The general practice nurse workforce

Estimating future supply

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Background
General practice nurses (GPNs) form an important component of the general practice workforce in Australia. Despite this, there is limited research on estimating their future supply. This study aims to estimate the future GPN supply and the impact of a range of policy and non-policy changes on workforce balances.

Method
A simulation model of the GPN workforce over the period 2012–25 was developed, with scenario analysis used to assess the effects of policy and non-policy scenarios.

Results
The baseline scenario estimated a shortage of 814 full-time GPNs by 2025. The non-policy single scenarios all projected shortages by 2025. The worst-case scenario was reduced working hours and best-case scenario was the retention scenario.

Discussion
Over the 13-year period considered, the Australian practice nurse workforce is predicted to move into a position of shortage. Retention and recruitment policies are shown to be effective in addressing these shortages.

IN AUSTRALIA, general practice nurses (GPNs) are major contributors to the delivery of primary care health services. Their role has expanded following the introduction of government initiatives such as the Nursing in General Practice Initiative in 2001, which provided incentives to practices to employ nurses.[1] Partly driven by these government initiatives, there has been a 64% increase in the GPN workforce from an estimated 7778 in 2007[2] to 12,746 in 2015,[3] with 63% of practices employing GPNs in 2012.[2] This workforce tends to be female registered nurses who work part time in all regions of Australia.[3]

As nursing in general practice has changed over the past decade, with roles expanding to coordination of care, patient education, immunisations,[4] health assessments[5] and management of the clinical environment,[5,6] this workforce has some challenges. These include lack of a career pathway,[4,7] poor remuneration,[7,8] a lack of respect or recognition[7] and an increasingly ageing workforce,[3] all of which have an impact on recruitment and retention.

To date, health workforce planning in the Australian primary care field has largely concentrated on general practitioners (GPs). As GPNs represent a relatively small population within the national nursing workforce, consistent annualised data on the GPN workforce have been unavailable until recent years. As such, analysis of this workforce has been based on cross-sectional surveys, often with a focus on career development, satisfaction and work, with low response rates or based on sub-samples of the workforce.[2,5,7,9,10]

Understanding more about the GPN workforce and its sustainability is increasingly important, given the ageing population and the growing prevalence of chronic disease in Australia. Building on newly available data, this study aimed to develop a simulation model that estimates the national supply of GPNs from 2012 to 2025 on the basis of the current workforce dynamics and incorporates an estimate of need for them. It also aimed to assess the impact of policy and non-policy changes on the estimation of the future supply of this workforce.

Method

The simulation model for the Australian GPN workforce uses a stock and flow approach used in many countries[11–13] to build supply side estimates. The current stock of GPNs is estimated on the basis of new entrants (graduates) to the workforce, exits from the workforce (retirement) and productivity (full-time or part-time work). For the model, the GPN stock was broken down into cohorts on the basis of their age group (five-year groupings), sex, qualification type (enrolled or registered nurse) and practising location (urban or rural). This stock was then modified according to a range of inflows (new graduates and other nurses), transitions (between age groups and practice locations) and outflows (retirement) on an annual basis to simulate the change in the GPN workforce to the year 2025. Estimation of the need for GPN services was determined to be directly related to the estimated need for general practice services, and these estimates were made on the basis of a model built for the general practice workforce in Australia.[14] The need component combines disease incidence and prevalence data with age-specific and gender-specific usage rates per incident/prevalent case to estimate the aggregate level of general practice services required

over the whole population. The model uses historical data spanning 2012–14, with each year beyond that being a result of the simulation model. An estimate of the workforce gap was generated by the difference between estimated supply and need. The base year stock was 10,952 GPNs (7269 full-time equivalent [FTE]), with nurse inflows estimated at 1789.

The primary source of data for the GPN workforce stock was extracted from the National Health Workforce Dataset (NHWDS)[15] using both the Commonwealth Department of Health's online Health Workforce Data Tool (HWDT) and customised data from the Australian Institute of Health and Welfare. The GPN workforce was identified by selecting all nurses who identify practice nursing as their primary area of practice in the workforce labour survey undertaken at the time of annual registration. The data sources and variables used in the model are detailed in Table 1.

To assist with understanding the internal dynamics of the workforce, a survey was undertaken by a sample of 51 South Australian GPNs. Further survey details are provided in Table 1. The results provided an estimate of flows into the GPN workforce on the basis of the distribution of new practice nurses (those working as a practice nurse less than one year) and applying this to the observed workforce structure. The survey was also used to determine transition probabilities for the workforce moving between rural and urban locations. Exits out of the stock were estimated on the basis of a calculation of net exit rates using historical counts within each age cohort and the difference between the observed actual total and the predicted total.

In the absence of consistent historical data to estimate any pre-existing workforce shortage or oversupply, the model assumes workforce supply and need were in balance in 2012. The rate of growth of need for GPNs is then linked to the rate of growth calculated as applicable to the general practice workforce.

Baseline scenario

The baseline scenario represented changes in population demographics, assuming constant age-specific and gender-specific disease incidence and prevalence rates to represent need and a continuing upward trend in the level of general practice services.

The baseline model assumes a slow decrease in the inflow rate in the years to 2025 from its last observed level through to the current growth rate of the overall national workforce. It also assumes that a sufficient number of nurses continue to be available to meet the assumed inflows into the GPN workforce. The baseline scenario was then adapted to assess the effect of various policy and non-policy options.

Policy and non-policy scenarios

A variety of policy scenarios (ie changes assumed to be controllable) and non-policy scenarios (ie exogenous changes to workforce factors) were modelled by adjusting variables in the baseline model, both singularly and in combination. The former are captured by the terms 'recruitment' (representing policies and programs that are able to increase the relative inflow of particular nurses into practice nursing) and 'retention' (representing policies and programs that are successful in reducing the exit of particular nurse cohorts). They also include a scenario where government incentives to employ GPNs are reduced. The non-policy factors considered represent a range of issues that are relevant to either the broader health workforce or nurses in particular, such as changes in population growth, changes in illness in the population, GPN retirement rates and GPN working hours. Details on each scenario and their rationale are summarised in Table 2.

In assessing the scenario outcomes, it was assumed that the policy objective was to achieve a balanced workforce over the projection period, and that the best-case scenario represents the outcome closest to achieving a balanced workforce and the worst-case scenario results in an increased gap between supply and demand. To reflect the inherent uncertainty around the projections, the modelling defines a gap between supply and need of within 5% (equal to around 510 FTE GPNs) as presenting a situation of workforce balance.

Ethics approval from the University of Adelaide Human Research Ethics Committee was obtained (H-2015-245).

Results

In the model baseline, the projections indicate a GPN workforce growing from a headcount of 10,952 (7269 FTE) in 2012 to 14,581 (10,209 FTE) in 2025 – a growth of 33.1% (40.5%) over 13 years in absolute terms and a compound annual growth rate of 2.2% (2.6%). The baseline scenario projects a GPN workforce that moves from a small oversupply of around 60 FTE GPNs in 2020 to a larger position of shortage of around 800 FTE GPNs by 2025 (Table 3).

Policy and non-policy scenarios

All the single non-policy scenarios result in an estimated shortage of FTE GPNs by 2025 (Table 3). The three policy scenarios over the same time frame have mixed results, with the recruitment scenario resulting in an estimated shortage of GPNs, the retention scenario projecting a workforce in balance and the reduced incentives scenario projecting a workforce in oversupply.

The worst-case single scenario result occurs in the reduced working hours scenario, with an estimated shortfall of –1308 FTE GPNs by 2025 (Table 3). The best-case scenario occurs in the retention scenario, which achieves a balanced workforce over the projection period, with –147 FTE GPNs in 2025. The only single scenario that results in an oversupply is that of reduced incentives to employ GPNs (Table 3).

The combined scenarios that estimate the most rapid move from a balanced workforce to a shortage (Table 4) are:

- high population growth and recruitment
- reduced working hours and retention
- reduced working hours and recruitment
- early retirement and recruitment.

The combined scenarios also indicate that the impact of the reduced working hours scenario on the estimated workforce in 2025 can be offset by the implementation of retention strategies. The negative effect of the high population growth scenario can be brought back to balance if retention strategies are implemented (Table 4).

Table 1. Main datasets and variables used in the model for the general practice nurse workforce

Component	Dataset	Organisation	Description and scope of dataset	Variables used
Supply	NHWDS	Obtained through the Commonwealth Department of Health online HWDT[15]	The NHWDS is comprised of elements of registration data (eg, demographics) of health professionals as well as workforce details obtained by the associated Medical Workforce Survey issued at the time of registration. AHPRA, the Commonwealth Department of Health and the AIHW work together to generate the final NHWDS, which is made available in a de-identified format.	Year, locality (by Rural Area), sex, age group (pre-defined), clinical hours worked, nurse type (qualification level)
	NHWDS	Obtained through the AIHW	As above – except customised data requests were made to obtain data in a finer detail than available through the publicly available data (with confidentialised data where, for example, small cell numbers arose).	Year, locality (by Rural Area), sex, age group (by five-year age grouping), clinical hours worked, nurse type (qualification level)
	Custom online survey of 120 South Australian practice nurses	Undertaken by University of Adelaide in conjunction with the AOGP	Practice nurses known through the AOGP program were surveyed and data collected on their demographics (age, gender, location of practice, nursing qualification and hours worked in general practice), work history (age at entry as GPN, location of practice, years worked as a GPN and nurse, any breaks from general practice nursing) and years to retirement. The survey was undertaken by a practice nurse working for AOGP with a 43% response rate. The questionnaire was designed by the authors and the practice nurse.	Years as a practice nurse, age of entry to practice nursing – by age group, sex, location and qualification, intended years of pratice
Need*	Burden of Disease study	Australian Institute of Health and Welfare	The Burden of Disease and Injury in Australia study published in 2007 was a comprehensive assessment of the health status of Australians.[19] Annexes to the report provide data on a number of measurements including incidence and prevalence, and these were used for this study.	Prevalence cases and incidence cases by age and sex
	Australian population projections	ABS	The ABS is Australia's national statistical agency. It manages and analyses the Australian Census of Population and Housing every five years. It also provides population projections at a national and regional level.	Age and sex (for low, mid and high population projection series)
	BEACH — GP activity (customised data)	Family Medicine Research Centre, University of Sydney	The BEACH program was a continuous national study of general practice activity in Australia. Each year, a random sample of approximately 1000 GPs participates in the program. They record information on 100 consecutive patient encounters.[27]	Problems managed by South Australian GPs by age and sex
	GP attendances	Medicare Australia	Medicare Australia data includes services that qualify for a Medicare Benefit and for which a claim has been processed by the Department of Human Services. It includes data on services provided by all active Australian medical practitioners eligible for claiming medical benefits.	Unreferred attendances by Broad Type of Service for South Australia by age and sex

**As per the simulation model built for general practitioners and extended to an Australia-wide estimate*
ABS, Australian Bureau of Statistics; AHPRA, Australian Health Practitioner Regulation Agency; AIHW, Australian Institute of Health and Welfare; AOGP, Adelaide to Outback GP Training Program; BEACH, Bettering the Evaluation and Care of Health; HWDT, Health Workforce Data Tool; GP, general practitioner; GPN, general practice nurse; NHWDS, National Health Workforce Data Set

Discussion

The model provides an estimate of the future requirements for GPNs in Australia not only in terms of supply, but also assessed against changes in need for this workforce. The modelling shows that there will be a substantial shortage of the GPN workforce by 2025 and that this occurs under several different scenarios. However, the scenario analysis also indicates that while these shortages are persistent, they could be reduced through recruitment and retention strategies.

Over the past decade, the scope of practice has widened for the GPN workforce and the care they provide has become an essential part of general practice in Australia. In 2013–14, the Bettering the Evaluation and Care of Health (BEACH) study data showed that 8.0% of general practice encounters and 5.3% of problems managed involved GPNs, which equated to involvement in around 10.7 million consultations in that year.[16] Given this workload, the projected shortfall in GPNs is likely to have a significant impact on healthcare provision in general practice.

The estimated shortage has a number of implications for how general practice teams function in the future or for new models such as 'Health Care Homes', where GPNs are delegated roles previously undertaken by GPs.[17,18] International experience suggests that the trend towards team-based care in the provision of primary health services will continue to grow. In the US there is increasing use of nurse practitioners and registered nurses as care managers working alongside primary care physicians.[19] These new models of care may not reach their full potential if there are insufficient numbers of GPNs. Having an insufficient number of GPNs could mean that essential components of improved models of primary care, such as care coordination, patient education and team-based care, may be not be implemented in the most efficient and cost-effective way.[20]

The importance of a sustainable GPN workforce is also driven by community need for general practice services. This includes the effect of an ageing population, the increase in patients with multimorbidity and the growth in chronic disease. It is estimated that approximately half of all Australians have a chronic disease and one in five have at least two, particularly in adults aged over 45 years.[21] Ensuring sufficient numbers of nurses continue to enter general practice nursing is essential for sustaining adequate provision of primary care health services.

The model identified that the highest net exit rates are found in age groups under 40 years. This is true of both male and female nurses, suggesting the higher exit rates in these age groups are driven by factors beyond common events in those age groups, such as taking maternity leave. Combined with their indicated intent to work for more years as nurses, their higher work hours and the current proportion of GPNs over 55 years of age,[3] retention of the cohorts under 40 would seem to offer the best chance of sustaining the estimated growth needed for GPNs through to the year 2025. Australian research has identified factors such as relationships with management, access to education/training, and wages and salaries as key causes of dissatisfaction for GPNs, and these have an impact on retention.[7] For older GPNs, feeling valued, being consulted and accessing reduced working hours and workload as retirement neared were important retention factors.[22] Recruitment of GPNs is another option to offset the estimated shortfall. Suggested recruitment strategies include graduate transition programs to primary care,[23,24] better definition of career pathways, enhanced recognition of the role within nursing and the promotion of flexible working hours.[2,8,10,25,26]

One key uncertainty that remains regarding the future sustainability of the GPN workforce is the effect of any change in government initiatives. The workforce has developed rapidly since the introduction of incentives specific to GPNs, but the sensitivity of the workforce to changes in both the form of these incentives and their scale remains unknown. The modelling showed that a removal of incentives that substantially fund the GPNs would lead to a surplus of unemployed GPNs if practices were unable to retain GPNs. Without GPNs, practices may:

- find it difficult to manage the increasing rates of complex health conditions and chronic disease
- increase GP workloads
- limit their participation in new models of care and result in increased cost of care.

This scenario serves to indicate how vulnerable the GPN workforce remains to changes in government policy and suggests that if GPNs are a valued and essential part of primary care, then a definitive funding source should be provided for them rather than the current fee-for-service model.

Limitations

The key limitation for the study is the availability and quality of data. The lack of longitudinal data necessitated construction and calculation of approximate patterns of workforce transitions (time of entry and exits from practice nursing) and movements (eg rural to urban areas and vice versa). This was mediated to some degree by collecting data from a sample of GPNs in South Australia and assuming that these state-specific transitions do not have major variations from those that would be observed at the national level; however, this may not be the case.

There is also limited historical data to draw on to better understand how the workforce has traditionally responded to change in supply and need parameters. While there is currently only consistent and comparable workforce data from 2012 onwards, this will improve over time. Another complication is the lack of specific pathways or credentials that determine eligibility to work as a GPN. Supply of the GPN workforce is drawn predominantly from the broader nurse workforce, who can enter at a variety of points into practice nursing.

The scenarios were developed to represent a particular practical effect of a broad policy or non-policy change. While they attempt to cover the range of relevant workforce issues highlighted in literature, the specific magnitude and timing of any of these changes cannot be known. The scenarios are therefore

Table 2. Summary of scenarios used in the model

Sub-models	Scenario	Description	Rationale/source	Measures	Policy or non-policy scenario
Need and supply	Base scenario	Uses base year data – 2012 Projections commence 2015 No changes except annual increase in level of service and population changes	The base scenario represents an attempt to reflect business as usual. Since the practice nurse workforce has exhibited strong historical growth rates which have tapered off markedly in the last three years, an attempt has been made to reflect this moderation trend through the projection years while maintaining the overall patterns and proportions observed historically.	None	Non-policy
Need	Illness of the population	Changes in population incidence and prevalence of disease	Vos et al[28] and Goss[29] predicted changes in incidence and prevalence for selected injuries and illnesses. This fed through into projected need for GPs, which has been applied to the practice nurse workforce.	Changes in estimated prevalence/incidence levels from base year	Non-policy
	High population growth	Need is taken from the general practice model under high population growth	One of the key drivers of changes in need is the growth and change in the composition of the population under different growth assumptions.	The underlying growth rate of need for Australian general practice services using the ABS series A ('high') population projection is used to estimate the need for practice nurses.[30]	Non-policy
	Low population growth	Need is taken from the GP model under low population growth	One of the key drivers of changes in need is the growth and change in the composition of the population under different growth assumptions.	The underlying growth rate of need for Australian general practice services using the ABS series C ('low') population projection is used to estimate the need for practice nurses.[30]	Non-policy
	Reduced incentives	Government programs designed to support practice nurses through subsidies to general practice clinics are significantly reduced	The partial historical data suggests that when support for practice nurses was reduced it had a flow-on impact on observed numbers of practice nurses in the years afterwards.	Without sufficient data to estimate the relationship, a notional reduction in baseline growth rate of need (of two percentage points) is introduced from 2018.	Policy
	Growing demand for registered nurses	The growth rate of need for registered nurses is increased above baseline; the growth rate of need for enrolled nurses is decreased below baseline	The most recent workforce data suggests the practice nurse workforce is mirroring the broader nurse workforce in growing the density of registered nurses employed while lowering the density of enrolled nurses employed. This scenario attempts to quantify the impact of this being continued into the future.[3]	The modelling introduces an approximate estimate of differences in need growth of registered nurses and enrolled practice nurses based on workforce data in the 2012 to 2014 period. Registered nurses need is grown at 10% above baseline per annum; enrolled nurses need is grown at 10% below baseline per annum.	Non-policy

Table 2. Summary of scenarios used in the model (cont'd)

Sub-models	Scenario	Description	Rationale/source	Measures	Policy or non-policy scenario
Need (cont'd)	Increased demand for general practice services	Need for general practice visits (and subsequently practice nurses) increases over the projection period	Changes in chronic disease are anticipated to be a key driver of need for primary healthcare into the future.	Need for practice nurses grows at one percentage point above baseline growth from 2018 onwards to simulate a higher growth of chronic disease than expected.	Non-policy
Supply	Early retirement	A retirement age of 65 years (from 70 years) is introduced in the baseline model		Retirement at age 65 years is phased in over three years from 2015 to simulate a shift in retirement behaviour by practice nurses.	Non-policy
	Recruitment	The inflow of new nurses into the practice nurse stock is rebalanced towards younger nurses	Increased focus on developing clearer career pathways and appeal of being a nurse to increase the flow of nurses into practice nursing at an earlier age makes the workforce more stable.[31]	The share of inflow aged <40 is increased from 43% in the baseline model to 63% (increase of 20 percentage points).	Policy
	Retention	Reduced loss of practice nurses aged less than 40 years from the practice nurse workforce	Increased retention – early career preparation and workplace support – are key areas to mitigate nurse losses.[31]	Exit rates for all practice nurses aged <40 (regardless of location or nurse type) are reduced by 20% over three years from 2015.	Policy
	Reduced working hours	The working hours of nurses aged under 45 years are reduced	Sometimes termed the 'Gen Y' effect, younger cohorts have increasingly expressed a desire to work fewer hours to achieve better work–life balance.[32]	Working hours of practice nurses aged <45 years are reduced by 10% (phased in over three years from 2015).	Non-policy

ABS, Australian Bureau of Statistics; GP, general practitioner

presented to provide an indicative sensitivity of workforce balance to plausible shifts emanating from either the supply or need side (or both, in the combination scenarios).

Conclusion

Over the 13-year period considered, the Australian GPN workforce is predicted to move into a position of workforce shortage. On the basis of the scenario modelling results, a policy mix that seeks to combine recruitment and retention strategies would provide the strongest ability to maintain and achieve workforce balance over the period to 2025.

Implications for general practice

The estimated shortfalls in the GPN workforce in Australia will have an impact on the provision of care to patients within a primary care setting where these nurses play a crucial role. Without an adequate supply, the ability of the health sector to implement new models of care aimed at improving care for patients with chronic disease will be severely hampered. Action is required by governments and professional organisations to implement recruitment and retention strategies and improved training opportunities to ensure that this workforce is sustainable long term.

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Table 3. Summary of full-time equivalent general practice nurse estimates for Australia for the single baseline, policy and non-policy scenarios, 2015, 2020 and 2025

Type of scenario	Scenario		2015	2020	2025
Baseline	Base	Supply	8,747	9,484	10,209
		Demand	8,018	9,423	11,024
		Gap	+729	+61	−814
Non-policy scenarios	High population growth	Supply	8,747	9,484	10,209
		Demand	8,034	9,515	11,266
		Gap	+712	−31	−1,057
	Low population growth	Supply	8,747	9,484	10,209
		Demand	8,001	9,336	10,806
		Gap	+745	+148	−597
	Change in illness	Supply	8,747	9,484	10,209
		Demand	8,079	9,513	11,148
		Gap	+667	−29	−939
	Early retirement	Supply	8,251	8,950	9,779
		Demand	8,018	9,243	11,024
		Gap	+233	−473	−1,245
	Reduced working hours	Supply	8,346	9,041	9,715
		Demand	8,018	9,243	11,024
		Gap	+328	−383	−1,308
	Growing demand for registered nurses	Supply	8,747	9,484	10,209
		Demand	8,037	9,580	11,497
		Gap	+710	−96	−1,287
	Chronic disease	Supply	8,747	9,484	10,209
		Demand	8,011	9,402	10,986
		Gap	+735	+82	−776
Policy scenarios	Recruitment	Supply	8,554	9,575	10,496
		Demand	8,018	9,423	11,024
		Gap	+536	+151	−528
	Retention	Supply	8,847	9,979	10,876
		Demand	8,018	9,423	11,024
		Gap	+829	+556	−147
	Reduced incentives to employ general practice nurses	Supply	8,747	9,484	10,209
		Demand	8,018	8,872	9,417
		Gap	+729	+612	+792

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Table 4. Summary of full-time equivalent general practice nurse estimates for Australia for combined policy and non-policy scenarios, 2015, 2020 and 2025

Scenario		2015	2020	2025
Early retirement + recruitment	Supply	8,327	9,249	10,124
	Demand	8,018	9,423	11,024
	Gap	+309	–174	–900
Early retirement + retention	Supply	8,672	9,652	10,526
	Demand	8,018	9,423	11,024
	Gap	+655	+229	–497
Reduced working hours + recruitment	Supply	8,165	9,126	9,991
	Demand	8,018	9,423	11,024
	Gap	+147	–297	–1,033
Reduced working hours + retention	Supply	8,436	9,494	10,331
	Demand	8,018	9,423	11,024
	Gap	+418	+71	–693
High population growth + recruitment	Supply	8,554	9,575	10,496
	Demand	8,034	9,515	11,266
	Gap	+519	+60	–770
High population growth + retention	Supply	8,847	9,979	10,876
	Demand	8,034	9,515	11,266
	Gap	+812	+465	–390
Chronic disease + recruitment	Supply	8,554	9,575	10,496
	Demand	8,011	9,402	10,986
	Gap	+542	+173	–490
Chronic disease + retention	Supply	8,847	9,979	10,876
	Demand	8,011	9,402	10,986
	Gap	+835	+577	–110
Chronic disease + early retirement + recruitment	Supply	8,327	9,249	10,124
	Demand	8,011	9,402	10,986
	Gap	+316	–153	–862
Chronic disease + early retirement + retention	Supply	8,672	9,652	10,526
	Demand	8,011	9,402	10,986
	Gap	+661	+250	–460

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