

PHARMACY WORKFORCE
PLANNING STUDY
LITERATURE REVIEW



LITERATURE REVIEW

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Executive Summary

The aim of this narrative literature review is to discuss factors which are or will likely contribute to pharmacy workforce planning in Australia over the next decade, in the context of published literature. These factors include:

- The rapid growth in the number of new pharmacy schools in Australia and an expansion of established schools.
- The feminisation of pharmacy in Australia. This has implications for workforce planning as females are more likely to work part time.
- An understanding of the increased role of technicians and use of technology (e.g. robotic dispensing) in workforce planning. This may have an influence on the uptake of cognitive services.
- The strategies to address the shortage of pharmacists in rural/remote areas, as a part of the Fourth Community Pharmacy Agreement.
- The shortages of pharmacists in the hospital pharmacy sector and the potential for an increased workforce to implement pharmaceutical review.
- Rates of attrition in the pharmacy workforce.
- Profession-wide uptake of cognitive services. This may provide the biggest demand factor on the pharmacy workforce especially given the aging population and an increased public demand for pharmacy services.
- The debate concerning the extent to which profession-wide uptake of cognitive services will occur.
- The Aggregate Demand Index, as a measure of demand for pharmacists. This index is currently used in the USA.

Scope of literature review

The importance of Pharmacy Workforce Planning in Australia can not be understated¹. There are many factors which have contributed to the complexity of workforce planning over recent years. These issues include the opening of new pharmacy schools and the expansion of existing pharmacy schools; widely perceived shortages of pharmacists in rural and remote areas; and the desire for profession-wide uptake of cognitive services. Careful workforce planning is important because pharmacy workforce shortages may result in compromised patient safety, inability of the pharmacy profession to meet patient medication management needs and damage to the professional image of pharmacy (Desselle, 2006).

This literature review will focus on factors relating to pharmacy workforce in the Australian context; however lessons learned from the international literature will also be discussed.

Debate and evidence surrounding the shortage or over supply of pharmacists remains an important and significant issue for all sectors of the pharmacy profession and more broadly the health sector. Sectors of pharmacy are broad in scope and include well defined roles in community pharmacy, hospital pharmacy, industrial pharmacy, academic pharmacy, as well as other areas such as development of government health policy in pharmaceutical use, drug information and support of quality use of medicine efforts including with the National Prescribing Service (NPS).

Many diverse issues should be explored when reviewing factors which may contribute to the Australian pharmacy workforce. The overall aim of this narrative literature review is to describe the factors which may influence the pharmacy workforce in Australia, in the overall context of healthcare delivery.

Methods

A systematic search of key electronic databases was conducted. These were Medline, International Pharmaceutical Abstracts and Embase. Key words and MESH headings included:

- Health Services Needs and Demand;

¹ The 'pharmacy' workforce in this study includes all forms of labour engaged in the delivery of pharmacy services. Thus the focus is not just on registered pharmacists, but also less qualified forms of labour (eg technicians, assistants) that primarily support pharmacists deliver services in community and hospital pharmacy settings. In theory, degree qualified labour that are ineligible to register as a pharmacist but could substitute for pharmacist labour in certain settings (eg industry research), could be included within the parameters of the 'pharmacy' workforce.

- Health Manpower;
- Pharmacy and Community pharmacy services.

Articles published up to February 2008 were included; however the focus of this review is on the more recent literature. A review of the references cited in retrieved articles was also undertaken. Other sources of data included websites (eg <http://www.pharmacymanpower.com/about.html>) and reports and seminars on pharmacy workforce issues in Australia (e.g. Australasian Pharmaceutical Sciences Association Annual Conference 2007). Specific journals were also hand searched, such as The Pharmaceutical Journal.

Results and discussion

This review is broadly divided into issues related to the supply of pharmacists and those which relate to the demand for pharmacists.

Supply

In this section, factors related to the supply of pharmacists will be discussed. In general, more is known about the supply than the demand for pharmacists, with supply data collected on a routine basis by various organisations which is relatively easy to access and thus quantify (Dewdeny, 1999).

Growth in Numbers of Schools of Pharmacy

For many years six Australian universities have offered Australian Pharmacy Council (APC) accredited Bachelor of Pharmacy degrees (B Pharm):

- University of Queensland
- The University of Sydney
- Monash University
- The University of Tasmania
- University of South Australia
- Curtin University of Technology

Over the past seven or eight years the number of universities across Australia has increased almost three-fold (n=6 to n=16). The number of registrable pharmacy degrees has more than tripled (n=6 to n=19). The range of registrable pharmacy degrees has gone from one (Bachelor of Pharmacy) to three: Bachelor of Pharmacy; Bachelor of Pharmacy (Rural); and Master of Pharmacy. In addition there is now a Bachelor of Pharmaceutical Science, which does not deliver a registered pharmacist vocational outcome but does provide an alternate and competing source of labour to the pharmaceutical industry.

All courses must undergo accreditation on a regular basis. Half of the degree programs currently have full accreditation. The remainder are working towards full accreditation. It should be noted that it takes four years to attain full accreditation, hence the provisional status for many of the new degree programs (Anonymous, 2008a). The breakdown of the Australian Pharmacy Council accreditation status is:

- N=8 degrees have full accreditation;
- N=9 degrees have provisional accreditation; and
- N=2 degrees have preliminary accreditation.

This growth in the number of schools from 6 to 16 and the number of degree programs from 6 to 19 is having a significant impact on the number of pharmacy interns produced per year, a detailed analysis of which will be presented in the 'Initial Supply' Report, another component of this study.

APEC is another important source of pharmacists in Australia. The number of pharmacists who have received Stage 2 Certificates from APEC, and hence who are eligible for immediate registration, has steadily increased over recent years from 37 in 2001 to 94 in 2007. This is comparable to the number of graduates from a medium sized school of pharmacy each year.

Table 1: Australian Universities Offering Pharmacy by State or Territory¹

State / Territory	University	Registrable Degree
Queensland	The University of Queensland	B Pharm
	Queensland University of Technology	B Pharm
	Griffith University	M Pharm
	James Cook University	B Pharm
New South Wales	The University of Sydney	B Pharm B Pharm (Rural) M Pharm
	Charles Sturt University	B Pharm
	The University of Newcastle	M Pharm
Australian Capital Territory	University of Canberra	M Pharm
Victoria	Monash University	B Pharm
	La Trobe University	B Pharm
Tasmania	The University of Tasmania	B Pharm
South Australia	University of South Australia	B Pharm MPharm

Western Australia	Curtin University of Technology	B Pharm
	University of Western Australia	M Pharm
	Murdoch University	M Pharm
Northern Territory	Charles Darwin University	B Pharm

¹ Adapted from Australian Pharmacy Council
http://www.apec.asn.au/NAPSAC_accREDITATEDpharmacyschools.html accessed 30/4/2008)

The growth in the number of universities offering pharmacy degrees over recent years is not unique to Australia. For example, the UK has also experienced a growth in the number of new schools of pharmacy offering degree programs, because of fears of shortages of pharmacists and the effect of market forces within the UK higher education sector (Hassell *et al.*, 2007; Taylor *et al.*, 2004).

Taylor and Bates (2003) propose the following explanations for the recent trend of universities in the UK to set up new pharmacy schools [cited in (Taylor *et al.*, 2004)]:

- *The need to address the current and projected shortage of pharmacists.*
- *A general drive within higher education to increase student numbers, in accordance with the current UK stated aim for a 50% participation rate in higher education for those aged 18 to 21 years by the end of the decade.*
- *The perceived need for pharmacists within particular regions within the UK.*
- *The lack of popularity of traditional science degrees.*
- *Pharmacy is a high prestige vocational course attracting applicants with high "A" level grades, who on graduation are almost certain to secure employment.*
- *Higher education is driven by economics.*

In the UK, the number of pharmacy schools has risen to 22, after a long period of stability according to Pharmacy Careers in UK [www.pharmacycareers.org.uk/] (Anonymous) and the number of graduates has doubled over the past 20 years (Willis *et al.*, 2007). This growth in the number of new pharmacy schools and the increased number of graduates being produced from more established schools was one of the key issues discussed at a recent seminar on pharmacy workforce planning held at The Australasian Pharmaceutical Sciences Annual Conference (December 2007), discussed later in this report.

Similarly the US has seen the creation of new schools of pharmacy and expansion of existing pharmacy programs. This expansion appears to have

occurred with limited planning, other than the enforcement of accreditation standards (Cohen *et al.*, 2000; Knapp, 2005). In the US supply projections of numbers of pharmacists are predicted to increase from 236,227 in 2007 to 304,986 in 2020. This estimation is based on a “stock-flow” model in which new graduates are added to the supply annually and losses resulting from death and retirement are subtracted (Knapp *et al.*, 2007). Over this same period the ratio of pharmacist per 100,000 population is estimated to increase from 71.2 to 74.9 (Gershon *et al.*, 2000). The increase in this ratio is a result of increased numbers of US pharmacy graduates (educational expansion) and pharmacists remaining in the workforce longer (persistence in the workforce). A third factor, the numbers of international pharmacy graduates achieving US licensure, was also mentioned, but noted to be less important. Putting aside the absolute numbers, the authors particularly noted that the changing demographics of the profession, though a significant loss of experienced pharmacists would necessitate an accelerated rate at which younger pharmacists assumed positions of greater responsibility in the profession. Hence they recommended on-going analysis of the workforce, maintaining pharmacist supply and that great importance be placed on leadership programs for the profession.

A contentious issue associated with the growth in the number of pharmacy schools and the expansion of established schools is whether interns (graduates) will be able to readily find employment. This does not seem to be an issue in Australia. The following ‘local’ examples show the employment rates for interns (graduates), where data is known, is greater than 97%. For instance:

- The University of Sydney reports employment rates of 97 to 99% with the remaining graduates returning to further study or overseas travel (Anonymous, 2008d). (Anonymous, 2008b)
- Victorian College of Pharmacy reports an employment rate of 99.4% within four months of graduating (Anonymous, 2008c).
- The University of Tasmania reports 100% fulltime employment over the past three years (2005 to 2007) for pharmacy graduates (Anonymous, 2008e).
- The University of Queensland reports 100% employment for those leaving the university (Anonymous, 2008b).

Graduate destination statistics provided by Graduate Careers Australia indicate that four months after graduation 99.4% of graduates are located in positions in the pre-registration or ‘intern’ training program. In a specially commissioned study by the Committee of Heads of Pharmacy Schools in Australia and New Zealand, Graduate Careers Council of Australia (2005) found only 2.2% of pharmacy graduates post the pre-registration year were not in employment; and that was their choice.

In the UK, headlines describing pharmacy degrees as a “passport to nowhere” along with reports that some graduates are unable to find employment have been published in *The Pharmaceutical Journal*. However, Willis and Hassell contend that there is not a shortage in training posts for pre-registration pharmacists in the UK, and that almost 70% of students are successful in getting their first choice of pre-registration training post (Willis *et al.*, 2007). They do note, however, that black and minority ethnic groups were significantly more likely than white students to have difficulties in securing pre-registration training posts. The potential questions raised and explanations for why individuals were unable to secure their first choice of training position were offered and include: a mismatch of expectations; perceived deficiency in relevant undergraduate experience; late applications; and desire to work in a particularly narrow sector or geographical location.

A related issue to the increased number of pharmacy schools and student numbers is a potential threat to the quality of education, the result of a small and diminishing number of fulltime academics (Taylor *et al.*, 2004). Taylor *et al.*, suggest that there are likely real threats to the sustainability of not just the new schools of pharmacy but established schools as well (Taylor *et al.*, 2004) posed by any genuine shortage in the pharmacist academic workforce.

Changing Demographics

The “feminisation” of the pharmacy profession is one of the most cited and researched aspects of the changing demographic characteristics of the pharmacy profession, both in Australia and internationally (Pearson, 2006; Seston *et al.*, 2007; SHPA, 2007). Women outnumber men in the 2007 UK Register by 2 to 1 in the under-30 age group. Overall, the feminisation of the profession results in a higher proportion of the profession working part time (PT), as male pharmacists are more likely to work full time than female pharmacists (ACCP, 2000; Hassell *et al.*, 2002). The sequence or pattern of workforce participation also varies between the genders because of career breaks for starting a family (Willis *et al.*, 2006a). From a purely quantitative point of view, the feminisation of the pharmacy profession means that whilst the total number of registered pharmacists employed may be increasing, this may not necessarily translate into significantly increased fulltime equivalent labour supply.

However this may be seen as an advantage for the profession. For example, this allows the profession a degree of “supply elasticity” as it has the capacity to increase (or decrease) total work hours based on market conditions. In addition, a high proportion of part-time workers may allow additional training or credentialing of pharmacists, which is especially important for the delivery of cognitive services (Knapp, 2005).

It is also important to consider definitions of part and full time work in this context. This is because although full time work in other fields is generally between 35 to 40 hours per week, the hours worked by community

pharmacists may be significantly higher. For example, in a UK study Blenkinsopp *et al.*, found that 30% of pharmacists worked between 41 and 50 hours per week and that 10% worked more than 50 hours per week (Blenkinsopp *et al.*, 1999). In a US study most “moonlighters” (i.e. those who work more than full time hours) are male (69.9%) (Knapp, 2000).

Other aspects of changing demographics which should be considered include the representativeness of the pharmacy workforce in terms of cultural background or ethnic group and the impact this may have on the workforce (Hassell *et al.*, 2002). It is known, for example, that 56.1% of the new entrants on the UK register of pharmacists are white, compared with 71.9% of the register as a whole (Seston *et al.*, 2007). Accounting for the overall changes in ethnicity for the workforce is important, especially if the pharmacy workforce is meant to reflect the composition of the population for whom it provides pharmacy services. Furthermore there are specific examples of ethnicity which can influence workforce patterns. For example, it is known that the pattern of return to work after child birth differs markedly between some groups with white women pharmacists in the UK returning to work much later than some ethnic minority women pharmacists.

With regard to ethnicity, the question for the Australian context is; does the Australian pharmacy workforce accurately reflect the composition of the Australian population and what are the implications if it does not? In the US, minority racial and ethnic groups are underrepresented in pharmacy and hence the implementation of specific recruitment strategies of minority racial and ethnic groups to pharmacy so that practising pharmacists and pharmacy leaders more accurately reflect the composition of the US population (Edwards *et al.*, 2006b). The Fourth Community Pharmacy Agreement strategy of supporting Aboriginal Pharmacist Assistants through Scholarships (Emerson *et al.*, 2005) represents an analogous strategy although this targets pharmacy assistants not pharmacists.

A disproportionately high proportion (27.6%) of older age pharmacists (>55 years) is another important demographic for the UK, given that the average age of pharmacists on the register is coming down. This compares to 14.5% of nurses, 14.0% of GPs and 9.6% of hospital medical staff (Shann *et al.*, 2003) who are over 55 years old. As stated above, the US also has an aging male pharmacy workforce and this, along with a decrease in full time equivalents (FTEs) for all pharmacists is thought to be a major issue for the current and future supply of pharmacists (Mott *et al.*, 2006).

A further consideration in relation to demographics of the pharmacy workforce is the potential influence of Generation X (born 1965-1982) and Generation Y (born 1980-1994).

As a significant proportion of the pharmacy workforce is Generation X and female, and because the majority leaving the workforce belong to Generation X (Sellers, 2002), it is important to consider the Generation X perspective, to

attract and maintain the workforce and in the design of training programs for pharmacists (Romanelli *et al.*, 2003; Ryan *et al.*, 2003; Sellers, 2002). For example, Gen-Xers are accustomed to receiving information in an entertaining multimedia format and learn more from lectures designed especially for their learning styles rather than from traditional lectures.

Factors for consideration for Gen-Xers include (Sellers, 2002):

- Gen-Xers were born during the rise of the information age and seem to be able to assimilate data faster than preceding generations.
- Gen-Xers are outspoken and direct.
- Gen-Xers value fun and relaxation.
- Gen-Xers learn that nothing is stable.
- Gen-Xers are confident and entrepreneurial.
- Gen-Xers are demanding but give a lot in return.
- Gen-Xers crave responsibility.

Other commentators recommend that Gen-Xers be provided with high responsibility, flexibility and opportunity (Ukens, 2002).

Members of Generation Y, are those currently studying or comparatively recent entrants to the workforce. They are described by Miller (2004) as:

- Gen Yers are family-oriented.
- Gen Yers are accepting of differences in people.
- Gen Yers are deeply committed to authenticity and truth telling.
- Gen Yers are heavily stressed.
- Gen Yers are living in a no-boundaries world where they make short term decisions and expect paradoxical outcomes (i.e. good and bad consequences).
- Gen Yers are strong advocates for social responsibility and care about the world, environment, poverty and global issues in general.
- Gen Yers have grown up with technology and are comfortable with changes brought about by technology.

Role of technicians and Use of Technology

The Australian Bureau of Statistics uses the term pharmacy technician (or dispensary technician) with the following role:

“fills and labels patients’ prescriptions under the supervision of a pharmacist – may record details of, place orders for, take stock of, and store medications and medical supplies and deliver them to patients” (ABS, 2006).

In NSW, under the Health Employees' State Award (12th December 2003), a distinction is made between Pharmacy Assistant (Grade 1 or 2) and Pharmacy Technician (Grades 1 to 4) in the hospital sector, in terms of salary, certificate level training required and job description (Walton *et al.*, 2003).

Pharmacy assistants, especially those designated 'technicians', can play a significant role in supporting pharmacists in a broad range of tasks (HMA, 2004). An expanded and better trained pharmacy assistant workforce it is claimed has the potential to reduce workload pressures on pharmacists; free them from undertaking routine dispensary tasks; and allow them to provide patient-centred care (ASHP, 2007; Kreling *et al.*, 2006). Additional pharmacy technicians could allow pharmacists to become more efficient in their day-to-day practice, hence fewer pharmacists may be required for the same amount of work (Anonymous, 2003; HCI, 2003). This notion was also reported in the Pew Health Professions Commission in the US in 1995, as a response to the pharmacist workforce shortage.

However, and although accredited training programs for pharmacists endorsed by the Australian National Training Authority (ANTA) and ranging from Certificate I to Certificate IV (since 2002) have been available since 1995, the uptake of training, especially the Certificate III level, has been slow. This has potentially inhibited the delegation to pharmacy assistants of various operational tasks (PGA, 2002).

The jurisdictional differences in training programs along with differences in job title and recognition for pharmacy assistants also complicates workforce planning. A report published in December 2004 noted the following key issues in relation to the regulatory environment for pharmacy assistants in Australia (HMA, 2004):

- There is no State or Territory Acts or statutory regulations that apply to the use of pharmacy or dispensary assistants.
- Only the Pharmacy Boards of Queensland and Victoria define how dispensary assistants may be used in the dispensary.
- Pharmaceutical Society of Australia (PSA) policy requires pharmacists to supervise all activities of pharmacy and dispensary assistants; and that they do not undertake any activities that require the knowledge and professional judgement of a pharmacist.
- QCPP standards are inline with the PSA approach to pharmacy and dispensary assistants.

A cross sectional survey conducted in the US in 2000 and 2004 showed that there was an increased technician to pharmacist ratio in 2004 compared to 2000, from 1.84 to 2.43. This corresponded with an increased number of prescriptions handled by pharmacists across a variety of settings (independent, chain, mass merchandiser, supermarket pharmacies) from a mean of 112 per day to 137 per day (Kreling *et al.*, 2006). Interestingly, over

this same period, although pharmacists had indicated a desire to spend a higher proportion of time in professional activities, this had not changed (Schommer *et al.*, 2006).

Robotics, like pharmacy technicians, have the potential to free up pharmacists time to participate in other activities and or mean fewer pharmacists are required given the same amount of work (efficiency). Other stated considerations which could influence the greater uptake of robotics into pharmacy include improvements to safety and quality in the dispensing process.

Willach and Heise report that automated dispensing systems have been installed in 29 pharmacies (including two in private hospitals) across Australia, with most in regional areas. The breakdown by state/territory is:

- ACT: 1 metropolitan
- NSW: 1 metropolitan and 3 regional
- VIC: 4 metropolitan and 8 regional
- QLD: 2 metropolitan and 4 regional
- WA: 3 metropolitan
- SA: 1 metropolitan and 1 regional

It is estimated that automation can result in one hour of time saving for every 100 prescription items dispensed (personal communication Amy Crow). The installation in regional areas in particular can free up pharmacist time to deliver patient-centred care and also potentially improve the safety and quality of the dispensing process. The use of such technology in regional or other areas where there may be a shortage of pharmacist is therefore potentially important.

Several reports of the introduction of robot automation for dispensing and stock control in the US have cited the value of implementing systems on (Barbaccia *et al.*, 2007; De Rijdt, 2007; Jones *et al.*, 2005; Klein, 2003; Lee, 2007):

- Improving patient and medication safety; and reducing medication errors.
- Improving efficiency and accuracy and decreasing turn around times, affording the opportunity for role expansion by pharmacists and technicians.
- Facilitating inventory management via automated ordering.
- Easing pharmacist workload.

It should be noted that the use of technology encompasses far more than robotic dispensing. Other uses include automated medication delivery; pharmaceutical compounding; pharmaceutical packaging and labelling; automated distribution and vending; bedside verification; drug

administration (e.g. infusion pumps); electronic drug information; electronic communications; and electronic patient records, amongst others (ASHP, 2007).

Rural and Remote Workforce

The distribution of pharmacists across Australia is not uniform. In general there is a shortage of pharmacists practising in rural and remote Australia, hence the introduction of a number of innovative strategies by the Pharmacy Guild of Australia known as the Rural Pharmacy Workforce Program. This program has been implemented to address the shortages in the rural pharmacy workforce

A broad range of strategies have been developed and implemented under this program as a part of both the Third and Fourth Community Pharmacy Agreements (<http://www.guild.org.au/rural>) to address shortages in the rural and remote pharmacy workforce. These strategies are summarised in Table 2.

Table 2: Rural and Remote Pharmacy Workforce Development Program

Strategy	Aim/s	Description / Interventions
Rural Pharmacy Workforce Program	Aim was to increase access to pharmacy services in rural and remote areas and to strengthen and support the rural pharmacy workforce	<ul style="list-style-type: none"> ▪ Continuing education scholarships for rural pharmacists ▪ Emergency locum placement service ▪ Scholarships for students from rural and remote areas ▪ Student placement allowance scheme ▪ Scholarships for indigenous students ▪ Small project funding ▪ Rural commissioned research projects ▪ Placement of pharmacy academics in rural areas ▪ National rural pharmacy promotion campaign ▪ Rural pharmacy newsletter
Rural and Remote	To ensure that pharmacists and	<ul style="list-style-type: none"> ▪ Introduction to dynamics of rural and remote communities

Pharmacy Orientation Package	students entering rural or remote locations have an understanding of the positive and negative aspects of rural pharmacy practice and lifestyle	<ul style="list-style-type: none"> ▪ Exposure to cultural and clinical issues in indigenous health ▪ Basic knowledge of rural and remote pharmacy practice
Rural Pharmacy Scholarship Scheme	To provide financial support to encourage and enable students from rural and remote communities to undertake undergraduate or graduate studies in pharmacy	<ul style="list-style-type: none"> ▪ Up to 30 scholarships offered annually (at \$10K pa/student)
Aboriginal and Torres Strait Islander Undergraduate Pharmacy Scholarship	To encourage Aboriginal and Torres Strait Islander students to undertake studies in pharmacy	<ul style="list-style-type: none"> ▪ 3 scholarships offered annually (at \$15K pa)
Rural Pharmacy Mentor Program	To enforce the scholar's ties to rural and regional Australia and to provide support to scholars during each year of their pharmacy studies outside the university and formal study environment	<ul style="list-style-type: none"> ▪ Quarterly meetings (at least) instigated by the scholar
Rural and Remote Infrastructure Grants Scheme	Aim was to support community pharmacy in the development of innovative	<ul style="list-style-type: none"> ▪ Executive summaries and final reports funded under this scheme are available from http://www.guild.org.au/rural

	strategies to enhance and improve access to pharmacy services for Australians in rural and remote communities	
Small Projects Funding Scheme	To support the role of community pharmacists in rural and remote communities so that innovative ideas and services can be developed and implemented	<ul style="list-style-type: none"> ▪ Successful projects available at http://www.guild.org.au/rural
Emergency Locum Service	To provide access to locums in emergency situations	<ul style="list-style-type: none"> ▪ Locum service within 24 hours (for a maximum of 7 days)
Academics and University Departments of Rural Health	To raise the profile of rural pharmacy within University Departments of Rural Health (UDRH); to enable graduates to acquire the skills to practice effectively in rural areas	<ul style="list-style-type: none"> ▪ 10 full time positions at UDRHs across Australia
Allowances		
Professional Development Allowance for Pharmacists	To assist pharmacists to access CPE and professional development activities	<ul style="list-style-type: none"> ▪ Allowance for pharmacists, pre-registration pharmacists, pharmacists preparing to re-enter pharmacy practice in rural locations or a professional educator travelling to a group of practicing pharmacists to deliver CPE
Placement Allowance for Pharmacy	To provide financial support to encourage and enable pharmacy	<ul style="list-style-type: none"> ▪ Allowance for travel and accommodation costs associated with undertaking a placement in a

Students	programs at Australian universities to deliver student placements in rural and remote communities	rural or remote area
Quality Care Pharmacy Allowance for Pharmacists	To support pharmacists in rural and remote areas by reducing their costs of participating in QCPP	<ul style="list-style-type: none"> ▪ Reimbursement of travel and accommodation costs
Rural Pharmacist Pre-registration Incentive Allowance	To increase and support the rural and remote pharmacy workforce, by encouraging pharmacists to practice in rural and remote areas	<ul style="list-style-type: none"> ▪ Defray additional costs with encouraging pharmacists to practice in rural and remote areas
Start-Up Allowance	To encourage the establishment of new pharmacies in remote locations	<ul style="list-style-type: none"> ▪ Maximum payment of \$100K to eligible pharmacists
Succession Allowance	To encourage the establishment and retention of pharmacists in remote locations	<ul style="list-style-type: none"> ▪ Maximum payment of \$60K to eligible pharmacists
Rural Pharmacy Maintenance Allowance	To defray the additional financial burden of maintaining a pharmacy in rural and remote areas of Australia	<ul style="list-style-type: none"> ▪ Monthly allowance paid to eligible proprietors
Section 100 Pharmacy Support	To support provision of services to a remote	<ul style="list-style-type: none"> ▪ Allowance of \$6K-\$10.5K

Allowance	area Aboriginal Health Service	
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The impact of rural placements undertaken by pharmacy students, amongst others, has been studied. Lyle et al. conducted a cross-sectional survey on Australian rural workforce issues of a broad range of health discipline academics including pharmacy, medicine, dentistry, nursing and midwifery and other allied health professionals. They found that rural placements undertaken by students during their university degree were better developed than other strategies such as attracting and supporting students of rural origin (Lyle *et al.*, 2007). They concluded that benefits to the rural workforce were more likely to accrue from a coordinated and collaborative approach at the institutional/university level.

Similar challenges regarding the rural pharmacy workforce have been identified in the US (Knapp, 2005). In one commentary, Gangeness stated that the number of pharmacists entering the rural workforce was low as a result of financial barriers to maintaining a rural business; lower profit margin; declining rural population and a higher proportion of individuals who may choose not to have their medicines dispensed due to financial reasons. It is noteworthy that one of the main solutions proposed involved integration of education for rural practice in pharmacy curricula (Gangeness, 1997).

With respect to the shortage of pharmacists in rural/remote areas, mobility of the pharmacy graduate workforce is another consideration. In the UK, although geographically much smaller than Australia and the US, most graduates wanted to work in London. Some areas such as Eastern England were clearly unpopular choices. Interestingly, however, there was a link between where a student was studying and their choice of location for pre-registration training. Hence this has positive implications for regional or rural based pharmacy schools in Australia.

Hospital Workforce

The Society of Hospital Pharmacists of Australia endorse a broad range of clinical and distributive pharmacy services (SHPA, 1996). A challenge to the delivery of these services has been a shortage in the Australian hospital pharmacy workforce, reported over the last decade (SHPA, 2007). For example, a study conducted in 2005 of 99 hospitals revealed a 7% vacancy rate for (establishment position) pharmacists. An SHPA report (February 2007) cites the current "staffing crisis" in state public hospitals as the major inhibitor of pharmacists ability to provide patient care (SHPA, 2007). It is estimated that the current workforce of 1,600 FTE pharmacists will need to be increased by 400 to 500 pharmacists within the next two to five years. Failure to do so it is argued would result in significant increased risk to consumers, as a (US)

study has shown a link between clinical pharmacy services, pharmacy staffing and mortality rates (O'Leary, 2007).

The long term goal of the American Society of Health-System Pharmacy (ASHP, formerly known as the American Society of Hospital Pharmacy) with respect to workforce is to build capacity within the hospital sector and health systems to “meet the growing challenges related to optimising the use of medicines in those settings” (ASHP, 2007). This is in direct response to the shortage of pharmacists practising in this sector. The overall goal of ASHP for supporting patient care through safe, evidence-based and cost-beneficial use of medicines, is not unique to this organisation, nevertheless is relevant to workforce planning because of the personnel requirements to meet this aim. Amongst other visions for the ASHP are:

- the adoption of an interdisciplinary approach to care;
- use of technology; and
- appropriate and on-going credentialing for pharmacists (including credentialing in specialised areas) as well as credentialing for pharmacy technicians.

The notion of specialisation within the hospital pharmacy sector brings hospital pharmacy specific workforce challenges as there must be adequate systems, credentialing and training available for pharmacists wishing to specialise. Furthermore, mandatory credentialing for pharmacy technicians (Anonymous, 2003) could have an immediate impact on the supply of technicians in this sector.

Another interesting factor relating to the hospital pharmacy sector is hospital-based training. In the UK, approximately the same proportion of graduates undertakes training in the community and hospital sectors despite the bulk of the total workforce being engaged in community pharmacy. Higher proportions of females than males undertake hospital training (Willis *et al.*, 2006b). This difference is so marked that hospital positions have been described as “gendered” career choices or “gender niche” choices. Feminisation of the hospital pharmacy workforce in particular does have workforce implications, as overall, females are more likely to work part time than males.

Other factors which may affect the hospital pharmacy workforce in Australia include the recent PBS Reforms and Pharmaceutical Review. The former has been implemented in some states (e.g. South Australia, Victoria) and resulted in increased numbers of pharmacists working in hospitals in these states. With respect to pharmaceutical review, it makes sense that pharmacists play a key role, however if this is in addition to current services provided, then this is likely to increase demand for pharmacists (O'Leary *et al.*, 2006).

Attrition Rates

The rate of attrition of pharmacy students, pharmacy graduates or pharmacists from the profession has the potential to significantly impact on pharmacy workforce planning. For pharmacy students, attrition refers to those who have entered a university pharmacy program but who do not graduate with a pharmacy degree. Over the past decade, the rate of attrition of pharmacy students in the UK has been as high as 18.8% in 1997; however time series analysis indicates that there has been no statistically significant trend in the rate of attrition (either upwards or downwards) over time. Further analysis showed that the rate of attrition was higher for males than females and also for overseas students when compared to home/EU students (Hassell *et al.*, 2007).

In general, the rate of attrition during the graduate year (pre-registration training) in Australia is regarded as low because individuals tend to be motivated to register as pharmacists even if they don't intend to practice pharmacy (Personal communication, Victorian Pharmacy Registration Board).

The rate of attrition of pharmacists is more complex to measure because it is determined by what constitutes attrition and work as a pharmacist. For example, if a pharmacist moved from community pharmacy practice to hospital pharmacy practice this would not be considered attrition. If they moved to work in the pharmaceutical industry, would this constitute attrition? If they moved to the information technology sector with a focus on drug information, would this constitute attrition? If they moved to study medicine would this constitute attrition? The notion of attrition from the pharmacy profession will be explored in the key informant qualitative interviews, although it is anticipated that consensus may be difficult to reach. Therefore, other aspects of this study will seek to operationally define attrition from the profession, for the purpose of evaluation.

In the US, other factors which have been noted to effectively reduce the availability of pharmacy workforce include:

- the feminisation of the profession and corresponding part time work;
- the shift from a Bachelors (BS) program to a Pharm D Program resulting in no graduates in some years; and
- the reduced number of independently owned pharmacies as pharmacy owners tends to work longer hours.

Counterbalancing these factors is the increased use of automation and technicians (Knapp, 1994).

Similarly in Australia, the shift from a three to four year university degree program (in 2000 the first of the four year cohort graduated), had a similar one off effect on the pharmacy graduate workforce as the change from BS to Pharm D programs in the US.

In 2005, the UK Register for pharmacists differentiated between “practising” and “non-practising” pharmacists for the first time (Hassell *et al.*, 2006).

In the UK it is known that approximately 3 to 6% of registered pharmacists are not in the paid workforce. A further 2% remain on the pharmacy register even though they are in non-pharmacy employment and approximately 10% work overseas, effectively (even if temporarily) removing them from the UK workforce (Hassell *et al.*, 2003; Seston *et al.*, 2007).

Demand

Less is known about how to measure demand for pharmacists than the supply of pharmacists (Dewdney, 1999). Measuring demand is more complex than measuring supply, with a variety of approaches possible. Quantification of demand as a single metric is generally not undertaken. Most publications of demand for pharmacists therefore focus on the drivers of increased demand for pharmacists such as extended hours of opening (Dewdney, 1999); aging population; demand for professional services or metrics such as the Aggregate Demand Index (Knapp *et al.*, 2002).

Professional Pharmacy Services - The Changing Nature of the Practice of Pharmacy

Over the past two decades there has been a significant move in the pharmacy profession in Australia and internationally to take a more patient-centred approach to care. This has coincided with the development, implementation and evaluation of a range of new cognitive services and strategies to facilitate their uptake (Roberts *et al.*, 2006a; Roberts *et al.*, 2006b; Roberts *et al.*, 2003). Particularly in the area of medication management, Australia is regarded as a leader. Established Australian programs include Residential Medication Management Review (RMMR) and Home Medicines Review (HMR) (Bell *et al.*, 2005; PGA, 2008a; Roberts *et al.*, 2005). Other professional pharmacy disease statement management programs include the Diabetes Pilot Program (DMAS) and an Asthma Pilot Program; compliance programs (eg *MedsIndex*) and medication related programs supported by technology (HygeiaRx) (Sclavos, 2008).

In the UK, a recent White Paper Report (April 2008) also details a strategy for ensuring safer, effective, fairer and more “personalised care” by pharmacists and their staff, as health professionals with expertise in the use of medicines (DoH, 2008). Importantly pharmacists are seen as a “significant untapped resource” for the delivery of professional services, especially given the already available network of pharmacists, their accessibility to the public, the opening hours of pharmacy and the “convenient and less formal environment” offered. Examples of these services include primary care pharmacy, independent and supplementary prescribing and Medication Use Review (MUR). To support the use of pharmacists’ skills, the UK government is making ...

“legislative changes that promote the better use of the pharmacy workforce” (pharmacists, technicians and other pharmacy staff) (DoH, 2008).

In the US, professional pharmacy services are broadly termed pharmaceutical care and include pharmacist care services such as health screening and medication therapy management, disease state management, collaborative drug therapy management (Doucette *et al.*, 2006; Manasse *et al.*, 2007).

The widespread adoption and uptake of a patient-centred approach to care has the potential to result in a significant demand for pharmacists to provide these services. The White Paper produced by the American College of Clinical Pharmacy (ACCP) on *“A vision of Pharmacy’s future roles, responsibilities and manpower needs in the United States”* fully endorses a profession-wide, patient-centred approach (ACCP, 2000). The ACCP White Paper acknowledges that there are unresolved issues in terms of future surpluses and shortages of pharmacists which make a quantitative prediction of the impact of professional services growth on demand difficult. It quotes Wells (1999) who said:

“Manpower demand studies have a long history of inaccuracy, especially at times when the workforce and nature of the work are undergoing rapid change.”

The White Paper states that estimates for future demand are likely to be affected by the profession’s success in *“redefining and transforming itself”* in relation to the provision of patient-centred care (Pedersen, 2002), that is, the extent to which current and future cognitive services such as HMR are taken up.

Other manpower issues identified in the White Paper included:

- an increased use of prescription drugs and hence demand for prescriptions;
- evolving roles in managed care organisations (eg drug utilisation review);
- increased use of automated dispensing;
- increased number of pharmacy graduates; and
- increased demand/requirement for academic pharmacists (Penna, 1999).

The American College of Clinical Pharmacy recommends strong leadership and management to obtain the goal of a profession-wide patient centred approach to care. The American Society of Health-Systems Pharmacy also endorses the careful pursuit of pharmacy leaders and managers of the future (Edwards *et al.*, 2006b) to facilitate the uptake of professional cognitive services.

A recent review by Manasse and Speedie also describes the changing nature of the profession of pharmacy, especially in relation to the evolution of a more *“direct patient care model”* approach by pharmacists (Manasse *et al.*, 2007). They acknowledge that although such an approach has been adopted, the

shift towards a patient focus, especially in the community setting is “far from complete”. Amongst other examples, they cite collaborative drug therapy management (CDTM) as a case in point, as CDMT requires a shift from simply dispensing medicines as prescribed to working with prescribers to carry out patient care related to medicines.

However not all agree that profession-wide uptake of cognitive services is possible or practical. In the UK, the “*Making better use of the pharmacy workforce*” program aims to allow pharmacists to focus on the delivery of professional services and categorises them as “less essential” to the supply function (Wheatley, 2005). Wheatley strongly believes though that the demand for extended services will not be sufficient to allow many “displaced” pharmacists to practice in this way.

Studies conducted in the US have also shown that cognitive services such as medication therapy management provided by community pharmacies is relatively low and that the main focus of community pharmacy is on the dispensing of prescriptions (Doucette *et al.*, 2006).

To address some of these concerns, Australian research has thus been undertaken to investigate ways to understand and facilitate the uptake of cognitive services (Roberts *et al.*, 2006a; Roberts *et al.*, 2006b; Roberts *et al.*, 2003). In Australia, it is clear that if the uptake of HMR and other cognitive services was significantly increased then this would have the potential to significantly increase pharmacy workforce requirements. Hence the importance of understanding practice change in a dynamic pharmacy workforce environment.

A related factor to the uptake of cognitive services is the average (especially new) pharmacist’s *desire* to practice patient-centred care (Manasse *et al.*, 2007). A UK study estimated that approximately 59% of UK registered pharmacists surveyed indicated a strong or very strong desire to practise pharmacy (Hassell, 2006). However, the remainder had either a “lukewarm” or “weak” desire to stay in the profession or “regretted” becoming a pharmacist. The latter sentiment was attributed to insufficient engagement in practice of cognitive services.

Furthermore, the sector in which a pharmacist practices or wishes to practice is important. For example, in the UK, Mullen *et al.*, found that pharmacists have moved from traditional practice areas such as hospital and community pharmacy in to the relatively new area of primary care, known as primary care pharmacy (Noyce, 2007). This has had the effect of drawing away pharmacists from one sector to another, with the impact on the hospital sector particularly marked (Mullen *et al.*, 2005). That is, demand in one sector may result in under supply in other sector/s. Interestingly, a strong reason for this shift to the primary care sector has been the added clinical and professional responsibility for pharmacists within primary care (Mullen *et al.*, 2003). Noyce has commented that this changing nature of the practice of pharmacy (i.e.

new professional roles and responsibilities) also requires new governance structures for this aspect of the pharmacy workforce (Noyce, 2006). Although the primary care pharmacy model appears unique to the UK (Mullen *et al.*, 2005), it is conceivable that a similar or analogous model could evolve in Australia.

It is noteworthy that most primary care pharmacists (PCP) in the UK are female (69.7%) and aged between 30-39 years (40.3%). These pharmacists work in primary care to utilise their knowledge and function as a team member (Mullen *et al.*, 2003). This could suggest that female pharmacists may be more suited to the delivery of professional pharmacy services, as it is also known that a higher proportion of female pharmacists have postgraduate qualifications (18.5%) when compared to male pharmacists (11.5%) (Hassell, 2003). This notion will be explored in subsequent components of the study.

In summary, despite the philosophical adoption of a patient-centred approach to care by many key professional organisations within the profession, and the desire of (some) pharmacists to utilise their relative expertise in pharmacotherapy, challenges lie ahead for universal uptake of cognitive services by pharmacists. However, if uptake of professional services is increased significantly, then the demand for pharmacists will increase. Four major work force needs have been identified (Manasse *et al.*, 2007):

- the role of automation technology;
- the willingness of pharmacists to adopt a patient-centred approach;
- the economic consequences of using pharmacists predominantly for dispensing/supply roles; and
- public expectation for medication information, medication review and management.

Aging Population

The changing demographics of the population as a whole should be considered as a demand factor when examining the pharmacy workforce, in particular the impact of aging. This is important because it is known that the majority of persons aged over 65 years have at least one chronic disease, which may be treated pharmacotherapeutically [cited in (Edwards *et al.*, 2006a)]. As the population ages, the demand for pharmacy services will likely increase. This is particularly relevant in the Australian context with the current range of cognitive services such as Residential Medication Management Review (RMMR), Home Medicines Review (HMR), Dose Administration Aids (DAA), Patient Medication Profile (PMP) etc (PGA, 2008b). For example, it is known that the majority of persons who have received a HMR are in the age group 75 to 84 years and that the second highest number of HMRs is performed for those aged between 65 to 74 years (PGA, 2008a). This potential demand for pharmacy services is likely to

increase, should additional cognitive services be provided by pharmacists in the future, such as disease state management (e.g. diabetes).

Public Demand

Probably the most important factor which would necessitate a significant demand for pharmacists is the general public. Although the value of pharmacists in the provision of cognitive services is well documented and generally well known within the profession of pharmacy and to a lesser extent other health care professionals, the general public has a low awareness of the potential for pharmacists to significantly enhance the quality use of medicines (ASHP, 2007).

This has the potential to change rapidly in Australia and other countries with increased public awareness and debate about medication safety, medication costs and the avoidance of medication related problems.

Other Issues

Measuring Demand: Aggregate Demand Index (ADI)

Fluctuations in the pharmacy workforce can be difficult to forecast and measure over time. Although supply data for pharmacy workforce is generally robust, demand data is more complex. The Aggregate Demand Index (ADI) is a US tool designed to give an on-going (monthly) assessment of the demand for pharmacists, as assessed by the difficulty in filling pharmacists vacancies (Knapp *et al.*, 2002). The five categories in the ADI are as follows:

Aggregate Demand Index ¹
Demand categories
5 = High demand: difficult to fill open positions 4 = Moderate demand: some difficulty filling open positions 3 = Demand in balance with supply 2 = Demand is less than the pharmacist supply available 1 = Demand is much less than the pharmacist supply available
¹ . http://www.pharmacymanpower.com/about.html accessed 30/4/2008

The ADI has its origins in the Pharmacy Manpower Project which commenced in 1999. The ADI aggregates data from a variety of individuals/organisations responsible for filing pharmacy positions. Data can be stratified by area and are available as monthly reports from www.pharmacymanpower.com. Whilst the reliability of the ADI is not yet

established (Knapp *et al.*, 2002) it does provide a score which can be tracked over time and stratified via region/area. The ADI has been used successfully in a number of US studies as the dependent variable, to help determine the extent of the demand for pharmacists as a result of changes to the Medicare (Part D) Scheme (Meissner *et al.*, 2006).

It may be possible to develop a similar tool for the Australian context as a longitudinal measure for demand for pharmacists by geographical area (e.g. Guild Zone, local government area, division of general practice) or stratified by PhARIA. Such a tool would provide a measure of on-going data on the demand for pharmacists across Australia.

Pharmacy Workforce Seminar

This section summarises a recent workshop on the Australian Pharmacy Workforce. The findings of this workshop have yet to be published but they clearly indicated the complexity of workforce planning in Australia.

A seminar on pharmacy workforce was conducted in December 2007 at the Australasian Pharmaceutical Sciences Association Annual Conference, Sydney. This conference is predominantly attended by pharmacy academics and researchers from across Australia and New Zealand. Discussion at this seminar was robust indicating a broad range of views on whether there was going to be a likely over or under supply of pharmacy graduates into the future. A key focus for the discussion concerned the *supply* of pharmacy graduates as a direct result of the significant growth of pharmacy schools across Australia and the potential increased *demand* for pharmacists with greater uptake of current cognitive services and uptake of future professional services especially in the area of Disease State Management (DSM) for example with diabetes or asthma.

Some present stated that the unplanned nature of the growth of new pharmacy schools was concerning, without basis and not sustainable. Others identified the important role of rural and regional pharmacy schools in training pharmacists for the future who would likely work in rural and regional areas, where there is a current under supply of pharmacists.

With respect to practice innovation, opinions varied widely on whether uptake of current or future cognitive services would generate demand for pharmacists. Some believed that there would be a significant oversupply of pharmacy graduates as a result of the significant growth in the number of pharmacy schools, in addition to the increase in numbers of graduates in established schools of pharmacy. Others strongly believed in the importance that the whole pharmacy profession take up the delivery of current and future cognitive services and that this would generate significant demand for pharmacists. The proponents of this viewpoint argued the increased new graduate supply facilitated the realisation of a substantial shift of labour resources to cognitive services delivery.

The challenges associated with the uptake of cognitive services were acknowledged, particularly in terms of practice change (change management) and the full integration of pharmacists as members of multidisciplinary health care teams. The disconnect between University training in cognitive services, and the activities undertaken by pharmacy graduates, was viewed as a significant challenge.

Another contentious issue which raised significant discussion concerned views about the notion of quality of the 'product' of Schools of Pharmacy. This is a complex area to assess and it was acknowledged that many factors may contribute to quality. Some of the issues discussed concerned the:

- quality and quantity of undergraduate experiential placements in pharmacy practice;
- quality of the graduates produced and their ability to maintain currency within a rapidly changing health care sector; and
- relative scarcity of experienced academics in pharmacy education and research.

Many other issues were discussed at this seminar and are reported elsewhere in this literature review. These include: aging population; feminisation of the profession; pharmacist salary; geographical issues; type of pharmacy qualification; and cultural diversity.

In summary, consensus was not reached and many key (rhetorical) questions posed. These may broadly be categorised as:

- *Demand and supply issues:* Are we (still) short of pharmacists? Are we short of academics? Are we short of suitable practice sites for training purposes? Where?
- *Pre-registration issues:* What is the viability of pre-registration training positions, especially given the increased number of graduates? What influence will the increased number of graduates have on quality of pre-registration training?
- *University issues:* Are all schools of pharmacy able to produce graduates for current practice and future practice? Are there research underpinnings in each school to facilitate this? Are undergraduates exposed to research? Is the mix of academic staff suitable? What was the rationale/plan for opening new schools? What are the implications for the long-term viability of the profession? What is the quality of clinical placements? How can quality be maintained / improved?

This seminar at APSA 2007, serves to underline the importance and complexity of the current pharmacy workforce study. The many contributors to this workshop are acknowledged.

Summary of key points from literature review

- There has been a rapid growth in the number of new pharmacy schools in Australia and an expansion of established schools.
- The feminisation of pharmacy in Australia has implications for workforce planning as females are more likely to work part time.
- Understanding of the increased role of technicians and use of technology (eg robotic dispensing) is important, especially in relation to the uptake of cognitive services.
- There are new strategies to address the shortage of pharmacists in rural /remote areas as a part of the Fourth Community Pharmacy Agreement.
- Shortages remain in the hospital pharmacy sector and the uptake of services such as pharmaceutical review may require increased hospital pharmacy workforce.
- Rates of attrition should be considered in an evaluation of the pharmacy workforce.
- Profession-wide uptake of cognitive services may provide the biggest demand factor on the pharmacy workforce especially given the aging population and an increased public demand for pharmacy services.
- Debate concerning the extent to which profession-wide uptake of cognitive services remains.
- The Aggregate Demand Index is a measure of demand currently used in the US.
- A recent workshop (2007) on the Australian pharmacy workforce highlighted the complexity of workforce planning and lack of consensus on likely shortages or over supply of the pharmacy workforce.

References

- ABS (2006). 1220.0 - ANZSCO - Australian and New Zealand Standard Classification of Occupations, First Edition 2006. Canberra: Australian Bureau of Statistics.
- ACCP (2000). ACCP White Paper. A vision of Pharmacy's future roles, responsibilities and manpower needs in the United States. *Pharmacotherapy*, **20**, 991-1020.
- ANONYMOUS (2003). 2002 white paper on pharmacy technicians - Needed changes can no longer wait. *Journal of Managed Care Pharmacy*, **9**, 72-83.
- ANONYMOUS Pharmacy Careers www.pharmacycareers.org.uk/.
- ANONYMOUS (2008a). Pharmacy FAQ Accessed 5/6/2008 www.canberra.edu.au/faculties/health/pharmacy/faq. Canberra.
- ANONYMOUS (2008b). School of Pharmacy Frequently Asked Questions Accessed 5/6/2008 www.uq.edu.au/pharmacy/documents/faq2008.pdf. Brisbanc.
- ANONYMOUS (2008c). Top five reasons to study at the Victorian College of Pharmacy Accessed 5/6/2008 www.vcp.monash.edu.au/futurestudents/cop.html. Melbourne.
- ANONYMOUS (2008d). Welcome to The Faculty of Pharmacy University of Sydney Accessed 5/6/2008 www.pharm.usyd.edu.au/future_students/services/pharmacy_career.shtml. Sydney.
- ANONYMOUS (2008e). Work outcomes by field of study Accessed 5/6/2008 www.studentservices.utas.edu.au/careers/forms_files/workoutcomes_FOS2007.pdf. Hobart.
- ASHP (2007). ASHP long-range vision for the pharmacy work force in hospitals and health systems: ensuring the best use of medicines in hospitals and health systems.[see comment]. *American Journal of Health-System Pharmacy*, **64**, 1320-30.
- BARBACCIA, J.G. & KRAKOWSKI, K. (2007). Delivery robotics as a tool to augment pharmacy staffing and improve customer service to nursing. In *ASHP Midyear Clinical Meeting*.
- BELL, S., MCLACHLAN, A.J., ASLANI, P., WHITEHEAD, P. & CHEN, T.F. (2005). Community pharmacy services to optimise the use of medications for mental illness: a systematic review. *Australia and New Zealand Health Policy*, **2**, 29.

- BLINKINSOPP, A., BOARDMAN, H., JESSON, J. & WILSON, K. (1999). A pharmacist workforce survey in the west Midlands: (1) Current work profiles and patterns. *The Pharmaceutical Journal*, **263**, 909-913.
- COHEN, J.L., KABAT, H.F., KNAPP, D.A., KODA-KIMBLE, M.A. & RUTLEDGE, C.O. (2000). Pharmaceutical education and the pharmacy workforce: should we expand our programs? Report of the AACP Argus Commission 1999-2000. *American Journal of Pharmaceutical Education*, **64**, 4S-7S.
- DE RIJDT, T. (2007). Robotisation and automisation, a new way of dispensing medicines. In *ASHP Midyear Clinical Meeting*.
- DESSELLE, S.P. (2006). Much needed attention devoted to pharmacy workforce issues. *Research in Social & Administrative Pharmacy: RSAP*, **2**, 294-8.
- DEWDENY, R. (1999). The pharmacy workforce: what we know and what we don't know. *The Pharmaceutical Journal*, **263**, 71-73.
- DOH (2008). Pharmacy in England - Building on strengths - delivering the future. pp. 139. Norwich: Department of Health.
- DOUCETTE, W.R., KRELING, D.H., SCHOMMER, J.C., GAITHER, C.A., MOTT, D.A., PEDERSEN, C.A., DOUCETTE, W.R., KRELING, D.H., SCHOMMER, J.C., GAITHER, C.A., MOTT, D.A. & PEDERSEN, C.A. (2006). Evaluation of community pharmacy service mix: evidence from the 2004 National Pharmacist Workforce Study. *Journal of the American Pharmacists Association: JAPhA*, **46**, 348-55.
- EDWARDS, J.M. & PATRY, R. (2006a). Pharmacy's changing demographics. *American Journal of Health System Pharmacy*, **63**, 1691.
- EDWARDS, J.M., PATRY, R.A., EDWARDS, J.M. & PATRY, R.A. (2006b). Pharmacy's changing demographics. *American Journal of Health-System Pharmacy*, **63**, 1691.
- EMERSON, L. & MITCHELL, F. (2005). Rural and indigenous programs - bigger and better than ever. *Pharmacy Review*, **29**, 16-19.
- GANGENESS, D.E. (1997). Pharmaceutical care for rural patients: ominous trends. *Journal of the American Pharmaceutical Association*, **NS37**, 62-5.
- GERSHON, S.K., CULTICE, J.M. & KNAPP, K.K. (2000). How many pharmacists are in our future? Bureau of Health Professions projects supply to 2020. *Journal of the American Pharmaceutical Association*, **40**, 757-764.
- GRADUATE CAREERS COUNCIL OF AUSTRALIA (2005) Pharmacy Post-Registration Graduate Destination Survey, April 2005. Conducted for the Committee of Heads of Pharmacy Schools in Australia and New Zealand
- HASSELL, K. (2006). Destination, future intentions and views on practice of British-based pharmacists 5 and 10 years after qualifying. *Pharmacy World & Science*, **28**, 116-122.

- HASELL, K. (2003). The national workforce census: (6) - The gendered nature of pharmacy employment in Britain. *Pharmaceutical Journal*, **271**, 550-552.
- HASELL, K., FISHER, R., NICHOLS, L. & SHANN, P. (2002). Contemporary workforce patterns and historical trends: The pharmacy labour market over the past 40 years. *Pharmaceutical Journal*, **269**, 291-296.
- HASELL, K. & NICHOLS, L. (2003). The national workforce census: (4) - Overseas pharmacists - Does the "globalisation" of pharmacy affect workforce supply? *Pharmaceutical Journal*, **271**, 183-185.
- HASELL, K. & SESTON, E. (2006). Workforce update - joiners, leavers, and practising and non-practising pharmacists and the 2006 Register. *The Pharmaceutical Journal*, **277**, 576-578.
- HASELL, K., SESTON, E., EDEN, M. & WILLIS, S. (2007). The UK pharmacy degree: Attrition rates and demographics of non-completers. *Pharmacy Education*, **7**, 249-256.
- HCI (2003). A study of the demand and supply of pharmacists, 2000-2010.
- HMA (2004). Workforce and career options for pharmacy assistants. pp. 12. Collingwood, Victoria: Healthcare Management Advisors.
- JONES, K., SWENSEN, N., HOLLEY, M. & CASH, J. (2005). Automation in a pediatric hospital: implementation of a dispensing robot. In *ASHP Midyear Clinical Meeting*.
- KLEIN, P.R. (2003). Technology marathon: lessons learned implementing a pharmacy information system, bar code automation and point of care bedside scanning and electronic medication documentation system within 120 days. In *ASHP Midyear Clinical Meeting*.
- KNAPP, K.K. (2000). Building a pharmacy work force mosaic: new studies help to fill in the gaps. *Journal of the American Pharmaceutical Association*, **40**, 13-4.
- KNAPP, K.K. (2005). Pharmacy and medicine: different workforce strategies driving expansion in educational systems. *Journal of the American Pharmacists Association: JAPhA*, **45**, 430-2.
- KNAPP, K.K. (1994). Pharmacy manpower: implications for pharmaceutical care and health care reform. *American Journal of Hospital Pharmacy*, **51**, 1212-20.
- KNAPP, K.K., CULTICE, J.M., KNAPP, K.K. & CULTICE, J.M. (2007). New pharmacist supply projections: lower separation rates and increased graduates boost supply estimates. *Journal of the American Pharmacists Association: JAPhA*, **47**, 463-70.
- KNAPP, K.K., LIVESEY, J.C., KNAPP, K.K. & LIVESEY, J.C. (2002). The Aggregate Demand Index: measuring the balance between pharmacist supply and

- demand, 1999-2001.[see comment]. *Journal of the American Pharmaceutical Association*, **42**, 391-8.
- KRELING, D.H., DOUCETTE, W.R., MOTT, D.A., GAITHER, C.A., PEDERSEN, C.A., SCHOMMER, J.C., KRELING, D.H., DOUCETTE, W.R., MOTT, D.A., GAITHER, C.A., PEDERSEN, C.A. & SCHOMMER, J.C. (2006). Community pharmacists' work environments: evidence from the 2004 National Pharmacist Workforce Study. *Journal of the American Pharmacists Association: JAPhA*, **46**, 331-9.
- LEE, S.D. (2007). Automation selection driven by hospital patient safety initiatives. In *ASHP Midyear Clinical Meeting*.
- LYLE, D., KLINEBERG, I., TAYLOR, S., JOLLY, N., FULLER, J., CANALESE, J., LYLE, D., KLINEBERG, I., TAYLOR, S., JOLLY, N., FULLER, J. & CANALESE, J. (2007). Harnessing a university to address rural health workforce shortages in Australia.[see comment]. *Australian Journal of Rural Health*, **15**, 227-33.
- MANASSE, H.R. & SPEEDIE, M.K. (2007). Pharmacists, pharmaceuticals, and policy issues shaping the work force in pharmacy. *American Journal of Health System Pharmacy*, **64**, e30-e48.
- MEISSNER, B., HARRISON, D., CARTER, J., BORREGO, M., MEISSNER, B., HARRISON, D., CARTER, J. & BORREGO, M. (2006). Predicting the impact of Medicare Part D implementation on the pharmacy workforce. *Research In Social & Administrative Pharmacy: RSAP*, **2**, 315-28.
- MILLER, S.W. (2004). Teaching geriatrics to Generation Y. *American Journal of Pharmaceutical Education*, **68**, Article 67.
- MOTT, D.A., DOUCETTE, W.R., GAITHER, C.A., KRELING, D.H., PEDERSEN, C.A., SCHOMMER, J.C., MOTT, D.A., DOUCETTE, W.R., GAITHER, C.A., KRELING, D.H., PEDERSEN, C.A. & SCHOMMER, J.C. (2006). Pharmacist participation in the workforce: 1990, 2000, and 2004. *Journal of the American Pharmacists Association: JAPhA*, **46**, 322-30.
- MULLEN, R. & HASSELL, K. (2003). The national workforce census: (5) - The primary care pharmacy workforce in Britain. *Pharmaceutical Journal*, **271**, 326-327.
- MULLEN, R., HASSELL, K. & NOYCE, P. (2005). Primary care pharmacist workforce mobility: why do pharmacists want to work in primary care and how do these reasons differ for community and hospital pharmacists? *International Journal of Pharmacy Practice*, **13**, 281-288.
- NOYCE, P. (2006). Governance and the pharmaceutical workforce in England. *Research In Social & Administrative Pharmacy: RSAP*, **2**, 408-19.
- NOYCE, P.R. (2007). Providing patient care through community pharmacies in the UK: policy, practice, and research. *Annals of Pharmacotherapy*, **41**, 861-8.

- O'LEARY, K.M. (2007). Link between clinical pharmacy services, pharmacy staffing and hospital mortality rates. *Journal of Pharmacy Practice & Research*, **37**, 258.
- O'LEARY, K.M. & ALLINSON, Y.M. (2006). Pharmaceutical review: Resource implications for the pharmacy component in Australian public hospitals. *Journal of Pharmacy Practice & Research*, **36**, 291-296.
- PEARSON, D. (2006). Rise and rise of women and young pharmacists. *Pharmacy Review*, **30**, 24-25.
- PEDERSEN, C.A. (2002). The state of the pharmacy workforce. *Journal of the American Pharmaceutical Association*, **42**, 822-3.
- PENNA, R.P. (1999). Academic pharmacy's own workforce crisis. *American Journal of Pharmaceutical Education*, **63**, 453-454.
- PGA (2008a). Medication Management Review Programme: The Pharmacy Guild of Australia.
- PGA (2008b). Professional Pharmacy Services.
- PGA (2002). Workforce and career path options for pharmacy assistants (Request for Tender). pp. 17. Canberra: Pharmacy Guild of Australia.
- ROBERTS, A.S., BENRIMOJ, S.I., CHEN, T.F., WILLIAMS, K. & ASLANI, P. (2005). Implementation of Home Medicines Review (HMR) in community pharmacy. . *Australian Pharmacist*, **24**, 808-813.
- ROBERTS, A.S., BENRIMOJ, S.I., CHEN, T.F., WILLIAMS, K. & ASLANI, P. (2006a). Implementing cognitive services in community pharmacy(2): a review of facilitators used in practice change. . *International Journal of Pharmacy Practice*, **14**, 163-170.
- ROBERTS, A.S., BENRIMOJ, S.I., CHEN, T.F., WILLIAMS, K. & P., A. (2006b). Changing pharmacy practice: implementation of cognitive pharmaceutical services in community pharmacy. *International Journal of Pharmacy Practice*, **14**, 105-113.
- ROBERTS, A.S., HOPP, T., WEST SORENSEN, E., BENRIMOJ, S.I., CHEN, T.F., HERBORG, H., WILLIAMS, K. & ASLANI, P. (2003). Understanding practice change in community pharmacy using organisational theory: development of a qualitative research instrument. . *Pharmacy World & Science*, **25**, 227-234.
- ROMANELLI, F. & RYAN, M. (2003). A survey and review of attitudes and beliefs of Generation X Pharmacy students. *American Journal of Pharmaceutical Education*, **67**, Article 12.
- RYAN, M. & ROMANELLI, F. (2003). Identifying and teaching Generation X Pharmacy students. *American Journal of Pharmaceutical Education*, **67**, Article 42.

- SCHOMMER, J.C., PEDERSEN, C.A., GAITHER, C.A., DOUCETTE, W.R., KRELING, D.H., MOTT, D.A., SCHOMMER, J.C., PEDERSEN, C.A., GAITHER, C.A., DOUCETTE, W.R., KRELING, D.H. & MOTT, D.A. (2006). Pharmacists' desired and actual times in work activities: evidence of gaps from the 2004 National Pharmacist Workforce Study. *Journal of the American Pharmacists Association: JAPhA*, **46**, 340-7.
- SCLAVOS, K. (2008). Pharmacy Guild Initiatives.
- SELLERS, J.A. (2002). Pharmacy and generation X. *American Journal of Health System Pharmacy*, **59**, 832.
- SESTON, E., HASSELL, K. & SCHAFHEUTLE, E. (2007). Workforce update - joiners, leavers, and practising and non-practising pharmacists on the 2007 Register *The Pharmaceutical Journal*, **279**, 691-693.
- SHANN, P. & HASSELL, K. (2003). The national workforce census: (2) Older pharmacists and the pharmacy workforce in Britain. *Pharmaceutical Journal*, **270**, 833-834.
- SHPA (1996). Definitions for hospitalpharmacy services. Collingwood, Victoria: Society of Hospital Pharmacists of Australia.
- SHPA (2007). Strategies to improve the retention and recruitment of Australia's Hospital Pharmacy Workforce as part of the National Workforce Action Plan. pp. 8. Collingwood, Victoria: Society of Hospital Pharmacists of Australia.
- TAYLOR, K.M., BATES, I.P. & HARDING, G. (2004). The implications of increasing student numbers for pharmacy education. *Pharmacy Education*, **4**, 33-39.
- UKENS, C. (2002). genX P.Ph.s seek mission, not money. *Drug Topics*, **146**, 32.
- WALTON, M.J., GRAYSON, J.P. & MCLEAY, J. (2003). Health Employees' (State) Award, Industrial Relations Commission of New South Wales.
- WHEATLEY, S.A. (2005). Pharmacy workforce. Urgent debate needed. *The Pharmaceutical Journal*, **274**, 175.
- WILLIS, S. & HASSELL, K. (2007). Supply and demand for preregistration placements: don't believe the hype. *The Pharmaceutical Journal*, **279**, 42.
- WILLIS, S., SHANN, P. & HASSELL, K. (2006a). Career choices, working patterns and the future pharmacy workforce. *Pharmaceutical Journal*, **277**, 137-138.
- WILLIS, S., SHANN, P. & HASSELL, K. (2006b). Graduate destinations - choices made about preregistration training. *The Pharmaceutical Journal*, **277**, 164-165.