

Australian Health Workforce Advisory Committee

**THE AUSTRALIAN NURSING WORKFORCE –
AN OVERVIEW OF WORKFORCE PLANNING
2001-2004**

AHWAC Report 2004.2

August 2004

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ABBREVIATIONS

ABS	Australian Bureau of Statistics
ACDNM	Australian Council of Deans of Nursing and Midwifery
AHMAC	Australian Health Ministers' Advisory Council
AHWAC	Australian Health Workforce Advisory Committee
AHWOC	Australian Health Workforce Officials' Committee
AIHW	Australian Institute of Health and Welfare
DEST	Australian Government Department of Education, Science and Training
EN	Enrolled nurse
FTE	Full time equivalent
MMSS	Monthly Management Summary System (South Australia)
NCVER	National Centre for Vocational Education Research
RN	Registered nurse
VACS	Victorian Ambulatory Classification System
VET	Vocational education and training

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AUSTRALIAN HEALTH WORKFORCE ADVISORY COMMITTEE – TERMS OF REFERENCE

The Australian Health Workforce Advisory Committee (AHWAC) was formed in December 2000 to oversee national level, government initiated, health workforce planning in Australia, covering the nursing, midwifery and allied health workforces. AHWAC is funded by each jurisdictional health department through the Australian Health Ministers' Advisory Council (AHMAC).

AHWAC provides advice to AHMAC on a range of nursing and allied health workforce matters, including:

- workforce supply and demand in Australia;
- the composition, balance and distribution of the health workforce in Australia; and
- the establishment and development of data collections concerned with the health workforce.

AHWAC's initial priority has been the specialised nursing and midwifery workforces, and in particular the areas of critical care nursing, midwifery, and mental health nursing. Work has also been undertaken on improvements to national level nursing and allied health data collections. The current work program is focused on providing advice on future specialist nursing requirements, allied health workforce planning and improvements to national data collections.

AHWAC works to an annual work program approved by AHMAC and developed through the Australia Health Workforce Officials' Committee (AHWOC). Further information on national structures, projects and general health workforce information is available on the Health Workforce Australia website: www.healthworkforce.health.nsw.gov.au

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EXECUTIVE SUMMARY

In Australia, increased attention has been paid to nurse workforce planning both at state and territory and national levels in recent years. This is in response to nurse workforce shortages. Between 2001 and 2004 a number of reports have been produced examining the nursing workforce and various specialist nurse workforces. This paper provides an overview of these planning exercises, examines their findings, and in the light of these findings, draws together some broad conclusions and recommendations regarding the future nurse requirements, particularly for new graduate nurses in Australia.

Specifically this overview examines four national nursing workforce planning reports:

- Access Economics for the Australian Government Department of Health and Ageing (2004), *Employment Demand In Nursing Occupations*;
- Barbara Preston for Australian Council of Deans of Nursing (2002), *Australian Nurse Supply and Demand to 2006*;
- Chandrah Shah and Gerald Burke for National Review of Nursing Education (2002), *Job Growth and Replacement Needs Nursing Occupations*; and
- Tom Karmel and Jianke Li for National Review of Nursing Education (2002), *The Nursing Workforce 2010*

Several discipline specific reviews are also noted, as are several jurisdictional reviews of the nursing workforce.

Although each of the national nursing workforce reports differs slightly in its findings due to the various data sources and methodologies, there are consistencies in both identification of key drivers of supply and demand and findings in terms of projected supply and demand. Essentially the “sign posts” are pointing in the same direction and each of the reports highlight the same factors. These include:

- the general inadequacy of numbers of nursing graduates produced over recent years to meet demand (in terms of both replacement and growth in demand for health services);
- the ageing of the nursing workforce (and projected retirements), decreasing hours worked and turnover will have an effect on the ability of the nursing workforce supply to replace itself; and
- growth in demand for health services is expected to increase especially in the aged care sector but also across acute care sectors.

While there is some variation in the projected supply and demand in each report, they all show that the current student nurse numbers are inadequate to meet projected future demand.

For supply to meet demand, between 10,182 and 12,270 new graduate nurses are required to enter the workforce in 2006 and between 10,712 and 13,483 in 2010. New enrolled nurse requirements are projected to be between 5,734 in 2006 and 6,201 in 2010. It should be noted that these numbers reflect completions rather than entrants to nursing undergraduate courses.

In July 2004, the Australian Government announced additional nursing places for 2005 and 2008. Whilst these additional places will benefit the nursing workforce, they will not be sufficient to meet projected demand as identified in the reports reviewed in this paper.

The consistencies identified across the reports analysed suggest that there is no need to carry out further national supply and demand studies on the overall nursing workforce in the short term. At this point in time, it is more important to develop strategies to ensure that there is an increased supply of new nurses adequately educated and supported for entry to the nursing workforce and then retained within the workforce. Monitoring of nurse completion rates and rates of entry to the workforce will be required.

It should be noted that the National Nursing and Nursing Education Taskforce, which was recently set up by the Australian Health Ministers Conference, aims to implement a number of recommendations of the National Review of Nursing Education (2002) which deal with aspects of nursing supply, including support and retention of nurses. The National Review of Nursing Education was responsible for the commissioning of two of the national nursing workforce reports examined in this paper.

In the short term, there is no need to commission any further national nursing workforce planning projects that review the nursing workforce as a whole. The national nursing workforce planning projects reviewed in preparing this paper have contributed sufficient advice on future nurse workforce supply and recommended levels of undergraduate nurse intakes. The scope of the challenge is quite clear, what is now required is implementation. In turn this will require all stakeholders to act cohesively and decisively to further boost nursing workforce intakes and to put in place suggested reforms within the education and clinical environment to ensure the nursing workforce is trained, retained and supported.

1. INTRODUCTION

In Australia, increased attention has been paid to nurse workforce planning both at state and territory and national levels in recent years. This is in response to nurse workforce shortages. Between 2001 and 2004 a number of reports have been produced examining the nursing workforce and various specialist nurse workforces. This paper provides an overview of this workforce planning, examines the results and findings of these reports and, in the light of these findings, draws together some broad conclusions about the future requirement for nurses in Australian.

Specifically this overview examines four national nursing workforce planning reports:

- Access Economics for the Australian Government Department of Health and Ageing (2004), *Employment Demand In Nursing Occupations*;
- Barbara Preston for Australian Council of Deans of Nursing (2002), *Australian Nurse Supply and Demand to 2006*;
- Chandrah Shah and Gerald Burke for National Review of Nursing Education (2002), *Job Growth and Replacement Needs Nursing Occupations*; and
- Tom Karmel and Jianke Li for National Review of Nursing Education (2002), *The Nursing Workforce 2010*

Several discipline specific reviews are also noted, as are several jurisdictional reviews of the nursing workforce.

Each of the reports has been analysed according to the conceptual approach, the data used, the calculation tool and projection methodology, and the outputs and results of the exercise. As with any health workforce planning study, the date of the reports' completion is important. Health workforces are dynamic and constantly evolving. Similarly, the key data inputs to the planning process and analysis are also being updated over time. As a consequence, the more recent reports will have used the more up to date data sets and therefore can be expected to also include the more up to date analysis and projection estimates. It should also be noted that each of the nurse workforce planning studies examined in this paper were prepared prior to the Australian Government's announcement in July 2004 of additional nursing undergraduate places for commencement in 2005.

Prior to embarking on an examination of recent studies and their findings, it's important to note that the objectives of the planning exercise (and the subsequent approach or conceptual framework) and the calculation tools and methods used for nurse workforce planning are dependent upon a number of factors.

The objectives of the planning exercise will determine the approach (or conceptual framework) used. For example, is the planning exercise to determine how many nurses are required to serve the population in the same way? Or how many nurses are required to meet expected needs of the population (which may not currently be met)? Or how many nurses will be required to satisfy expected health services plans or changes to service provision (O'Brien-Pallas 2001). Is the planning supply-based or based on mainly determining future requirements? Is the objective of

the process to base planning on future population health needs, health service funding, health service infrastructure or emerging models of care?

The choice of calculation tool or method will also be dependent upon a number of other factors including the data available (both supply and demand), the size of the workforce, the degree to which workforce participation and other factors are dependent on age and gender, and the time and resources available for the planning exercise.

A number of questions could be useful in determining the appropriateness of the calculation tool used. Preston (2003) suggests the following:

- Does the model provide conclusions or outputs that are useful to the particular policy purposes it is intended to inform?
- Does the model incorporate all relevant matters?
- Are inputs appropriately modelled?
- Are appropriate assumptions made?
- Is the best data used (and appropriately)?
- Can the model be easily updated and alternative scenarios tested?

Although there have been a range of approaches, most have used a dynamic stocks and flows approach, concentrating more on supply-side projections than on the underlying demand or the requirement side. In the most recent years, alternative modelling techniques have been used trying to incorporate more effective demand/utilisation/needs side factors from a broader range of data (including economic indicators and health services utilisation data) to determine drivers of demand and enable projections which incorporate these drivers.

The two main methods for modelling nursing workforce supply are summarised by O'Connor (2003) as being "input/output" analysis and "Markov chain" analysis. Input/output analysis takes the workforce in year one and calculates entry rates, subtracts exit rates and then calculates the workforce in year two. Markov chain analysis develops transition matrices based on workforce characteristics perceived to be important, such as participation rates in age and gender cohorts, and calculates changes rates by cohort by year for each of the input/output factors.

The obvious benefits of the Markov chain analysis is the increased sensitivity to changes in participation rates amongst age and gender cohorts for example. However, it may not be appropriate for small workforces and it does require a number of data items that may not be available, such as expected entrants and expected exits by age and gender.

Another method for projecting supply is based on time-series data, where patterns of change in a workforce are projected based on historical trends.

The issue of availability of quality data for nurse workforce planning has been a factor in each nursing workforce project examined in preparing this paper. This has been the case in relation to almost all factors required in the workforce planning process, from describing the workforce, through to assessing workforce supply and requirements and to determining the adequacy of the current workforce.

Finally, this paper is a companion paper to the earlier 2004 AHWAC report on Nursing Workforce Planning In Australia (AHWAC 2004) which outlined the workforce planning process and methods used by AHWAC in its nursing workforce planning. This earlier paper also discusses the concepts and methods referred to in this paper.

2. NATIONAL NURSING WORKFORCE REPORTS

2.1 Employment Demand In Nursing Occupations

Access Economics for the Australian Government Department of Health and Ageing 2004.

Conceptual approach

The analysis was undertaken to forecast demand for employment in nursing occupations (both aged care nursing and other nursing) over the period 2003 to 2012, with a view to determine how many newly qualified registered nurses (RNs) and enrolled nurses (ENs) would be needed each year of the projection period to meet demand.

The project was based on using a number of identified key drivers of demand or replacement needs. The key drivers used were employment patterns; population growth and ageing; expected retirements; and turnover. These were included in a model to determine gross replacement requirements.

Underlying assumptions in the projections were that overall average hours worked per week would remain constant over the projection period (based on 2001 data); and that staffing practices and levels at baseline (2001) would remain constant throughout projection period (given that nurses achieve economy-wide productivity gains and increasing efficiency beyond economy-wide productivity gains is not required).

Data used:

A number of sources were used in this project. Nursing supply, characteristics, projected retirements and employment were estimated using Australian Institute of Health and Welfare (AIHW) nurse labour force survey data from 2001, nursing student numbers were accessed from Department of Education Science and Training (DEST) and National Centre for Vocational Education Research (NCVER). Australian Bureau of Statistics (ABS) Labour Mobility Survey data was used to determine turnover. ABS census data was used to project population growth and ageing, growth in aged care requirements were estimated using a model developed by ACCESS Economics call the Aged Care Dynamic Cohort Model. AIHW National Hospital Morbidity Database was used to estimate growth in demand for other nurses.

Projection calculation

Overall demand for both the aged care sector and other nursing sectors were calculated separately and a total nursing demand was provided. Demand was projected by analysing total employment, net employment growth (examining growth in service demand), expected retirements and turnover to other occupations. A gross replacement requirement was then estimated for each of the projection years.

The gross replacement requirement (for all nurses: aged care and other) was then compared with the actual number of student nurse commencements at baseline (2003) and this was held constant over the projection years to see how well expected new nurse numbers would meet expected demand.

Findings

Demand for employment, retirements and turnover was estimated to provide a gross replacement requirement for both aged care nurses and other nurses (RNs and ENs). A total gross replacement requirement was also provided

Demand for employment:

Demand for aged care services is projected to grow steadily with population growth and ageing, with an average increase in demand for nursing hours in aged care of 4.9% for RNs and 3.6% for ENs (above economy-wide productivity gains of 1.75%). Demand for other nursing services is based on hospital morbidity data: estimated hospital days by age cohort and changes in population by age. The effect on nursing requirements is 2.0% employment growth for RNs and 0.8% increase in employment growth for ENs per annum (above 1.75% economy-wide productivity gains).

Retirements:

Retirement rates were inferred using AIHW data on age structure of the nursing workforce in 1996 and 2001 and national workforce participation data by age. The analysis found that 37% of the 2002 aged care nursing workforce would retire over the next ten years (12,761) and that 26% of other nursing (53,112) would retire over the next ten years, making a total of 65,873 retirements from total nursing workforce over the next ten years.

Occupational turnover:

ABS labour mobility survey data was used to determine turnover (other than related to retirement). Turnover was therefore estimated to be related to those nurses who leave nursing for other occupations, leave to become unemployed or leave labour force (but not retire). However, turnover related to leaving for other occupations was considered the most useful estimate of replacement need and was the only one of the three factors included in the analyses. Therefore, it was estimated that 1% of RNs and 7.7% of ENs leave the nurse labour force for other occupations.

Gross replacement requirement:

Given the above findings, the gross replacement requirement for the nursing workforce over the projection period (2003-2012) is summarised as the following:

- 117% of the 2002 RNs in aged care;
- 166% of the 2002 ENs in aged care;
- 60% of the 2002 RNs in other nursing;
- 113% of the 2002 ENs in other nursing; and
- 78% of the total 2002 nursing workforce (aged care and other nursing).

The cumulative estimated shortfall over the ten year projection period was estimated to be 60,799 if base year student nurse numbers are held constant (12,500 per annum for RN and EN commencing students). For example, in 2006, the gap is estimated to be 5,504 and by 2012 the gap is estimated to be 8,329.

Comments

The methodology used by Access Economics is clear and adheres to the brief that only key drivers be focused on in the analysis. As with all attempts to analyse nurse workforce supply and demand, there are issues and challenges with the data available. One aspect in particular is reliable data to determine turnover or exits from the nursing workforce. The use of ABS labour mobility data is sensible as it is one of the few sources of national data related to nursing turnover, however, it does have limitations depending on the size of the workforce in question.

The decision not to include nurses leaving the workforce without retirement (other than into another occupation), because it is assumed that this percentage (1.5% for RNs and 1.4% for ENs) is offset by those returning to work, may be a factor in an underestimation of replacement requirements. There is currently no national data available to determine re-entrants to nursing.

Another assumption made in the analyses is that commencing nursing students equates to completing nursing students, which may provide another factor for the underestimation of the projected gap between supply and requirements.

The modelling also assumed that average hours worked per week would remain constant through the projection period.

Unlike other reports (by Chah and Burke and Karmel and Li, which follow), no economic data was used to project requirements.

2.2 Australian Nurse Supply and Demand to 2006

Barbara Preston for the Australian Council of Deans of Nursing 2002.

Conceptual approach

The aim of this project was to provide the Australian Council of Deans of Nursing (and Midwifery) (ACDNM) with an estimation of the number of graduate nurses (RNs only) required per year up to 2006.

The project used a utilisation based approach assuming nurse to population ratios at baseline reflected an adequate nursing workforce.

Data used

ABS census (1996) to determine population projections for each year 2000 to 2006. It was also used to determine net separation rates for nurses (proportion of individuals with professional nursing qualifications in each age range who are working as professional nurses) AIHW nurse labour force data (1999) to determine nurse to population ratios. DEST and university data to determine nurse completions and projected nurse completions.

Projection calculation

Projected demand was based on an input/output model. Population projections, current nurse to population ratios, shortfall or surplus from previous year, percentage of projected graduates expected to enter the workforce and net separation rates were factored into the model.

Projected supply was based on projected undergraduate nurse completions (as projected by universities). Demand and supply were then compared to develop the conclusions of the report.

Findings

By 2006 10,182 graduate nurse completions will be required, with only 6,131 projected completions, leaving a shortfall in graduate nurse completions of 4,051 (40%).

Comments

The aim of the project was to provide the ACDNM with an estimation of the required number of graduate nurse completions. It does this using a modelling process that is transparent, which could be updated and expanded upon in future years.

However, it is likely that the requirements (demand) have been underestimated due to a number of factors:

- no account was taken for population growth and ageing over the time period (they were not increased in the modelling process)
- the model lacks sensitivity to changes in hours worked per age group;
- the use of nurse to population as a measure of adequacy of the workforce may have provided an inaccurate assessment of actual shortage;
- the assumption that 90% of graduate nurses enter the workforce successfully (it would have been preferable to model a number of scenarios across a range of entry proportions);
- registered nurses upgrading to degree status were included in projected completions (ie. they are already working, but being counted as potential new entrants to the workforce).

2.3 Job Growth and Replacement Needs in Nursing Occupations

Chandrah Shah and Gerald Burke 2001, commissioned for the National Review of Nursing Education 2002.

Conceptual approach

The aim of this project was to determine job growth and replacement needs in all nursing occupations. The conceptual framework therefore was a requirements analysis based on effective demand (or how many nurses will be required given workforce participation patterns?) and the trends including growth nursing employment and economic growth.

Data used

ABS labour force mobility survey (2000); employment growth in nursing occupations, economic indicators, including Access Economics' five year business outlook, Australian Bureau of Agricultural and Resource Economics, Tourism Forecasting Council, Productivity Commission and growth in government spending on health.

Projection calculation

Job growth was estimated by using the MONASH model, which is a computational general equilibrium model. It takes macro forecasts of the economy and incorporates known policy changes and other economic data to forecast production by industry.

Replacement needs were forecasted by examining the concepts of gross replacement, meaning the total number of jobs arising from individuals leaving an occupation, and net replacement, meaning the number of jobs arising from individuals leaving net of those re-entering (the jobs available for new entrants). An inflows/outflows model was used to determine net replacement needs based on identified participation patterns per age group and gender.

Job openings were calculated as a result of both job growth and net replacement needs.

Findings

Job openings for new entrants in nursing occupations from 2001 to 2006 are expected to grow at an annual rate of 2.5%. A total of 31,000 jobs for new nurses over the five years, 2001 to 2006. 21,000 of these are expected to be for registered nurses, ie. between 2001 and 2006 21,000 new registered nurses will be required to enter the workforce to replace those leaving the workforce and for new job opportunities opening. This total does not include the actual training requirement, as it does not take into account attrition from education and training courses, or those who complete their education but do not enter the nursing workforce.

Comments

The use of job growth indicators and workforce participation provides a comprehensive analysis of future demand for new entrants to the nursing workforce.

2.4 The Nursing Workforce 2010

Tom Karmel and Jianke Li, commissioned for the National Review of Nursing Education 2002.

Conceptual approach

This project aimed to provide an estimation of the underlying demand for the total nursing workforce up to 2010. It also aimed to provide an estimation of nursing supply up to 2010 given current supply characteristics. An effective-demand approach to estimate requirements was used.

Data used

AIHW nurse labour force data (1999), ABS population projections, Shah and Burke analyses of supply characteristics, health services data including hospital and community services and ABS data (wages, health expenditure etc).

Projection calculation

A shift-share analysis was carried out to determine those drivers of demand that had the greatest effect on the nursing workforce. Effects are interpreted in terms of "everything else being equal". Demand projections were then based on the identified "drivers".

Supply was projected using a dynamic stocks and flows model by single year of age for registered nurses. As with other nursing workforce studies, data on nurses returning to work or leaving was not available, so exit rates were estimated using data on new graduates, immigrants and overall nursing numbers.

New nursing graduates from 1999 were held constant through the projection period, together with the historical exit rates per single age group.

Findings

Demand: an overall increase of 2.56% per annum for nurses was projected. The main drivers for demand for nurses were population growth and ageing, organisational change and an ageing nursing workforce (increasing exits and decreasing hours worked per week). However, population demographics had less of an effect on the nursing workforce than the organisation of nursing work (occupational effect).

Registered Nurses: By 2010 a total of 180,522 nurses will be required, with a projected shortfall of 40,000 RNs (using the exit rate estimated from 1999 and the number of graduate nurses equalling the 1999 output). The ageing of the workforce will have a continuing effect at least to 2020. Increasing nursing graduate output by 120% would close the gap over the projection period. However, it is noted that increasing graduates by this magnitude might not be feasible.

Enrolled Nurses: According to the supply and demand projections, the EN workforce was estimated to be more in balance, assuming factors other than demographic and working hour trends do not come into play. By 2010 however, the ageing of the EN workforce will be having an effect that is projected to worsen over the next ten years to 2020. Increasing ENs by 17%, would balance the workforce at 2010, however, it is noted that this may create an oversupply in the years prior to 2010 unless the requirement for ENs increases.

Comments

This is a detailed approach to determining the expected changes in supply and separately determining the expected changes in demand for nurses. The use of broad economic data and utilisation data trends in identifying drivers of demand is complex but provides a basis for demand forecasting not used in nursing workforce planning in Australia to prior to this report.

2.5 The Critical Care Nurse Workforce in Australia 2001-2011

Australian Health Workforce Advisory Committee (AHWAC 2002.1)

Conceptual approach

This project aimed to provide projections of both supply and requirements of the critical care nurse workforce in Australia to 2011. Due to data limitations, a requirements only were projected and these were based on a combination of a utilisation and effective infrastructure approach. Inherent in the process was the assumption that critical care nurses would continue to care for patients based on current nurse to patient ratios and that the number of patients would be determined by the infrastructure to support them (ie. the number of critical care beds).

Data used

Supply: State health department data on nurses working in critical care, AIHW 1999 labour force surveys, Nursing Education and Graduate Profiles for 1999, 2000, 2001, 2002 (Ogle et al 2002).
Demand: ABS population projections and the Australian and New Zealand Intensive Care Society Review of Resources and Activity 2000-2001.

Projection calculation

Method One:

Baseline requirements were determined by using a formula to calculate the number of nurses required per critical care bed. This was then applied to the number of critical care beds for each state.

Evaluating the adequacy of the workforce was based on comparing baseline requirements with baseline supply. Total workforce requirements projections were developed by applying a population and ageing growth rate per annum to each state and territory based on ABS population projection data.

A stocks and flows method was used to model supply using the standard AHWAC calculation tool which projects supply in five year age cohorts using a Markov chain analysis. However, as data on entrants to specialty was not available, a requirements method was also incorporated. The projected required critical care nurse workforce was used as a starting point. The number of new entrants was then determined (by assuming an attrition rate per age group) using the stocks and flows model.

Four scenarios were used based on growth in requirements being held constant, or increasing by population growth and ageing effect, and attrition rates either being 15% or 10% per annum.

Method Two

A second method was used which could be considered an "input/output" calculation method. Baseline requirements as described above were used to determine future requirements by applying a net attrition rate per annum (either 10% or 15%) and growth factors (no growth or growth at population and ageing rate) per annum. Average hours worked per week were used to determine full time equivalents (FTE). This method analysed the workforce as a whole rather than in five year age cohorts. Four scenarios were used to determine future requirements as in method one.

Findings

Requirements for critical care nurses (nationally) were estimated to be 10,386. The estimated shortfall was 537.

Model one showed that between 722 and 1,356 new entrants would be required each year. Model two showed that between 1,038 and 1,764 new entrants would be required each year. Using model one, for a 50% qualified workforce 676 postgraduate critical care completions would be required annually up to 2011 and for a 75% qualified workforce 1,017 completions would be required.

Comments

A lack of data describing new entrants, expected entrants and attrition rates per age group within nurse specialties such as critical care, limited the usefulness of a Markov chain based stocks and flows model.

The use of population and ageing growth factors to determine future requirements may not be prove to be as accurate as using other factors that create growth in demand for critical care nurses.

2.6 The Midwifery Workforce in Australia 2002-2012

Australian Health Workforce Advisory Committee (AHWAC 2002.2)

Conceptual approach

Utilisation based approach (assumption that the way midwives practice will remain unchanged over the projection period).

Data used

State and territory health departments provided data on midwives working in the public sector, including vacancies, attrition rates, birth rate calculation tools and trends in distribution of different sizes of maternity units.

AIHW nurse labour force survey data (1999) was used to determine supply characteristics. Nursing Education and Graduates Profiles for 1999, 2000, 2001 and 2002 (Ogle et al 2002) were used to determine midwifery student numbers. This was supplemented with direct surveying of universities offering midwifery courses.

Surveys of a sample of maternity units (stratified according to number of births per year) was undertaken to determine the adequacy of the midwifery workforce.

Projection calculation

Growth in requirements was estimated to be zero (held constant) due to projected declining Australian birth rates.

Supply projections were made using a stocks and flows model, incorporating Markov chain analysis. Assumptions were made on overall exit rates from the workforce, with a number of scenarios used: 3%, 5%, 8% and 10% attrition each year.

Findings

By 2012 new entrants (midwifery completions) required to the midwifery workforce were estimated to be 519 (at 3% exit rate), 817 (at 5% exit rate), 1393 (at 8% exit rate) and 1752 (at 10% exit rate).

Comments

Due to the difficulty identifying a consistent model of midwifery practice, determining baseline requirements and current workforce adequacy was difficult.

3. STATE and TERRITORY NURSING WORKFORCE REPORTS

3.1 Nursing Workforce Supply and Demand Study - Victoria

Victorian Department of Health 2003

Conceptual approach

A utilisation based approach to supply was used which assumed that patterns of nursing service provision would remain constant (“no change”), demand was linked to both resident population forecasts, past service utilisation data and workforce capacity modelling.

This project examined the Victorian nursing workforce in segments according to work setting: public and private acute and sub-acute hospitals; residential aged care facilities; community and domiciliary services; and mental health.

Data used

Data to project supply included: Nurse Labour force Survey; Nurse Board of Victoria registration data; Graduate Careers Council of Australia data on graduates in work; re-entrant data; migration data from DIMIA; Resident Classification Scale statistics for residential aged care and Office of Public Employment data.

Data to project demand included: Resident Classification Scale statistics for residential aged care; Victorian Admitted Episodes Dataset for public and private hospital inpatient services; Victorian Ambulatory Classification System (VACS) and non VACS outpatient occasions of service data; Victorian Emergency Minimum Dataset; Report on government Services (Productivity Commission) for home and community care services and residential aged care services; community health workforce and activity reports; ABS Private Hospitals Data; and RAPID (mental health data set).

Projection calculation

Two methods of projecting future supply were used. Firstly, a time-series analysis using AIHW Nurse Labour Force Survey data from 1995 to 2002 was performed. The data was modelled using both linear regression and Holt-Winters time series analysis. Forecast estimates were made by extrapolating trend line to years 2003 to 2012.

The second method for projecting supply was a “stocks and flows” method, using AIHW Nurse Labour Force Survey data from 2002 as a baseline for stock, whereas nurse labour force survey data from 1995 to 2002 was used to measure inflow and outflows via age cohorts, enabling identification of trends across age groups.

Supply scenarios included:

1. A baseline scenario assuming no policy change except the expected 2% rise in number of division 1 (RN) nursing students as a result of Australian government university funding changes (2004-2007), with an added scenario of continuation of the 2% growth in division 1 nursing students 2008-2010.
2. Increasing migration in 2004-2006

3. Service demand was projected based on identified patterns of service utilisation (based on retrospective years of data). This approach assumes funding and activity patterns that will continue to change according to past patterns (utilisation approach).

Findings

This project is still in progress so it has not been possible to analyse the findings of the study.

3.2 South Australian Graduate Registered Nurse Requirements

Prepared by Debra Pratt and Edward Rawinski, for the South Australian Department of Human Services, 2001.

Conceptual approach

The purpose of the report was to estimate the number of pre-registration nursing students needed to graduate annually from undergraduate degrees to maintain the South Australian RN workforce at its (then) current size (2001).

The approach used was a utilisation based approach, focusing on underlying health system requirements and replacement needs. The underlying assumption in this approach is that current (baseline) workforce is adequate and that the way nurses provide services will remain constant.

Data used

Future health system requirements were based on population growth and ageing estimates and health service activity profiles.

Annual nursing graduate requirements were based on the overall (current) size of the registered nurse workforce (estimated headcount); and the average working life of registered nurses (to calculate replacement needs).

Demographic data was based on ABS Series II data for South Australia. Public health service data was sourced from the South Australian Monthly Management Summary System (MMSS). Private sector requirements trends were based on the South Australian Nurse Labourforce Bulletin (February 2001).

Nurse Labourforce Bulletin information was used to estimate the size of the RN workforce (headcount). AIHW Nurse Labour Force Survey data was used to determine average working life of RNs.

Projection calculation

The method for calculating the graduate nurse requirements is an input/output method.

The calculation begins with the estimated headcount 15,000 (+/- 10%) multiplied by the estimated annual attrition each year (1/15 of the total workforce +/- 25%) = 1,000 (+/- 35%).

The result is a replacement need (requirement for new graduate nurses entering the workforce) of between 650 and 1,350 annually.

Findings

Given population ageing, the increase in overall health systems activity profile, the conclusion of the report was that current employment levels of registered nurses may not be sufficient to meet future demand.

The estimated annual requirement for graduate registered nurses to meet current needs (2001) was between 650 and 1,350 annually. The report states that with 1,000 new graduate nurses there may still be an undersupply for over a decade (by 2004-5 the state's shortage is estimated to be over 1,500). For this reason it was recommended that the upper demand forecast of 1,350 new graduate nurses be used when planning intakes.

A report completed in 1997 (SA Department of Human Services, 1997) on undergraduate student nurse requirements recommended between 600 and 800 student nurse intakes over the period 1998-2002. In 2001, the estimated number of graduating registered nurses was 430 (well below the estimated requirement even at the lower demand forecast in both the 2001 and 1997 reports).

Recommendation in relation to supply

Between 1,000 and 1,350 pre-registration nursing students should graduate annually and that a minimum number of 1,350 graduates be produced for the period 2004-2006 (to meet increasing demands and cover current shortfalls).

Comments

The baseline workforce estimations did not include an assessment of current adequacy. Converting the headcount to FTE (based on average hours of work) might have provided a more sensitive indication of overall requirements.

This calculation method is clearly set out and would be easy to apply and update.

3.3 South Australian Health System Enrolled Nurse Training Requirements

Prepared by Julie Lewis and Edward Rawinski, for the South Australian Department of Human Services, 2002.

Conceptual approach

The purpose of the report was to estimate the number of South Australian EN training numbers needed to maintain the South Australian EN at its (then) current size (2002).

The approach used in this report (2002) was a utilisation based approach, focusing on underlying health system requirements and replacement needs. The underlying assumption in this approach is that current (baseline) workforce is adequate and that the way enrolled nurses provide services will remain constant.

Data used

Future health system requirements were based on population growth and ageing estimates and health service activity profiles.

Annual enrolled nurse training requirements were based on the overall (current) size of the enrolled nurse workforce (estimated headcount); and the average working life of enrolled nurses (to calculate replacement needs).

Public health service data was sourced from the South Australian Monthly Management Summary System (MMSS). Private sector requirements trends were based on the South Australian Nurse Labourforce Bulletin (February 2001).

Nurse Labourforce Bulletin information was used to estimate the size of the EN workforce (headcount). AIHW Nurse Labour Force Survey data was used to determine average working life of ENs.

Projection calculation

The method for calculating the graduate nurse requirements is an input/output method.

The calculation begins with the estimated headcount 4,647 (+/- 10%) multiplied by the estimated annual attrition each year (1/13 of the total workforce +/- 25%).= 357 (+/- 35%).

The result is a replacement need (requirement for annual student enrolled nurse intakes) of between 232 and 482 annually.

Findings

The result is a replacement need (requirement for annual student enrolled nurse intakes) of between 232 and 482 annually.

In 2000, 239 students graduated from certificate IV Health (Nursing), with 25 completing re-entry and 4 completing re-fresher (total 268).

Recommendation in relation to supply

Given the shortages in the registered nurse workforce, the recommended number of EN trainee intakes should be increased to the range of 357 to 482 to ensure adequate supply to meet requirements.

Comments

The baseline workforce estimations did not include an assessment of adequacy. Converting the headcount to FTE (based on average hours of work) might have provided a more sensitive indication of overall requirements.

This calculation method is clearly set out and would be easy to apply and update.

3.4 Tasmanian Nurse Workforce Planning Project, November 2001

Department of Health and Human Services, Tasmania, 2001

Conceptual approach

The aim of the Tasmanian Nurse Workforce Planning Project was to examine the current nursing workforce and determine current and future needs. The project was to report on a number of factors including nursing workforce data collections, a profile of the nurse workforce requirements, recommendations for recruitment and retention, recommendations for marketing and promotion of nursing in Tasmania, and recommendations for the provision of nurse education programs responsive to demand.

Data used

Data used for the project included surveys sent to nurses with practising certificate renewals. Focus groups and reference groups were also used to gather information.

Projection calculation

Because of issues with poor quality data, no projections of supply were reported.

Findings

The findings of the labourforce surveys reflected an ageing nursing workforce with the majority of nurses between 30 and 59 years of age, with 46% being of 45. The most frequently reported years of initial registration were between 1976 and 1980, with only 20% showing initial registration between 1990 and 1999.

Other findings of the report included shortages in specialist areas such as operating theatres, intensive care, renal, mental health and aged care. It was also found that rural areas were particularly affected. Declining numbers of registered and enrolled nurses, decreasing retention rates of both existing nurses and new graduate nurses, and a heavily segregated and ethnically limited nursing population were also reported.

Focus groups and reference groups reported lack of clarity about the future nature of broad health care policies and service delivery requirements.

The report provided recommendations around the nurse education sector (including the review of intake numbers for pre-registration nursing courses to ensure maintenance of the future nursing workforce and ensuring early exposure to a range of practice settings, responsiveness of nursing education to workforce needs, and accessibility to nursing courses). Other recommendations were around data improvements, marketing and promotion of nursing in Tasmania, increasing the ethnic representativeness of the nursing workforce, career development, and scope of practice.

Comments

The findings of this report and its recommendations are consistent with other studies from other states and territories.

4. NURSING WORKFORCE REPORTS 2001-2004: AN OVERVIEW OF FINDINGS

The analysis of recent Australian nurse workforce studies highlights a number of important factors. These include:

- the general inadequacy of numbers of nursing graduates produced over recent years to meet demand (in terms of both replacement and growth in demand for health services);
- the ageing of the nursing workforce (and projected retirements), decreasing hours worked and turnover will have an effect on the ability of the nursing workforce supply to replace itself;
- growth in demand for health services is also expected to increase especially in the aged care sector but also across acute care sectors;
- the need to increase the intakes into nursing (university and VET sector) to provide new entrants to the nursing workforce (for both replacement and to meet growth in demand). A number of studies were carried out examining requirements for new graduate nurses (RNs). The projected new graduate nurses required for 2006 range between 10,182 and 12,270; and between 10,712 and 13,438 for 2010. One study projected required new enrolled nurses and found that between 5,734 and 6,565 will be required each year between 2006 and 2012.
- the need to better align workforce requirements with nurse education; and
- the continued need for improvements in nursing workforce data collections and processes so as to improve timeliness in data availability and to ensure that the information considered in Australian nursing workforce planning studies covers all key projection data items in terms of both supply and demand.

Table 1 highlights the findings and key recommendations regarding supply (not demand) from the nurse workforce projects that examined the overall nursing workforce.

Table 1. Summary Australian nurse workforce projects examining the general (overall) nurse workforce

PROJECT TITLE	KEY FINDINGS	KEY SUPPLY RECOMMENDATION
NATIONAL		
<p>Employment Demand in Nursing Occupations. Report by Access Economics for Australian Department of Health and Ageing, 2004.</p>	<p>78% of the total 2002 nursing workforce (aged care and other nursing, RNs and ENs) will need to be replaced over the projection period 2003-2012.</p> <p>Between 2003 and 2012 an average shortfall of new nurses (nursing students, RNs and ENs) is estimated to be 6,100 per annum (ranging between 4,343 in 2003 and 8,329 in 2012).</p>	<p>The current supply of nursing graduates from universities and VET sector are merely replacing nurses who retire or leave the occupation currently at baseline.</p> <p>In order for supply to meet demand, the nursing sector will have to train for growth in demand as well as increasing retirements.</p>
<p>Australian Nurse Supply and Demand to 2006 (Preston 2002)</p>	<p>2006:</p> <ul style="list-style-type: none"> • 10,182 new graduate registered nurses required • 6,131 projected • shortfall of 4,051 graduate nurses 	<p>For supply to meet demand, an increase of between 58.9% and 63.1% of expected new graduate nurses is required each year to 2006.</p> <p>For example, in 2004 5,711 new graduate nurses will be available to enter the workforce, but 9,764 will be required (need to increase supply by 63.2% to meet demand).</p>
<p>Job Growth and Replacement Needs in Nursing Occupations (Chah and Burke 2001)</p>	<p>2001-2006:</p> <ul style="list-style-type: none"> • 31,000 new job openings for nurses (minimum training requirement) • 21,000 for RNs • 10,000 for ENs 	<p>31,000 is the minimum training requirement over 5 years (assuming no attrition from courses and all completing students enter the nursing workforce)</p>
<p>The Nursing Workforce 2010 (Karmel and Li 2002)</p>	<p>RNs: Shortfall of 40,000 by 2010 and worsening with effects of ageing of workforce to 2020 (based on 1999 completions).</p> <p>ENs: ageing effects will take place by 2010</p>	<p>RNs: Increasing graduate registered nurses by 120% annually will balance workforce by 2020.</p> <p>ENs: Increasing EN training by 17% annually will ensure balance at 2010</p>

PROJECT TITLE	KEY FINDINGS	KEY SUPPLY RECOMMENDATION
STATE AND TERRITORY		
South Australian Graduate Registered Nurse Requirements (Pratt and Rawinski 2001)	Estimated annual requirement for graduate registered nurses is between 650 and 1,350 annually. However with 1,000 new graduate nurses there may still be an undersupply for over a decade.	The upper demand forecast of 1,350 new graduate nurses be used when planning intakes in the short term.
South Australian Health System Enrolled Nurse Training Requirements (Lewis and Rawinski 2002)	The requirement for annual student enrolled nurse intakes is between 232 and 482 annually.	Given the shortages in the registered nurse workforce, the recommended number of enrolled nurse trainee intakes should be increased to the range of 357 to 482.
Nurse Labourforce Projections 1998-2008 (DHS 2001)	<p>With demand held constant, graduate numbers held constant and no increase in losses, the workforce was estimated to be balanced by 2008 = 56, 350 nurses required</p> <p>With low demand growth, balance is achieved by 2008 by doubling graduates and increasing retention rate by 50% = 62, 802 nurses required.</p>	<p>In light of expected substantial gaps between supply and demand (shortage), the report suggested the following responses:</p> <ul style="list-style-type: none"> • Changing work practices and composition of the nursing workforce by identifying appropriate levels of support staff to work under the supervision of registered nurses. • Decreasing attrition rates • No increase in student numbers

To better understand the above findings and implications of the recommendations, undergraduate nurse data (for RNs) for the most recent years is provided in table 2. This should help contextualise recommended increases in undergraduate nursing numbers.

Table 2: Australian undergraduate nursing course completions, by State and Territory 1999-2003

	NSW	Vic	Qld	SA	WA	Tas	NT	ACT	Aust
1999	1504	1254	993	519	346	141	52	60	4869
2000	1693	1423	990	455	385	109	51	54	5160
2001	1473	1135	872	518	436	145	67	54	5050
2002	1514	1235	996	478	456	145	119	55	5310
2003	Waiting for data								

Note: 2002 total incorporates 312 completions from multi-state universities (Australian Catholic University).

Source: 2002: DEST, 1999-2000: Ogle et al (2001, 2002)

Table 3 provides the recommended number of new graduate nurses (those who have successfully completed undergraduate (pre-registration) domestic nursing from recent studies and compares these with actual commencement, applicant and places offered information. Where the states and territories have conducted their own assessment of requirements, these have been used. Where this information is not available from the jurisdictions themselves, the work of Preston (2002) has been used.

Table 3: Undergraduate domestic nursing students 2003: recommended completions, actual completions, number of eligible applicants, number of eligible applicants offered a place and percentage of eligible applicants not offered a place by State and Territory

State	2003 Recommended new graduate nurses (RN completions)	2003 commence (DEST)	2003 complete (DEST) (awaiting data)	2003 eligible applicants (AVCC)	2003 eligible applicants offered place (AVCC)	2003 % not offered place (AVCC)
NSW/ACT	3,484 ^a	2,594		3,193	2,701	15%
Vic	2,253 ^a	1,754		4,532	2,608	58%
Qld	1,863 ^a	1,553		3,292	1,191	36%
SA	1,350 ^b	982		912	708	22%
WA	1,003 ^a	720		909	794	25%
Tas	181 ^a	216		475	335	29%
NT	99 ^a	199		N/A	N/A	N/A
Multi-state		523				
Total 2003		8,541		13,313	8,452	37%

Sources: a: Preston B. (2002). Australian Nurse Supply and Demand to 2006, a projections model and its application. A report prepared for the Australian Council of Deans of Nursing. June 2002, Melbourne.

b: South Australian Department of Human Services 2001. South Australian Graduate Registered Nurse Requirements. Prepared by Debra Pratt and Edward Rawinski. June 2001 for the South Australian Department of Human Services.

DEST¹: Department of Education, Science and Training, Commencing Domestic Students Enrolled in Courses for Initial Registration as Nurses by State, Institution, Mode of Attendance, Type of Attendance and Gender, 2003.

DEST²: Department of Education, Science and Training (Waiting for data)

AVCC: Australian Vice Chancellors Committee, Survey of Applicants for Undergraduate Higher Education Courses, 2003.

* includes non-domestic students

Table 4 provides an estimation of projected total nurse education completion requirements drawn from the work of Preston (2002) Karmel and Li (2002) and Access Economics (2004). It is important to note that the underpinning assumption of these recommended numbers are that the way nursing services are provided (current skill mix and type of practice) remains constant throughout the projection period.

Table 4. Projected required number of national university nurse (registered nurse) and VET (enrolled nurse) completions 2006, 2010 and 2012.

Source	2006	2010	2012
Registered Nurse Completions			
Preston ^a	10,182	NA	NA
Karmel and Li ^b	NA	10,712	NA
Access Economics ^c	12,270	13,438	14,264
Enrolled Nurse Completions			
Access Economics ^c	5,734	6,201	6,565

Sources: a: Preston B. (2002). Australian Nurse Supply and Demand to 2006, a projections model and its application. A report prepared for the Australian Council of Deans of Nursing. June 2002, Melbourne

b: AHWAC estimation using information from Karmel T & Li J., (2002). The Nursing Workforce 2010. Commissioned for the National Review of Nursing Education c: Employment Demand in Nursing Occupations.

c: Report by Access Economics Pty Limited for Commonwealth Department of Health and Ageing 2004.

In July 2004 the Australian Government announced additional nursing places for 2005. Total additional places, based on data supplied by the DEST, are estimated to be 1,494 nationally (including midwifery and aged care nursing places). The estimated total number of undergraduate nurse commencements (based on 2003 commencements) with these additional 1,494 places is 9,382. These figures assume no current nursing places are lost and refer to commencing nursing students rather than completing nursing students. Not all entrants to undergraduate nurse education complete their courses and enter the nursing workforce. It is therefore important that completion and entry to the nursing workforce rates are high to ensure maximum benefit of increased intakes into undergraduate nursing courses are felt in the workplace, and that new entrants to the workforce are retained. This will require monitoring over coming years. Most recently available data specifically for nursing estimated a 78% retention rate in 1999 for undergraduate nursing courses (Nursing Education Review, 2002). The results from the 2003 graduate destination surveys show that 95% of nursing graduates in full time work are working as registered nurses and 90% of nursing graduates in part-time work are working as registered nurses (note: this survey had a 62.7% response rate of all graduates) (Graduate Careers Council of Australia 2003 and 2004).

Table 5 highlights these proposed changes in undergraduate nursing places by state and territory.

Table 5. Current undergraduate domestic nursing commencements, additional nursing places 2005 and total additional nursing places, by 2005 by State and Territory.

State/Terr.	2003 commencements (DEST) ^a	Additional new nursing places 2005 ^b	Estimated total commencements (2003 plus new places 2005, including midwifery and aged care nursing)
NSW	2,482	457	2,939
Vic	1,754	291	1,854
Qld	1,553	383	1,749
SA	982	105	1,001
WA	720*	158	725
Tas	216	50	258
NT	199	10	201
ACT	112	40	152
Multi-state	523		523
Total	8,541	1,494	9,382

*includes non domestic students

Sources: a: DEST Department of Education, Science and Training, Commencing Domestic Students Enrolled in Courses for Initial Registration as Nurses by State, Institution, Mode of Attendance, Type of Attendance and Gender 2003.

b: National Health Workforce Secretariat estimations based on data supplied by DEST following the Australian Government's announcement.

Note: 2004 commencements not available until December 2004.

Conclusion

This paper has analysed a number of key nurse workforce reports produced over recent years. Although each report differs slightly in its findings, depending on the data sources and how data has been used, a number of consistencies are found. These include: the ageing of the nursing workforce and subsequent expected retirements over the next decade; and the inadequacy of recent past and current new registered and enrolled nurses to meet projected replacement needs as well as growth in demand for health services in the future.

As highlighted in this paper, the total projected required number of new graduate nurses (RNs) by 2006 ranges from between 10,182 (Preston 2002) and 13,438 (Access Economics 2004). By 2010 an estimated 10,712 (AHWAC analysis of Karmel and Li 2002) and 13,438 (Access Economics) new graduate nurses will be required. These are in effect new RNs who have completed their undergraduate nurse education and have entered the nursing workforce. The additional nursing places (for new entrants to undergraduate nursing courses in 2005) announced by the Australian Government will contribute to increasing the supply of new graduate nurses, but will not be sufficient to meet projected demand based on replacement (turnover and retirements), population growth and ageing and increasing demand for health services.

This means a range of further policy responses will be required to ensure Australia has an adequate supply of nurses entering, and remaining in, the Australian nursing workforce. From the estimates provided in the national workforce planning reports considered in preparing this paper, this will need to include further increases in nurse undergraduate intakes. However, issues around the support of student nurses in the clinical environment, retention of nursing students, the subsequent support of new graduate nurses and the retention of nurses in the nursing workforce also need to be addressed. In this context, the National Nursing and Nursing Education Taskforce has been established by the Australian Health Ministers Conference and the Taskforce will be overseeing recommendations dealing with such additional issues in the context of implementing aspects of the 2002 National Review of Nursing Education.

In the short term, there is no need to commission any further national nursing workforce planning projects for the nursing workforce as a whole. The national nursing workforce planning projects reviewed in preparing this paper have contributed sufficient advice on future nurse workforce supply and recommended levels of undergraduate nurse intakes. The scope of the challenge is quite clear, what is now required is implementation. In turn this will require all stakeholders to act cohesively and decisively to further boost nursing workforce intakes and to put in place suggested reforms within the education and clinical environment to ensure the nursing workforce is trained, retained and supported.

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