The future nursing workforce in Australia: baseline data for a prospective study of the profile, attrition rates and graduate outcomes in a contemporary cohort of undergraduates

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ABSTRACT

Objective

To gather data from ten universities across two Australian states in order to: provide a descriptive demographic profile of undergraduate Australian nursing students; provide baseline data for a prospective analysis of attrition within undergraduate nursing programs; and to facilitate student recruitment into a prospective cohort study to examine graduate outcomes.

Methods

Approval was sought from each Head of School to enable recruitment of undergraduate nursing students as a sub-sample of an ongoing large scale longitudinal e-cohort study involving Australian, New Zealand and United Kingdom nurses and midwives (http://www.e-cohort.net). Each nursing school nominated a contact person to become part of the research team; provide aggregate data on the quantity and demographic profile of currently enrolled undergraduate nursing students; and to facilitate recruitment of students into the cohort study.

Results

Two of the ten universities could not supply any demographics of their undergraduate nursing student body and one university could not provide data on year levels. The remaining data revealed an interesting demographic profile in the following areas: the age range of students across both states was 17 to 68 years, with just under half the population of students aged over 25 years. Some universities had a younger cohort of students in comparison to others and this was potentially associated with universities which only offered their program in full-time mode. The high proportion of students choosing to enrol in their undergraduate program part-time in South Australia (22.5%) as well as the large number of international students at one Queensland university (28% in year one) may impact on the future graduate nursing workforce supply. Retrospective analysis of the average attrition rate in Queensland universities was estimated at 24.5% which is consistent with the findings of a recent systematic review of published primary studies.

Conclusion

Whilst this preliminary data reveals some interesting issues, in general, there is a paucity of evidence about the demographics of the future Australian nursing workforce, attrition within undergraduate nursing programs and graduate outcomes. Clearly there is a need to systematically track undergraduates and new graduates to quantify student attrition, graduate retention and career plans and begin to build this evidence-base. A minimum demographic dataset of all undergraduate nursing students in Australia should be established to track trends over time that will inform future workforce planning.

INTRODUCTION

The world has entered a period of scarcity for human resources in health which in turn impacts on the health of populations (Anand and Barnighausen 2004). The shortage of qualified health professionals, including nurses, is now one of the largest barriers to achieving the Millennium Development Goals for improving the health and well being of the global population (Anand and Barnighausen 2004). In response to this shortage, the International Council of Nurses (ICN) launched the Global Workforce Project in 2004, and in 2006, the World Health Organisation (WHO) announced the decade of the Health Care Workforce 2006-2015 (WHO 2006; ICN 2004).

Nurses are the 'front line' staff in most global health systems. A nursing shortage undermines the effectiveness of any health care system, particularly in small rural and remote communities where a nurse may be the only health practitioner (WHO 2006; ICN 2004). Predicted shortages of qualified nurses are reported in Australia, New Zealand, United Kingdom, United States of America and Canada (RCN 2005; Crow and Hartman 2005; ICN 2004; CNA 2002; Crowley and West 2002; DEST 2002).

Nurses comprise 40%-50% of the global health care workforce and represent 55% of the Australian health care workforce (Productivity Commission 2006; WHO 2006). As nurses occupy the largest share of the health workforce, a viable health care system providing optimum population health outcomes relies on a sustainable and healthy nursing profession (WHO 2006; AIHW 2004). While it is important to understand the demographics of the current nursing workforce in Australia to plan retention strategies and predict retirement trends for workforce planning, it is also critical to recruit and retain a viable future nursing workforce. Undergraduate nursing students comprise the future nursing workforce and yet there is currently no demographic data gathered to profile this group for workforce planning or to quantify projected graduate figures.

There is an estimated deficit of 40,000 nurses predicted in Australia by the year 2010 (AHWAC 2004;

DEST 2002). Projected estimates to meet workforce demands report the need for 10 000 graduates per year from 2006 onward (AHWAC 2004). The latest figures from the Australian Government Department of Education, Science and Training (DEST) show that only 5306 domestic nursing students, who form the majority of the future supply stock, completed their undergraduate program in 2003 (DEST 2004a).The Australian Health Workforce Advisory Committee (AWHAC), a national government body to oversee health workforce planning in Australia, anticipates a shortfall of 4,000 graduates per year, which is 40% above projected graduate completions. Although there are attempts to increase graduate supplies by increasing university places over the next four years, there will still be a significant shortfall in the nursing supply. Additionally, projected workforce supply estimates are calculated using stable commencement rates for undergraduate student nurses and therefore do not include the number of non-completers of pre-registration nursing courses, as well as assuming a 95% retention rate of new graduates (AWHAC 2004).

There is a paucity of state or national data in Australia that quantifies attrition in undergraduate nursing programs for workforce supply estimates. National statistics are reported on all student commencements and completions in undergraduate programs but these figures are not reported by specific field of study (DEST 2004b). The National Nursing and Nursing Education Taskforce (N[3]ET), was a government body formed in Australia in 2003 to implement recommendations from the *National Review of Nursing Education* (DOHA 2002). The N[3]ET reference a report from the Australian Council for Educational Research (ACER) which quotes student attrition rates in nursing programs in Australia at 7% (N[3]ET 2005; McMillan 2005).The ACER report is based on a sample of young people in Year 9 in 1995 and follows the cohort for three years after leaving school (McMillan 2005). The report however does not state a 7% attrition rate in nursing programs; it reports a 9% attrition rate within health as a field of education (excluding medicine, dentistry and veterinary science) and there is no data to determine

if any of the cohort followed were enrolled in nursing programs (McMillan 2005). Thus the N³ET data about undergraduate nurse attrition rates may not be accurate.

Despite decades of debate within the nursing profession about undergraduate attrition and graduate retention, a recent global systematic review found only four studies that examined undergraduate attrition as an outcome, and no studies were found that examined retention of new graduates as an outcome measure (Gaynor et al 2006). Only two of the four studies followed cohorts of students prospectively and were able to provide a high level of evidence. These studies reported a range of 25-27% attrition within the first year. The only prospective Australian study, based on four universities, measured attrition of undergraduate first year nursing students at 27%, and was published over ten years ago (Harvey and McMurray 1994). It is important to quantify contemporary undergraduate attrition rates for workforce planning and projected university enrolments.

The highest level of evidence for quantifying attrition in undergraduate nursing programs would be yielded by a prospective cohort study that examines a large cohort of students (or all students) from a range of programs and measured individual attrition over time. This type of study would also enable analysis of factors associated with attrition. The next best level of evidence would be to prospectively gather aggregate data and quantify attrition over time.

The aim of this paper was to do the latter and gather data from ten universities across two Australian states from which it would be possible to: provide a descriptive demographic profile of undergraduate Australian nursing students; provide baseline data for a prospective aggregate analysis of attrition within undergraduate nursing programs; and to facilitate individual student recruitment into a prospective cohort study to examine graduate outcomes.

METHODS

Approval was sought from each Head of School in Queensland (n=7) and South Australia (n=3) to enable recruitment of undergraduate nursing students as a sub-sample of the Nurses and Midwives e-cohort study (http://www.e-cohort.net), an ongoing large scale longitudinal cohort study involving nurses and midwives from Australian, New Zealand and the United Kingdom. This recruitment phase will continue into first semester 2007 with a view to reporting on graduate outcomes beyond this time.

Each Head of School nominated a contact person to become a part of the research team for the undergraduate demographic and attrition project. Each contact was requested to provide aggregate data on the quantity and demographic profile of currently enrolled undergraduate nursing students and to facilitate recruitment of students into the cohort study. The Behavioural and Social Ethical Review Committee of The University of Queensland granted ethical clearance for the study.

Each university contact was made an associate investigator of the Nurses and Midwives e-cohort study (http://www.e-cohort.net) and invited to become co-authors of papers reporting the results of the aggregate data that each would contribute. One university contact declined co-authorship. Each university contact was requested to provide aggregate data quantifying all undergraduate nursing students enrolled at their university after census date in first semester, 31 March 2006. Census date is the cut off date where withdrawal from an undergraduate program will not attract academic or financial penalty. It should be noted that some universities have earlier census dates, however this is the final date at a national level. To prospectively gather data over time on attrition within programs, the exact number of first, second and third year students was requested from participating universities. Current DEST data reports a much higher attrition within the first year of university programs compared to subsequent years (DEST 2004b). It is important to know the distribution of undergraduate attrition by year level across the three years of the program. Additional demographic data collected included: age range and mean and proportion of students less than 25 years; proportion of enrolled nurses; proportion of

males; proportion of part-time enrolments where applicable; proportion of Indigenous students and proportion of international students. Tables 1-3 outline the demographic aggregate data requested per total student cohort and for each year level; reported per state and reported aggregates across both states of Australia.

In addition, the in-kind support of the Queensland Nursing Council was obtained to quantify the aggregate number of eligible graduands for nursing registration submitted by each Queensland university in December 2005. These figures were matched to Queensland Tertiary Admissions data (QTAC) of aggregate enrolments for undergraduate nursing students three years prior, based on census figures reported from 31st March 2003. Table 4 shows the estimate of attrition within each program and the state average based on these figures. This could not be replicated in South Australia as the same data could not be accessed from the South Australia Tertiary Admissions Centre (SATAC).

Figure 1. Comparison of Queensland and South Australia universities Demographic Profiles.
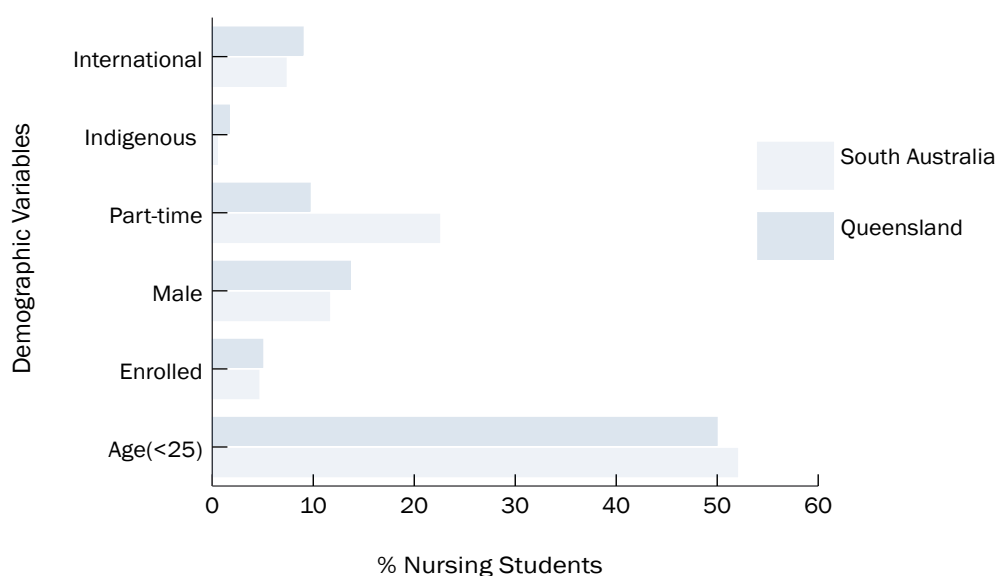
RESULTS

Baseline Aggregate Student Data

A major finding of the study was the difficulty that some university contacts experienced in accessing the data requested from university administrative databases. Most of the contacts were program coordinators and maintained aggregate and demographic data on their undergraduate cohort at school level. Surprisingly, not all universities were able to provide data that either quantified all undergraduate nursing students or 1st, 2nd and 3rd year undergraduate nursing students. Those university contacts able to supply baseline data will remain involved in the study over the next few years as further aggregate data is gathered in 2007 and 2008 and actual attrition figures can be reported prospectively from 1st to 2nd year and 2nd to 3rd year. Tables 1 and 2 outline the data able to be provided as of university census date 31st March 2006. At present, figures indicate that n=3,755 potential nursing graduates in Queensland over the next few years and n=3,610 potential nursing graduates in South Australia. A comparison of the demographic details between the two states is illustrated in figure 1.

Table 1: Demographic profile of undergraduate nursing students as at census 31st March 2006 Queensland

University	Year level	Total	Range	Mean	<25 years	Enrolled Nurses n	%	Male n	%	Part-time enrolments n	%	Indigenous students n	%	International students n	%
Australian Catholic University	1st	178	18-60	25.8	n=107, 60%	*	*	17	10	18	10	1	1	50	28
	2nd	131	19-55	26.9	n=74, 56%	*	*	14	11	24	18	2	2	31	24
	3rd	89	20-57	27.0	n=55, 62%	*	*	11	12	10	11	1	1	0	0
	Total	398	18-60	26.4	n=236, 59%	*	*	42	11	52	13	4	1	81	20
Central Queensland University	1st	362	17-56	27.5	*	6	2	49	14	9	3	11	3	7	2
	2nd	229	18-55	30.0	*	30	19	25	11	4	1	1	0.4	3	1
	3rd	140	19-53	31.2	*	20	14	18	13	7	5	5	4	4	3
	Total	731	17-56	30.0	*	56	8	92	13	20	3	17	2	14	2
Griffith University	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
James Cook University	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Queensland University of Technology	1st	*	*	*	*	Enter 2nd Year		*	*	*	*	*	*	*	*
	2nd	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	3rd	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	Total		*	*	n= 946, 61%	47	3	260	17	210	13	26	2	157	10
The University of Queensland	1st	164	17-50	21.7	n= 127, 77%	13	8	13	8	Full-time enrolment only		1	0.6	10	6
	2nd	105	18-53	22.6	n= 81, 77%	7	7	7	7			1	0.9	6	6
	3rd	78	19-50	26.8	n= 51, 65%	32	41	5	6			0	0	1	1
	Total	347	17-53	23.2	n= 259, 75%	52	15	25	7			2	0.5	17	5
University of Southern Queensland	1st	245	17-53	25.6	n= 148, 60%	π	*	39	15.9	32	13	6	2.4	*	*
	2nd	228	18-58	27.5	n= 122, 54%	*	*	26	11.4	30	13.2	2	0.9	*	*
	3rd	249	19-54	26.9	n= 184, 74%	*	*	31	12.4	21	8.4	7	2.8	*	*
	Total	722	17-58	26.6	n= 454, 63%	*	*	96	13.3	83	11.5	15	2	*	*
Aggregate Totals		3755	17-60	26.6	n=1895, 50%	155	5	515	13.7	365	9.7	64	1.7	269	9

* = unable to supply data

Demographic Profile of undergraduate Australian nursing students

A significant finding from this data is the age demographics of the student population. The age range from the combined data sets (table 3) is 17-68 years of age, with just over half of this population (51%) under 25 years of age. Each university had students enrolled who were aged 50 years and some obviously had students aged 60 years or greater, the latter able to make a minimal contribution in employment years, to the workforce on graduation. The age profile of these students has implications for future workforce planning strategies, considering that over 42% of the current workforce are aged 45 years or older and will therefore be retiring over the next 10 to 15 years (AIHW 2004).

Another interesting finding related to age demographics is the relationship between the younger ages of the cohort of students at universities that only offer courses as a full-time option. Both The University of Queensland and the University of Adelaide have well over half the student population under the age of 25 years (75% and 84%, respectively). Perhaps this reflects the likelihood of a younger aged cohort to enrol full-time and further investigation of these findings, while beyond the scope of this paper, may be significant with respect to workforce planning.

Within the South Australian population of students, it is interesting to note a much higher proportion of students who choose to study part-time, compared to their Queensland counterparts (22.5% and 9%

respectively, see figure 1). This may also impact on future workforce patterns, as almost one quarter of South Australian students have chosen this mode of study, and may also choose to work part-time after they graduate. The increase in part-time work status (and therefore decrease in average weekly hours worked) is significant when taken into consideration with population growth. The AIHW (2004) report that the nursing supply has decreased from 1,127 FTE (full time equivalent) nurses per 100,000 in 1995 to 1024 in 2001, due to the change from full-time to part-time work status.

Large numbers of international students in the undergraduate cohort (28% of year one level students at ACU, refer table 1) may also be significant with respect to future graduate supply, if these students choose to leave Australia once they have completed their degree. The other universities show low international student figures, with South Australia having an aggregate total of 7.3% and Queensland 9%, although three Queensland universities did not supply this data and are not reflected in the state total.

Table 2: Demographic profile of undergraduate nursing students as at census 31st March 2006 South Australia

University	Year		Age			Enrolled Nurses		Male		Part-time enrolments		Indigenous students		International students	
	level	total	Range	Mean	<25 years	n	%	n	%	n	%	n	%	n	%
Flinders University	1st	367	17-56	25.0	n= 237, 65%	60	16	50	14	93	25	4	1	52	14
Bedford Park	2nd	329	19-62	28.0	n= 182, 55%	79	24	41	12	60	18	1	0.3	52	16
	3rd	239	20-54		n= 139, 58%	27	11	29	12	64	27	2	0.8	38	16
	Total	935	17-62	26.5	n= 558, 60%	166	18	120	13	217	23	7	0.8	142	15
Riverland	1st	25	18-47	27.0	n= 14, 56%	*	*	1	4	4	16	2	8	0	
	2nd	25	20-61	35.0	n= 9, 36%	*	*	4	16	4	16	1	4	0	
	3rd	16	20-56	36.0	n= 3, 19%	*	*	2	13	1	6	0	0	0	
	Total	66	18-61	32.0	n= 26, 39%	*	*	*	*	9	14	3	5	0	
University of Adelaide	1st	50	17-50	22.2	n= 42, 84%	0		6	12	Full time enrolment only		0	-	0	
	2nd	0	First year only in 2006										-		
	3rd	0											-		
	Total	50	17-50	22.2	n= 42, 84%	0		6	12			0	-	0	
University of South Australia	1st	773	17-62	23.0	n= 409, 53%	*	*	88	11	163	21	*	*	59	8
City East	2nd	685	18-58	23.0	n= 356, 52%	*	*	99	15	116	17	*	*	41	6
	3rd	632	20-68	26.0	n= 290, 46%	*	*	59	9	222	35	*	*	22	3
	Total	2090	17-68	25.0	n=1055, 51%	*	*	246	11	501	24	*	*	122	6
Whyalla	1st	173	17-52	30.0	n= 70, 41%	*	*	20	12	50	29	*	*		
	2nd	183	18-58	35.0	n= 71, 39%	*	*	12	7	23	13	*	*	1	0.5
	3rd	113	20-59	29.0	n= 46, 41%	*	*	9	8	12	11	*	*		
	Total	469	17-59	30.0	n= 187, 40%	*	*	41	9	85	18	*	*	1	0.2
Aggregate Totals		3610	17-68	27.1	n=1868, 51.7%	166	4.6	420	11.6	812	22.5	10	0.5	265	7.3

* = unable to supply data

Table 3: Aggregate demographic profile of undergraduate nursing students as at census 31st March 2006 Queensland and South Australia

Aggregate Total	Age			Enrolled Nurses		Male		Part-time enrolments		Indigenous students		International students	
	Range	Mean	<25 years	n	%	n	%	n	%	n	%	n	%
7365	17-68	26.9	n=3763, 51%	321	4.8	935	12.7	1117	16	74	1	534	8

Retrospective data on enrolments and attrition in Queensland 2003 -2005

Table 4 outlines the aggregate enrolments in undergraduate university programs for Queensland universities as of census date in 2003: the corresponding aggregate graduates presented by each university to the Queensland Nursing Council in December 2005 and estimated program attrition over the three years.

There is a wide range in attrition rates between the universities: 9.7%-41.8%, however it needs to be acknowledged that these figures may not reflect a true picture of current attrition rates. For example, these figures do not take into consideration movement of students between universities and courses, and it would be prudent therefore to account for transfer students or entries from other courses in future

analysis to gain a more accurate attrition figure, if possible.

Transfer students might partly explain the high attrition rates attributed to the regional universities as co-authors anecdotally report students often transfer from regional to metropolitan universities after their first year. In addition, some universities might have a high attrition in the first year but supplement this with second year entry level students from either enrolled nursing programs, transfer students from other undergraduate programs or a graduate entry level option.

The state average aggregate total of 24.5% is consistent with previous Australian attrition figures found in a recent systematic review conducted that examined studies using attrition rates as an outcome measure (Gaynor et al 2006).

Table 4: Retrospective estimate of attrition in undergraduate pre-registration nursing programs from Queensland universities January 2003 - December 2005

University	Aggregate first year enrolments March 2003[1]	Aggregate graduates December 2005[2]	Estimated Attrition over 3 year program
Australian Catholic University	72	61	15.30%
Central Queensland University	220	128	41.80%
Griffith University	340	307	9.70%
James Cook University	198	138	30.30%
Queensland University of Technology	310	248	20.00%
University of Queensland	N/A program commenced in 2004		
University of Southern Queensland	241	161	33.20%
Total	1381	1043	24.50%

[1] Based on census 31.03.03 QTAC statistical reports of university enrolments

[2] Based on eligible graduand lists provided by each university to QNC

DISCUSSION

Maintaining an adequate supply of nurses within the workforce is partly a function of the number of nursing students completing undergraduate programs (Ogle et al 2001). It is therefore vital that key stakeholders are aware of the demographic profile of contemporary nursing student populations and can quantify attrition rates of programs in order to take these issues into consideration for workforce planning.

Quantifying and building a demographic database of the future nursing workforce provides an evidence

base for estimating attrition and graduate retention and systematically tracking trends in changing demographics and career plans that impact on workforce planning.

There is a lack of data gathered routinely by state regulatory authorities and national nursing organisations to determine actual figures for attrition in undergraduate programs and graduate outcomes. Attrition should be considered as an important outcome of program evaluation by both universities and regulatory authorities accrediting and monitoring

programs. Apart from educational evaluation purposes, it is essential for workforce planning. The Council of Deans of Medicine in Australia (CDAMS) have recognised this need and have established in recent years a Medical Outcomes project (CDAMS 2006). The project aims to establish a national minimum dataset of all newly enrolled first year medical graduates in Australian universities to assess demographic trends over time and career choices to inform workforce planning, particularly in specialty areas. The nursing profession as a matter of urgency should establish a similar approach. Nursing needs to monitor trends over time, changes, assess attrition and provide data to inform appropriate numbers of undergraduate funded places.

While attrition rates for undergraduate nursing programs may be calculated and used internally within individual universities, this data is not always made publicly available. For the purpose of this study, the reasons for gathering minimum datasets on first year nursing students is the same as the underlying principles of the CDAMS project - to begin to develop an evidence-base that will enable key stakeholders to design appropriate workforce planning measures to meet future nursing workforce requirements.

The authors acknowledge that there are limitations of data matching the QTAC and QNC data as this does not account for movements in and out of pre-registration programs during the three years. This data is not detailed enough to account for part-time enrolments, graduate entry, enrolled nurses who might commence in second year, international overseas nurses fast-tracking, transfers between universities, and dual degree enrolments. All these possibilities of different types of students enrolled that may complete the program in less or more than three years are included in both the aggregate enrolment and graduand figures. Whilst the figures are not perfect estimates they provide some insight into aggregate state-based numbers going in to Queensland pre-registration courses in one year and graduating three years later.

The university data presented in this paper is cross-sectional and will form baseline data for a subsequent prospective analysis of attrition across year levels within undergraduate programs over the next few years.

CONCLUSION

There is a paucity of collated and published evidence that captures a demographic picture of our future nursing workforce; attrition within undergraduate nursing programs; and graduate outcomes. Understanding the factors that impact on this population is central to ensuring appropriate workforce planning strategies. Systematically tracking undergraduate and newly graduated nurses by establishing a minimum demographic dataset on all Australian undergraduate nursing students will facilitate the development of an evidence-base to inform appropriate future workforce planning policies.

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