

Prevalence and associations of general practice nurses' involvement in consultations of general practitioner registrars: a cross-sectional analysis

Allison Turnock¹ MBBS(Hons), DipCH, FRACGP, Medical Educator

Simon Morgan² MPH&TM, FRACGP, Medical Educator

Kim Henderson² BNurs, GradDipHealthSocSci, Projects Manager

Amanda Tapley² BBiomedSc(Hons), Research Officer

Mieke van Driel³ PhD, FRACGP, Head of the Discipline of General Practice

Chris Oldmeadow^{4,5} PhD, BMath(Hons), Conjoint Senior Lecturer

Jean Ball⁵ BMath, GradDipMedStat, Statistician

Jenny Presser¹ BSc(Hons), PhD, MBBS, FRACGP, Senior Medical Educator

Andrew Davey⁴ BSc, BE(Hons), DCH, BMed, MCLinEpid, Associate Lecturer

John Scott² BComSc, Information Technology Officer

Parker Magin^{2,4,6} PhD, FRACGP, Conjoint Professor, Medical Educator

¹Tropical Medical Training, 100 Angus Smith Drive, Townsville, Qld, 4814, Australia.

Email: AllisonTurnock@tmt.org.au, jennypresser@gmail.com

²General Practice Training Valley to Coast, PO Box 573, Hunter Regional Mail Centre, NSW 2310, Australia.

Email: simon.morgan@gpvtvc.com.au, kim.henderson@gpvtvc.com.au, amanda.tapley@gpvtvc.com.au, john.scott@gpvtvc.com.au

³Discipline of General Practice, School of Medicine, The University of Queensland, L8 Health Sciences Building, Royal Brisbane and Women's Hospital, Brisbane, Qld 4029, Australia. Email: m.vandriel@uq.edu.au

⁴University of Newcastle, School of Medicine and Public Health, The University of Newcastle, University Drive, Callaghan, NSW, 2308, Australia. Email: Christopher.Oldmeadow@newcastle.edu.au, andrew.davey@newcastle.edu.au

⁵Clinical Research Design, Information Technology and Statistical Support Unit, Hunter Medical Research Institute, Lot 1 Kookaburra Circuit, New Lambton Heights, NSW, 2305, Australia.

Email: jean.ball@newcastle.edu.au

⁶Corresponding author. Email: parker.magin@newcastle.edu.au

Abstract

Objective. To establish prevalence and associations of general practice nurses' (GPNs) involvement in general practitioner (GP) registrars' consultations.

Methods. A cross-sectional analysis from an ongoing cohort study of registrars' clinical consultations in five Australian states. Registrars recorded detailed data from 60 consecutive consultations per 6-month training term. Problems and diagnoses encountered, including chronic disease classification, were coded using the International Classification of Primary Care, second edition duplication system (ICPC-2plus) classification system. The outcome factor in our analysis was GPN involvement in management of individual problems and diagnoses. Independent variables were a range of patient, registrar, practice, consultation and educational factors.

Results. We analysed 108 759 consultations of 856 registrars including 169 307 problems or diagnoses. Of the problems/diagnoses, 5.1% (95% confidence interval (CI) 5.0–5.2) involved a GPN. Follow-up with a GPN was organised for 1.5% (95% CI 1.4–1.5) of all problems/diagnoses. Significant associations of GPN involvement included patient age, male sex, Aboriginal or Torres Strait Islander status, non-English-speaking background (NESB) and the patient being

new to the practice. Larger practice size, the particular training organisation, and the problem/diagnosis being new and not a chronic disease were other associations.

Conclusions. Associations with Aboriginal or Torres Strait Islander status and NESB status suggest GPNs are addressing healthcare needs of these under-served groups. But GPNs may be underutilised in chronic disease care.

What is known about this topic? GPNs are increasingly involved in team-based care in Australian general practice. The potential positive contribution of GPNs to general practice teams is acknowledged, but the role of the GPN is still being refined.

What does this paper add? GPNs contribute to the care of a modest proportion of patients seen by GP registrars. Aboriginal or Torres Strait Islander status and NESB of patients are positively associated with being seen by a GPN; chronic disease is negatively associated with being seen by a GPN. There is geographic variability in prevalence of GPN consultations, not explained by other factors.

What are the implications for practitioners? Given the match of GPN skills and attributes to the needs of patients with chronic diseases, GPNs currently may be underutilised in chronic disease care in Australian general practice. The marked geographic variation in uptake of GPNs also suggests scope for greater utilisation of GPNs Australia-wide.

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Introduction

General practice is increasingly adopting a multidisciplinary approach.¹ There is an imperative for multidisciplinary, team-based approaches to provide adequate access and optimal care in primary care.^{2, 3} While a range of primary health providers are working within general practices,⁴ nurses are the most prominent non-doctor group in practice teams in general practice.^{1, 5} There is strong evidence that nurses in general practice are valued by patients for their clinical attributes and accessibility⁶ and in terms of overall patient satisfaction.⁷

A practice nurse in Australia has been defined as a registered nurse or an enrolled nurse employed in a general practice.⁸ This definition omits the role of nurse practitioner;⁹ these nurses with advanced qualifications are still relatively uncommon in Australian general practice.⁹ While Australia's adoption of general practice nurses (GPNs) lags behind that of the United Kingdom,¹⁰ in 2012, 63.3% of Australian practices employed a GPN and there were 2.88 GPNs per practice.¹¹

GPN roles have been broadly characterised as 'patient carer, organiser, problem solver, educator and agent of connectivity' (p. 93).¹² In Australian general practice, it has been proposed that GPN function is inhibited by funding arrangements^{8, 10, 12-14} and that the range and mix of GPN tasks may consequently be restricted. It is thus essential that GPN activity be documented and its nature understood. An important step towards this is a close understanding of the prevalence and associations of GPN activity including the patient, practice and general practitioner (GP) associations of management by a GPN. Previous Australian research has not addressed this issue.

In this study we aimed to address this evidence gap. Our primary aim was to establish the prevalence and associations of problems and diagnoses dealt with by GPNs in collaboration with GP colleagues. We also aimed to document the range of problems and diagnoses seen by GPNs in these consultations. The majority of GPN consultations in Australia are in conjunction with GP involvement (autonomous GPN consultations occur in only 23.5% of office-based GPN consultations)¹⁵.

Our study was of GP registrars (trainees). GP registrars in Australian vocational training train in an apprenticeship model,

supervised by an established GP. But, although registrars have recourse to supervisor advice and support when required, they operate as independent general practitioners (including for Medicare and prescribing purposes). GPN consultations conducted in collaboration with current cohorts of GP registrars are a particularly relevant means to examine the emerging role of GPNs in primary care and general practice, particularly as the registrars are entering practice and learning their craft (and establishing future clinical behaviour) at a time when the multidisciplinary team approach in general practice is becoming established, and the role of the Australian GPN is being refined.⁹ GPNs are also anecdotally a source of teaching and support for GP registrars.

Methods

This analysis took place within the Registrar Clinical Experiences in Training (ReCEnT) project. ReCEnT is an ongoing multisite cohort study of GP registrars. Participants are GP registrars training with five of Australia's 17 GP Regional Training Providers (RTPs) across five Australian states. RTPs are government-funded, not-for-profit, geographically-defined organisations charged with delivery of general practice vocational training.

The methodology has been described in detail elsewhere.¹⁶ GP registrars undertake data collection once during each 6-month training term (or 12-month term for part-time registrars) as part of their educational program. This results in registrars collecting data on three or four occasions during their training.

Initial data collection includes demographics as well as education and work experience of participating trainees and characteristics of the practice in which they are working. These parameters are recorded by each registrar, each training term.

Registrars then record the details of 60 consecutive clinical consultations each training term on a paper-based encounter form. On the ReCEnT encounter form, registrars record whether the patient was seen by a GPN at that consultation, and which problems and diagnoses this GPN involvement was related to. Whether scheduled follow-up was organised with the GPN is also recorded.

Data collection is performed approximately midway through the registrar's training term. As data collection is designed to

reflect a 'normal' week of general practice, consultations in a specialised clinic (e.g. vaccination clinic or Pap smear clinic) are excluded. Only office-based (not home visits or nursing home visits) consultations are recorded.

Outcome factor

The outcome factor in this study was whether a problem or diagnosis involved the patient seeing a GPN.

Independent variables

Independent variables related to registrar, patient, practice and consultation factors.

Registrar factors were age, sex, training term, place of medical qualification (Australia or overseas), full-time/part-time status and whether the registrar previously worked at the practice. The RTP with which the registrar trained was also an independent variable.

Patient factors were age, sex, Aboriginal or Torres Strait Islander status, non-English speaking background (NESB), new patient to the practice, and new patient to the registrar.

Practice factors included location (rural or urban), practice size (number of full-time equivalent GPs), and if the practice routinely bulk-bills (that is, there is no financial cost to the patient for the consultation). Practice postcode was used to define the Australian Standard Geographical Classification-Remoteness Area classification (the degree of rurality) of the practice location¹⁷ and to define the practice location's Socioeconomic Index for Area Relative Index of Disadvantage.¹⁸

Problems and diagnoses were coded according to the International Classification of Primary Care, second edition classification system (ICPC-2plus).¹⁹ ICPC-2plus classifies problems and diagnoses into 17 Chapters – 16 body system/discipline-specific chapters and a 'general and unspecified' chapter.

Factors relating to the problem or diagnosis were whether it was a chronic disease problem/diagnosis as classified according to the methodology of O'Halloran *et al.*,²⁰ whether the problem/diagnosis was a new one, and the number of problems dealt with in the consultation.

Statistical analysis

This was a cross-sectional analysis of patient consultations from the longitudinal ReCenT study. Analysis was performed on nine rounds of data from 2010 to 2014. Individual RTPs contributed 1–9 rounds of data, depending on their date of commencing the study.

The data for this analysis encompassed patient, registrar and practice demographics, problems/diagnoses, and other consultation factors.

The unit of analysis was the individual problem/diagnosis rather than the registrar consultation.

To test associations of a problem/diagnosis with seeing a GPN, simple and multiple logistic regressions were used within a generalised estimating equations (GEE) framework to account for clustering of patients within registrars. All variables with a *P*-value less than 0.2 and relevant effect size in the univariate analysis were included in the multiple regression models. Variables which had a small effect size and were no longer significant in the multivariate model were removed from the final model as long as the variable's removal did not change the resultant model.

Statistical analyses used STATA 13.1 (StataCorp, College Station, TX, USA) and SAS v9.4 (SAS Institute Inc, Cary, NC, USA). Predictors were considered statistically significant if the *P*-value was <0.05.

Ethics approval

The ReCenT project has approval from the University of Newcastle Human Research Ethics Committee, Reference H-2009–0323.

Results

A total of 856 individual registrars (response rate 95.1%) contributed 1832 registrar-rounds of data, including details of 108 759 individual consultations and 169 307 problems/diagnoses.

The demographics of the participating registrars and practices are presented in Table 1.

Of the problems/diagnoses, 8626 (5.1% (95% confidence interval (CI) 5.0–5.2)) were associated with the patient seeing a GPN. This equated to a GPN being involved in 7.5% (95% CI 7.4–7.7) of all GP registrar consultations.

The most common problems/diagnoses for which a GPN saw a patient are presented in Table 2. When a problem/diagnosis was classified by an ICPC-2plus chapter, the most frequent chapters were 'general and unspecified' (28.0%), 'skin' (22.2%), 'respiratory' (15.8%) and 'cardiovascular' (8.7%).

GP registrars organised follow-up with a GPN for 1.5% (95% CI 1.4–1.5%) of the problems seen. Of these, 37.7% (95% CI 35.8–39.6) of patients were seen by the GPN as well as the registrar at the index consultation. The most common problems/diagnoses for which follow-up with a GPN was organised are presented in Table 2.

Associations of GP registrar, patient and practice factors with having a GPN involved in managing a problem/diagnosis are presented in Table 3 and predictors in the logistic regression model of having a GPN involved in managing the problem/diagnosis are presented in Table 4.

In the adjusted model, patient age (age <15 years is associated with greater involvement of a GPN than age 15–64, but with less involvement than age ≥ 65), male sex (odds ratio (OR) 0.78, 95% CI 0.73–0.82, for female sex), Aboriginal and Torres Strait Islander status (OR 1.37, 95% CI 1.08–1.74) and NESB (OR 1.25, 95% CI 1.10–1.43) are significantly associated with being seen by the GPN, as is the patient being new to the practice (OR 1.53, 95% CI 1.35–1.73).

Registrar variables associated with the patient being seen by the GPN are being in term 1 of training (OR 0.88, 95% CI 0.78–0.99 for term 2 vs term 1) and training with RTPs 3 and 5 (OR 1.33, 95% CI 1.06–1.68, and 2.19, 95% CI 1.42–3.39, respectively).

The practice variable associated with seeing a GPN was larger practice (OR 1.30, 95% CI 1.16–1.47).

Problem/diagnosis variables associated with seeing a GPN were presentation with a new problem/diagnosis (OR 1.22, 95% CI 1.15–1.31), the problem/diagnosis not being chronic (OR 0.56, 95% CI 0.51–0.61) and there being fewer problems dealt with at the consultation (OR 0.58, 95% CI 0.55–0.61 for each extra problem).

Table 1. Registrar, registrar-term and practice characteristics
SEIFA, Socioeconomic Index for Area Relative Index of Disadvantage

Variable	Class	n, % (95% confidence interval)
Registrar variables (n = 856)		
Sex	Male	294, 34.4% (31.2–37.5)
	Female	562, 65.7% (62.5–68.8)
Pathway enrolled in	General	641, 75.2% (73.3–78.1)
	Rural	211, 24.8% (21.9–27.7)
Qualified as a doctor in Australia	No	182, 21.5% (18.7–24.3)
	Yes	664, 78.5% (75.7–81.3)
Age (years)	Mean (s.d.)	32.5 (6.3)
Year of graduation	Mean (s.d.)	2005.8 (5.4)
Registrar-term or practice-term variables (n = 1832)		
Registrar training term	Term 1	765, 44.8% (39.5–44.0)
	Term 2	538, 29.4% (27.3–31.5)
	Term 3	454, 24.8% (22.8–26.8)
	Term 4	75, 4.1% (3.2–5.0)
Registrar worked at the practice previously	No	1321, 73.1% (71.1–75.2)
	Yes	486, 26.9% (24.8–28.9)
Registrar works full-time	No	399, 22.2% (20.3–24.2)
	Yes	1395, 77.8% (75.8–79.7)
Practice routinely bulk bills	No	1502, 82.6% (80.8–84.3)
	Yes	317, 17.4% (15.7–19.2)
Number of general practitioners working at the practice	1–5 (small practice)	604, 33.7% (31.5–35.9)
	6+ (large practice)	1187, 66.3% (64.1–67.5)
Rurality of practice	Major city	1060, 57.9% (55.6–60.1)
	Inner-regional	521, 28.4% (26.4–30.5)
	Outer-regional, remote or very remote	251, 13.7% (12.1–15.3)
SEIFA (decile) of practice	Mean (s.d.)	5.4 (2.9)

Table 2. Problems/diagnoses addressed in general practice nurse (GPN) consultations, and for which GPN follow-up was organised

Problems/diagnoses in GPN consultations		Problems/diagnoses for which GPN follow-up was organised.	
Problem	%	Problem	%
Immunisation	22.85	Skin wound/laceration/ injury	11.17
Skin wound/laceration/ injury	9.14	Immunisation	10.42
Check-up/health maintenance	7.37	Check-up/health maintenance	6.40
Anticoagulation management	2.63	Diabetes	4.47
Ear wax	2.01	Anticoagulation management	4.47
Skin ulcer management	1.87	Ear wax	3.81
Diabetes	1.67	Skin ulcer management	3.3
Hypertension	1.36	Atrial fibrillation	1.81

Discussion

Main findings and comparison with existing literature

We found GPNs to be involved in 5.1% of problems/diagnoses managed by GP registrars and in 7.5% of GP registrar consultations. While there are no comparable studies of GP registrars, this modest figure closely compares with 5.0% and 7.4%, respectively, for problems and consultations involving GPNs or Aboriginal health workers in a national study of established GPs.²¹

We found that problems/diagnoses managed by GPNs were most commonly 'general and unspecified', 'skin', 'respiratory'

and 'cardiovascular'. The findings of Joyce and Piterman in a study specifically of Australian GPNs⁹ were broadly similar: general and unspecified (35.4% vs 28.0% in the present study); skin (20.0% vs 22.2%); cardiovascular (11.0% vs 8.7%); and respiratory (8.7% vs 15.8%). The studies, however, are not directly comparable as Joyce and Piterman included GPN consultations not conducted in collaboration with a GP.

Our finding that a large proportion of GPN–patient contacts concerned immunisations (25.9%) may partly explain the association of GPN consultations with patient age of less than 15 years. These findings compare with a previous Australian GPN-specific study,⁹ which found immunisations to be the

Table 3. Univariate associations of independent variables with general practice nurse (GPN) consultations
GP, general practitioner; RTP, Regional Training Providers; SEIFA, Socioeconomic Index for Area Relative Index of Disadvantage

Variable	Class	GPN seen		P
		No (n = 160681)	Yes (n = 8626)	
Patient age	0–14	21163 (92.5%)	1707 (7.5%)	<0.001
	15–34	41040 (96.2%)	1611 (3.8%)	
	35–64	65254 (95.9%)	2785 (4.1%)	
	65+	30755 (92.8%)	2389 (7.2%)	
Patient sex	Male	57805 (93.9%)	3764 (6.1%)	<0.001
	Female	98680 (95.5%)	4612 (4.5%)	
Aboriginal or Torres Strait Islander	No	150163 (94.9%)	8022 (5.1%)	0.08
	Yes	1987 (93.7%)	133 (6.3%)	
Non-English speaking background	No	143186 (94.9%)	7618 (5.1%)	<0.001
	Yes	10071 (94.3%)	610 (5.7%)	
Patient–practice status	Old patient to practice	69218 (95.2%)	3508 (4.8%)	<0.001
	New to registrar	76868 (95.0%)	4082 (5.0%)	
	New to practice	10293 (92.7%)	809 (7.3%)	
Registrar sex	Male	54866 (94.8%)	3006 (5.2%)	0.68
	Female	105815 (95.0%)	5620 (5.0%)	
Registrar work status	Part Time	35538 (95.1%)	1846 (4.9%)	0.71
	Full Time	121834 (94.8%)	6645 (5.2%)	
Training term/post	Term 1	68614 (94.8%)	3738 (5.2%)	0.002
	Term 2	46533 (95.3%)	2303 (4.7%)	
	Term 3	39280 (94.8%)	2164 (5.2%)	
	Term 4	6254 (93.7%)	421 (6.3%)	
Worked at practice previously	No	116249 (95.1%)	6000 (4.9%)	0.06
	Yes	42273 (94.3%)	2538 (5.7%)	
Qualified as doctor in Australia	No	35728 (95.0%)	1885 (5.0%)	0.91
	Yes	122911 (94.9%)	6635 (5.1%)	
Practice size	Small (1–5 GPs)	54386 (95.7%)	2444 (4.3%)	<0.001
	Large (\geq 6 GPs)	102783 (94.5%)	5990 (5.5%)	
Practice routinely bulk bills	No	131767 (94.9%)	7120 (5.1%)	0.37
	Yes	27896 (95.0%)	1458 (5.0%)	
Rurality	Major city	93671 (95.5%)	4365 (4.5%)	<0.001
	Inner-regional	45102 (94.4%)	2661 (5.6%)	
	Outer-regional, remote or very remote	21908 (93.2%)	1600 (6.8%)	
RTP	1	53157 (94.7%)	3001 (5.3%)	<0.001
	2	20592 (94.8%)	1122 (5.2%)	
	3	17868 (93.2%)	1295 (6.8%)	
	4	67502 (95.7%)	3008 (4.3%)	
	5	1562 (88.6%)	200 (11.4%)	
New problem	No	66906 (95.8%)	2906 (4.2%)	<0.001
	Yes	80499 (94.2%)	4931 (5.8%)	
Chronic problem	No	124055 (94.3%)	7476 (5.7%)	<0.001
	Yes	36224 (96.9%)	1140 (3.1%)	
Registrar age ^A	Mean (s.d.)	32.8 (6.6)	32.9 (6.7)	0.56
SEIFA Index ^A	Mean (s.d.)	5.4 (2.9)	5.3 (2.8)	0.11
Number of problems ^A	Mean (s.d.)	2.0 (1.0)	1.6 (0.9)	<0.001
Registrar age ^B	Mean (s.d.)	32.9 (6.6)	33.0 (6.8)	0.62
SEIFA Index ^B	Mean (s.d.)	5.4 (2.9)	5.4 (2.8)	0.18
Number of problems ^B	Mean (s.d.)	1.6 (0.8)	1.3 (0.6)	<0.001

^ADue to analysis at problem/diagnosis rather than consultation level, frequency tables should be interpreted with caution. Reported frequencies at the problem/diagnosis level may not reflect observed frequencies at the subject level.

^BFrequencies for continuous variables analysed at consultation level.

reason for encounter in 11.4% of consultations. Immunisations were provided in 22.0% of consultations involving a GPN in a study of established Australian GPs.²¹

Our findings regarding patient demographics associated with seeing a GPN are of particular relevance. Previous evidence suggests patient preference for, and satisfaction with, nurse-led

care is associated more with patient characteristics than with doctor or nurse characteristics.²²

We found GPN consultation to be associated with Aboriginal and Torres Strait Islander status and NESB, suggesting that GPNs play a role in extending care to these under-served groups with particular health needs. Aboriginal or Torres Strait Islander

Table 4. Logistic Regression model of associations of general practice nurse consultations

OR, odds ratio; CI, confidence interval; GP, general practitioner; RTP, Regional Training Providers; SEIFA, Socioeconomic Index for Area Relative Index of Disadvantage

Variable	Class	Univariate		Adjusted	
		OR (95% CI)	<i>P</i>	OR (95% CI)	<i>P</i>
Patient age (years)	15–34	0.49 (0.45–0.53)	<0.001	0.65 (0.60, 0.72)	<0.001
Referent: 0–14	35–64	0.54 (0.50–0.58)	<0.001	0.86 (0.79, 0.93)	<0.001
	65+	0.98 (0.90–1.06)	0.62	1.83 (1.66, 2.02)	<0.001
	Female	0.72 (0.69–0.76)	<0.001	0.78 (0.73, 0.82)	<0.001
Aboriginal or Torres Strait Islander	Yes	1.20 (0.98–1.48)	0.08	1.37 (1.08, 1.74)	0.01
Non-English speaking background	Yes	1.23 (1.11–1.37)	<0.001	1.25 (1.10, 1.43)	0.001
Patient–practice status	New to practice	1.56 (1.41–1.74)	<0.001	1.53 (1.35, 1.73)	<0.001
Referent: old patient to practice	New to registrar	1.06 (1.01–1.13)	0.03	0.95 (0.89, 1.01)	0.11
Training term/post	Term 2	0.96 (0.87–1.06)	0.40	0.88 (0.78, 0.99)	0.03
Referent: Term 1	Term 3	1.10 (0.99–1.21)	0.07	1.00 (0.89, 1.13)	0.94
	Term 4	1.40 (1.12–1.76)	0.003	1.13 (0.85, 1.48)	0.40
	Yes	1.09 (1.00–1.20)	0.06	1.07 (0.95, 1.20)	0.25
Worked at practice previously	Yes	1.09 (1.00–1.20)	0.06	1.07 (0.95, 1.20)	0.25
Practice size	Large (≥ 6 GPs)	1.23 (1.10–1.38)	<0.001	1.30 (1.16, 1.47)	<0.001
Rurality	Inner-regional	1.16 (1.01–1.33)	0.04	0.99 (0.85, 1.16)	0.94
Referent: major city	Outer-regional, remote, very remote	1.42 (1.20–1.69)	<0.001	1.12 (0.88, 1.42)	0.37
RTP	RTP 2	0.95 (0.78–1.15)	0.60	0.92 (0.73, 1.16)	0.48
Referent: RTP 1	RTP 3	1.34 (1.14–1.58)	<0.001	1.33 (1.06, 1.68)	0.01
	RTP 4	0.82 (0.72–0.93)	0.003	0.85 (0.72, 1.00)	0.05
	RTP 5	2.34 (1.64–3.34)	<0.001	2.19 (1.42, 3.39)	<0.001
	Yes	1.45 (1.37–1.53)	<0.001	1.22 (1.15, 1.31)	<0.001
New problem	Yes	1.45 (1.37–1.53)	<0.001	1.22 (1.15, 1.31)	<0.001
Chronic problem	Yes	0.51 (0.48–0.55)	<0.001	0.56 (0.51, 0.61)	<0.001
SEIFA Index ^A	Continuous	0.99 (0.97–1.00)	0.11	0.99 (0.97, 1.01)	0.45
Number of problems ^A	Continuous	0.57 (0.54–0.60)	<0.001	0.58 (0.55, 0.61)	<0.001

^AOdds ratios for variables treated as continuous (SEIFA and number of problems) reflect the multiplicative change in odds for an increase of one unit of the continuous variable.

Australians experience poorer health than other Australians.²³ Patients from NESB have also been found to receive poorer healthcare than those of English-speaking background.²⁴

Chronic disease management is of central importance to the healthcare of Aboriginal and Torres Strait Islander patients – endocrine, metabolic and nutritional disorders contribute to Aboriginal and Torres Strait Islander people's mortality at 6–7 times the non-Indigenous rates.²³ Chronic disease management by GPNs has been found to be acceptable and feasible,^{125–27} and is strongly advocated.^{28–30} Thus in this important area, the attributes of GPNs can be seen to be a good fit with the healthcare needs of Aboriginal and Torres Strait Islander people.

However, considering the wider patient population, we found chronic disease problems/diagnoses to be negatively associated with involvement of a GPN. Furthermore, involvement of GPNs was associated with fewer problems/diagnoses being addressed in the consultation, suggesting that these patients may be more straightforward, less complex, presentations. Though there have been various changes to Medicare benefits related to Australian GPNs and chronic disease management, making analysis complex,²⁸ funding methods seem to be a major barrier to GPNs fulfilling their potential role in meeting community needs for chronic disease management and patients with complex comorbidities.¹³

While chronic disease was negatively associated with seeing a GPN, the patient being new to the practice and the problem being new were both positive associations. While some of this effect may be explained by first immunisation contacts with

infants, another possible explanation is that GPNs take a role in triage, a key GPN function.¹²

The finding that GPN consultations are more likely to occur in larger practices may well reflect the greater ability of larger practices to sustain full-time GPN cover and other logistic issues. Solo GPs have particular financial and practical barriers to employing GPNs.³¹ But an Australian study found that the GPN's function as 'an agent of connectivity' to be particularly prominent in small- and medium-sized practices.¹² Connectivity is a central GPN role, encompassing triage and pivotal linkage in practice function and cohesion, and 'a key determinant of organisational resilience' (p. 92).¹² The lesser prevalence of GPN consultations in smaller practices in the present study may represent lost opportunities for connectivity in those practices which would arguably benefit most from it.

We found that GPNs have a greater role in the practices of some RTPs than others, after adjusting for other variables including size and rurality of the practice. This suggests substantial geographic variability in the uptake of GPNs within practices. The reason is not clear, but is likely to reflect the regional general practice culture and, possibly, the role of enablers such as Medicare Locals (now replaced by Primary Health Networks as regionally-based organisations of GPs and other primary care clinicians).

Strengths and limitations

Being the first Australian study, to our knowledge, to examine the associations of GPN involvement in general practice

consultations is a strength. As is the large number of independent variables we have collected, enabling a fine-grained examination of this issue. A major strength of this study, compared with previous studies in the field, is our response rate of 95.1%, particularly high for studies of GPs.³²

A limitation is that, unlike a previous Australian study of GPN consultations,^{9, 15} we examined only office-based GPN consultations (not home or nursing home consultations) in which a GP clinician also saw the patient. Of GPN consultations involving a GP, 98.3% are office-based.¹⁵ For office-based GPN consultations, 76.4% occur with GP involvement.¹⁵ Thus, our findings are generalisable to office-based GPN consultations involving a GP clinician rather than to GPN consultations overall.

A further limitation of this study is that we have extensive coverage of patient, registrar, practice and consultation independent variables, but not of GPN demographic variables.

Implications for practice, policy and future research

Our results regarding the prominence of GPNs in the care of those groups potentially marginalised in healthcare provision (Aboriginal or Torres Strait Islander and NESB patients) is encouraging and of considerable importance. However other findings suggest that the potential contribution of GPNs to community healthcare of chronic and complex disease is not being realised in GP registrar consultations. The geographic variation in uptake of GPNs and the appreciable difference in use of GPNs between small and large practices again suggest lost opportunities for team-based care.

Addressing these disparities will be a complex task. Medicare remuneration policies will be an essential part of any approach, but practice- and individual clinician-level approaches will be equally important. There is an obvious role for primary health networks, as grass-roots regional multidisciplinary organisations, to facilitate GPN contribution in their regions. GP registrars, being at a formative stage in developing clinical behaviours, are an appropriate group to engage with in educational initiatives around optimal integration of GPN roles into clinical practice.

To inform the required policy and practice actions, further research should investigate means of supporting GPNs in smaller practices and further define and characterise geographic variability in GPN uptake.

Conclusions

We have demonstrated the prevalence and associations of GPN consultations with the patients of GP registrars. The associations with Aboriginal and Torres Strait Islander patients and NESB patients suggest GPNs may be helping to address the healthcare needs of these under-served groups. But, given the match of GPN skills and attributes to the needs of patients with chronic diseases, GPNs may be underutilised in chronic disease care. The geographic variation in uptake of GPNs also suggests scope for greater use of GPNs Australia-wide.

Competing interests

The ReCEnT project is supported by five participating RTPs. Several of the authors are employed by these RTPs. The RTP organisations support and facilitate the data collection but do not have a role in analysis or interpretation or writing. The RTPs

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