48,161	4.9
2006	44	47,230	49,415	4.6
2007	44	48,742	50,701	4.0
2008	44	50,286	52,021	3.5
2009	44	51,857	53,376	2.9

Source: AMWAC

RECOMMENDATIONS

The Working Party recommends:

1. There be an increase in the number of funded orthopaedic surgery training positions and trainees to match an expected future growth in requirements over the next ten years of 2.7% per year.
2. That State and Territory health departments undertake negotiations with the Australian Orthopaedic Association (AOA) for the establishment of additional orthopaedic surgery training positions; with the increases in training program output to be staged and distributed as shown in the following table:

Table 26: Orthopaedic surgery training program, by State/Territory, 1998 (actual first year intake) and 2001 and 2002 onwards (recommended first year intake for graduation in 2005 and 2006-2009)

State/ Terr.	1998 1st yr. tr.	% 1998	2001 1st yr. tr.	% 2001	2002- 2005 1st yr. tr.	% 2002- 2005	2008 pop.	% 2008 pop.
NSW/ACT	11	34.3	14	35.0	15	34.0	7,309.2	35.6
Vic.	7	21.9	10	25.0	11	25.0	5,045.6	24.6
Qld	7	21.9	9	22.5	9	20.5	4,026.0	19.6
SA	2	6.3	2	5.0	3	6.8	1,554.3	7.6
WA	5	15.6	4	10.0	5	11.4	2,119.7	10.3
Tas.	0	0.0	1	2.5	1	2.3	475.8	2.3
Aust.	32	100.0	40	100.0	44	100.0	20,530.6	100.0

Source: AMWAC

3. If necessary, to effect the adjustments to the training programs, State/Territory based orthopaedic surgery working groups, comprising AOA and State/Territory department of health representatives, be organised to co-ordinate the establishment of the new training positions and to oversee the introduction of any short term measures they may feel are necessary to meet localised service shortfalls (recognising that the increase in trainees will not make an effective contribution to the orthopaedic surgery workforce until 2003 at the earliest).
4. That orthopaedic surgery requirements and supply projections continue to be monitored regularly so that they can be amended if new trends in any of the workforce characteristics or projection assumptions emerge, with a further review of the workforce to be undertaken in 2002.
5. That this monitoring be coordinated by AMWAC and the AOA, and the results incorporated into the AMWAC annual report to AHMAC. AMWAC will provide all necessary support.

REFERENCES

American Academy of Orthopaedic Surgeons and the American Orthopaedic Association (1998), The Orthopaedic Workforce In The Next Millenium - Proceedings of a Symposium, Journal of Bone and Joint Surgery, October

Australian Institute of Health and Welfare (1999), National Medical Labour Force Survey, 1997 (forthcoming), Canberra

Australian Medical Workforce Advisory Committee (1996), The Orthopaedic Workforce In Australia, AMWAC Report 1996.2, Sydney

Australian Medical Workforce Advisory Committee (1998), Sustainable Specialist Services: A Compendium of Requirements, AMWAC Report 1998.7, Sydney

Theile, David. Brennan, Peter. Gavel, Paul. Harding, John. Horvath, John (1998), Methodology for the study and projection of surgical and anaesthetic workforce, Australian and New Zealand Journal of Surgery, 68: 481-492