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RESEARCH

Clinical encounters of Australian general practice registrars with paediatric patients

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ABSTRACT

Background: Whether general practitioner (GP) registrars have adequate exposure to, and feel confident in, managing children's health during training is unknown. **Objectives:** To determine the prevalence and associations of GP registrars' paediatric vs. non-paediatric consultations. **Methods:** Cross-sectional analysis from a cohort study of Australian GP registrars' 2010–2014 consultations. **Results:** 889 registrars contributed details for 26,427 (21.8% (95% CI: 21.4–22.2) paediatric consultations. Paediatric patients were more likely to be male and new to the practice. Although paediatric patients were less likely to have a chronic disease (OR 0.38, 95% CI 0.36, 0.40) and presented with fewer problems (OR 0.59, 95% CI 0.57, 0.61), registrars were more likely to seek in-consultation advice (OR 1.25, 95% CI 1.19, 1.31) and generate learning goals (OR 1.12, 95% CI 1.07, 1.18) for paediatric consultations. **Discussion:** GP registrars appear to feel less confident in managing paediatric compared with adult consultations, suggesting an unmet training need.

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KEYWORDS

General practice; child health; referral, consultation; health services; general practice education

What is already known in this area

- In Australia, paediatric patients place increasing pressure on hospital outpatient clinics and emergency departments.
- GPs are the most common providers of healthcare for children and are often the gatekeepers to these hospital services.
- Whether GP training adequately prepares GPs for managing the broad spectrum of acute and chronic paediatric conditions is unknown.

What this work adds

- Despite the relative simplicity of paediatric consultations, GP registrars are more likely to seek help from a supervisor or other source.
- They generate more learning goals in paediatric compared to non-paediatric consultations. This suggests an unmet need in paediatric training.

Suggestions for future work or research

- Adequate training opportunities for GPs in the broad range of paediatric health conditions must be developed
- Evaluation of innovative training placements for GP registrars in hospital outpatient clinics, community health centres and private paediatric practices.

Introduction

Much has been written about the ageing of Australia's population but paralleling this, the absolute number of children in Australia has risen by 12% over the past two decades.[1] Many of the chronic conditions affecting

adults, including obesity and mental health problems, originate in childhood or adolescence.[2] Whilst general practitioners (GPs) provide much of the essential health-care for adults chronic conditions,[3] little is known about their approaches to paediatric care, despite the fact that

GPs are the most commonly accessed health service by Australian children.[4] We do not know whether GP training is providing trainees with the necessary experience to manage the spectrum of acute and chronic paediatric complaints including developmental and behavioural conditions. Yet this is essential to optimise health in children with physical, developmental and mental health conditions and ultimately their health as adults. Furthermore, pressure is mounting on specialist paediatric hospital outpatient services with delayed access for many common chronic conditions such as allergy, eczema, and mental health problems. Optimising care in the primary health sector may reduce the need for referral to specialist paediatric services.[5] As the cost of care in the primary sector is typically less than in secondary or tertiary sectors, this may reduce health service expenditure.[6]

The majority of GP registrar paediatric consultations are for acute illnesses and immunisations.[7] Yet children aged 0–4 years now make up the largest group of patients seen in Australian emergency departments, far eclipsing the elderly.[8] Sixty percent of presentations are for low acuity conditions including acute illnesses and fever, often referred by a GP, and may not need to be seen in emergency departments.[9] Training GPs to better manage children with acute conditions, may ease some of the growing burden on hospital services.

Current changes in the GP training environment, including curriculum reviews and boundary realignment, offer Regional Training Providers (RTPs), i.e. government-funded, geographically-defined organisations delivering general practice vocational training, the opportunity to develop programs to better equip GPs to care for children.[10] Before embarking on any change in training, understanding current GP education in paediatrics, including the characteristics of consultations with children, the complexity of children managed, and registrar-identified needs around paediatric compared with non-paediatric consultations, is essential.

The goals of this study were to determine, in a sample of Australian GP registrar trainees: (i) patient, registrar and practice variables associated with seeing a paediatric compared to adult patient; (ii) in-consultation variables for paediatric as compared to adult patient consultations; and (iii) paediatric compared to adult patient consultation outcomes.

Methods

Data were drawn from Registrars Clinical Encounters in Training (ReCEnT), an ongoing cohort study which captures data from the care provided by a sample of GP registrars in five of Australia's 17 RTPs across five

of six Australian states. Full details of the study methodology have been published elsewhere.[11] Registrars in Australian general practice training complete at least three six-month (full-time equivalent) training terms in general practice settings.

Demographic data are collected on registrars and the practices in which they train. GP registrars then, once per training term, collect data on 60 consecutive patients using a standardised paper form. Data elicited include patient demographics and visit details, number of problems managed, imaging and pathology requests, medications prescribed, referrals made, consultation duration, and follow-up arranged. Registrars also document their access to advice, including guidance from their clinical supervisor, other health professional or a non-human source, to inform the consultation and the generation of educational learning goals. These are indicative of the registrar's self-identified need for further learning. Data collection is completed approximately mid-term in each of the registrar's three compulsory general practice terms. Some registrars have also collected data in a fourth, elective, term in general practice.

Measures

Outcome variable

The outcome variable for this analysis was the patient being aged less than 19 years at the index consultation.

Independent variables

Registrar variables included age, gender, full-time or part-time status, training term (1, 2, 3 or 4), country of primary medical graduation (Australian or non-Australian) and their RTP.

Patient variables included gender, Aboriginal or Torres Strait Islander status, non-English speaking background (NESB) status, the patient being new to the practice, and the patient being new to the registrar.

Practice variables included size (number of full-time equivalent GPs), rurality classification, socioeconomic index, and billing policy (whether the practice routinely bulk bills all patients). Practice postcode was used to define practice (i) rurality as per the Australian Standard Geographical Classification-Remoteness Area [12] classification and (ii) Socioeconomic Index for Area (SEIFA) Relative Index of Disadvantage decile. Higher SEIFA scores indicate less disadvantage.[13]

Consultation variables related to (a) consultation content: duration and number of problems addressed, whether a chronic disease was addressed, and whether the registrar sought in-consultation advice or information from their supervisor or other resources, such as specialists, books or electronic resources; and (b) consultation outcome:

whether pathology or imaging tests were ordered, referral or follow-up organised, medication prescribed, or learning goals generated for post-consultation attention.

Statistical analysis

We conducted a cross-sectional analysis of data from 10 collection rounds from 2010 to 2014. The unit of analysis was the individual consultation. Univariate analyses were carried out to determine patient, registrar and practice variables associated with paediatric and non-paediatric consultations and their content and outcomes. Logistic regression analyses were used in a sequential order to determine (i) patient, practice, and registrar variables associated with paediatric consultations; (ii) consultation content variables associated with paediatric consultations; and (iii) consultation outcome variables associated with paediatric consultations. Each model included potential contributing variables from the previous model(s). The final model included all variables in the preceding models (as any variables could potentially be associated with consultation outcomes), as well as variables related to consultation outcome.

Logistic regression was used within the generalised estimating equations framework to account for repeated measures within registrars. An exchangeable correlation structure was assumed. All variables with a p -value < 0.20 and a relevant effect size in the univariate analysis were included in the multiple regression models. Covariates which had a small effect size and were no longer significant (at p -value < 0.05) in the multivariable model were tested for removal from the final model. If the covariate's removal did not substantively change the resulting model, the covariate was not included in the final multivariable model. Analyses were conducted using STATA 13.1 (College Station, TX) and SAS V9.4. (Research Triangle Park, NC).

Results

A total of 889 individual registrars from 376 practices contributed 2071 trainee-rounds of data, including details of 121,257 individual consultations. The demographic characteristics of the participating registrars and practices are presented in Table 1. Of the 121,257 consultations recorded, 26,427 (21.8% (95% CI: 21.4–22.2)) were for paediatric patients.

The univariate variables associated with paediatric vs. with non-paediatric consultations are presented in Table 2 with associations in unadjusted and adjusted analyses presented in Table 3. Compared with non-paediatric patients, paediatric patients were more likely to be male, of English speaking background, identify as Aboriginal or

Table 1. Participating registrar, registrar-term and practice demographics.

Variable	Class	<i>n</i> (%) [95% (CI)] or Mean \pm SD
<i>Registrar variables (n = 889)</i>		
Gender	Female	590 (66.4) [63.2–69.4]
Qualified as a doctor in Australia	Yes	689 (78.4) [75.5–81.0]
Trainee age (years)	Mean \pm SD	32.6 \pm 6.3
<i>Registrar-term and practice-term variables (n = 2071)</i>		
Registrar training term	Term 1	795 (39.4) [36.3–40.5]
	Term 2	713 (34.4) [32.4–36.5]
	Term 3	488 (23.6) [21.8–25.4]
	Term 4	75 (3.6) [2.9–4.5]
Registrar worked at the practice previously	Yes	594 (29.1) [27.2–31.1]
Registrar works fulltime	Yes	1585 (78.3) [76.4–80.0]
Practice routinely bulk bills	Yes	358 (17.4) [15.8–19.1]
Number of GPs working at practice	1–5	679 (33.7) [31.6–35.8]
	6+	1338 (66.3) [64.2–68.4]
Rurality of practice	Major City	1192 (57.6) [55.4–59.7]
	Inner Regional	578 (27.9) [26.0–29.9]
	Outer Regional or Remote	301 (14.5) [13.1–16.1]
SEIFA ^a Index (decile) of practice	Mean \pm SD	5.4 \pm 2.9

^aSocio-economic Indexes of Areas (SEIFA).

Torres Strait Islander, and be new to the registrar and to the practice. Registrars working in smaller practices and in lower socioeconomic areas were less likely to record paediatric encounters. There was significant variability in paediatric exposure between RTPs.

Paediatric patients were less likely to have a chronic disease (adjusted OR 0.38, 95% CI 0.36, 0.40), present with fewer problems (adjOR 0.59, 95% CI 0.57, 0.61 for each additional problem), and have shorter consultations (adjOR 0.99, 95% CI 0.98, 0.99 for each additional minute) than their adult counterparts (Table 3). Compared with non-paediatric consultations, registrars conducting paediatric consultations were less likely to order imaging or pathology, prescribe medication, arrange follow up, or refer for specialty care. However, they were more likely to generate learning goals (adjOR 1.12, 95% CI 1.07, 1.18) and to seek in-consultation information or advice from their supervisor (adjOR 1.25, 95% CI 1.19, 1.31) compared with non-paediatric consultations.

Registrars were most likely to see acute rather than chronic or developmental or behavioural conditions. Upper respiratory tract infections were the most common condition seen (Table 4). Registrars were most likely to generate learning goals and seek in-consultation information for upper respiratory tract infections, followed by immunisations and ear infections.

Discussion

Paediatric consultations make up only a fifth of all registrar encounters in general practice settings, similar to

Table 2. Characteristics associated with paediatric compared with non-paediatric consultations.

Variable	Class	Paediatric Consultation		p
		No (N, %)(n = 94,830)	Yes (N, %)(n = 26,427)	
Patient gender	Male	33,899 (36.4)	12,225 (47.1)	<0.001
Aboriginal Torres Strait Islander	Yes	1028 (1.1)	464 (1.8)	<0.001
NESB	Yes	6075 (6.7)	1386 (5.5)	<0.001
Patient/practice status	Existing patient	41,999 (45.4)	8491 (32.8)	<0.001
	New to registrar	44,602 (48.2)	15,202 (58.7)	
	New to practice	5905 (6.4)	2188 (8.5)	
Registrar gender	Female	60,538 (63.8)	16,759 (63.4)	0.35
Registrar PT or FT	Part-time	20,118 (21.7)	5505 (21.3)	0.56
	Full-time	72,552 (78.3)	20,390 (78.7)	
Training term/post	Term 1	36,358 (38.3)	10,071 (38.1)	0.71
	Term 2	32,619 (34.4)	9208 (34.8)	
	Term 3	22,326 (23.5)	6256 (23.7)	
	Term 4	3527 (3.7)	892 (3.4)	
Worked at practice previously	Yes	27,648 (29.6%)	7242 (27.7%)	0.02
Qualified as doctor in Australia	Yes	72,175 (77.1)	20,415 (78.1)	0.05
Practice size	Large	60,348 (65.4)	17,911 (69.4)	<0.001
Practice routinely bulk bills	Yes	16,604 (17.6)	4416 (16.8)	0.01
Rurality	Major City	53,985 (56.9)	15,813 (59.8)	0.006
	Inner Regional	26,759 (28.2)	7049 (26.7)	
	Outer Regional Remote	14,086 (14.9)	3565 (13.5)	
RTP	1	30,249 (31.9)	7710 (29.2)	<0.001
	2	12,687 (13.4)	3316 (12.5)	
	3	10,794 (11.4)	3080 (11.7)	
	4	39,350 (41.5)	11,850 (44.8)	
	5	1750 (1.8)	471 (1.8)	
Sought help any source	Yes	19,034 (20.1)	5721 (21.6)	<0.001
Chronic disease	Yes	30,456 (32.1)	2966 (11.2)	<0.001
Imaging ordered	Yes	11,823 (12.5)	1577 (6.0)	<0.001
Follow-up ordered	Yes	55,358 (58.4)	11,998 (45.4)	<0.001
Learning goals	Yes	21,604 (23.4)	5247 (20.4)	<0.001
Referral ordered	Yes	17,552 (18.5)	3124 (11.8)	<0.001
Pathology ordered	Yes	24,098 (25.4)	3039 (11.5)	<0.001
Medication ordered	Yes	56,543 (59.6)	14,758 (55.8)	<0.001
Registrar age	Mean (SD)	32.9 (6.5)	32.7 (6.5)	0.06
SEIFA Index	Mean (SD)	5.4 (2.9)	5.7 (2.9)	<0.001
Consultation duration	Mean (SD)	17.7 (9.4)	15.4 (7.7)	<0.001
Number of problems	Mean (SD)	1.6 (0.8)	1.3 (0.6)	<0.001

the 24% of consultations recorded by GP Medicare billing items for children aged 0–19 years in 2010 [14] and the 26% reported by GPs in the UK in 2006.[15]

Compared with non-paediatric consultations, paediatric consultations tended to be in larger practices located in higher socioeconomic areas, for patients who were male, and new to the registrar and practice. Larger practices may be more readily able to accommodate requests for the acute presentations common to children and GP registrars may have greater availability than co-located GPs to meet these consultation requests. Families from lower socioeconomic backgrounds may be less likely to take their children to healthcare providers than families from higher socioeconomic backgrounds.[16] Gender differences in paediatric consultations may reflect the underlying prevalence for males in some conditions frequently managed by GPs, such as asthma.[17]

Despite the relative medical simplicity of paediatric compared with non-paediatric consultations (i.e. less chronic disease, fewer problems, less need for investigations, specialist referral or clinical follow-up), registrars were more likely to seek help from a supervisor or other source and to generate learning goals around managing

children compared with adults. This suggests that GPs registrars are finding the assessment and management of paediatric consultations challenging. Whether this is due to registrar knowledge gaps in managing paediatric conditions and/or a lack of skills in dealing with the parental anxiety that often accompanies paediatric consultations is unknown. This requires further investigation.

Registrars are tending to see children with acute problems. Yet only asthma and mood disorders such as anxiety and depression feature in the top ten most commonly managed paediatric conditions.[7] Chronic conditions have the greatest impact on children's hospital outpatient service use [18] and subsequent health.[2] GP training programs must ensure adequate exposure to common, chronic paediatric conditions.

Our study has a number of strengths. It collected data from a broad range of locations and had power to examine a large number of patient, practice and registrar variables. It did not collect data from registrars working in Western Australia, Northern Territory or the Australian Capital Territory. Results may not generalise to them or to other countries. However, training programs are similar across Australia and the registrar demographics of our sample

Table 3. Unadjusted and adjusted logistic regressions with outcome variable 'paediatric patient'.

Characteristic	Class	UnAdj OR (95% CI)	P	Adj OR (95% CI)	P
<i>Associations of patients' paediatric status (patient, registrar and practice factors)</i>					
Patient gender	Female	0.64 (0.61, 0.66)	<0.0001	0.64 (0.62, 0.67)	<0.0001
ATSI	Yes	1.68 (1.48, 1.89)	<0.0001	1.83 (1.60, 2.09)	<0.0001
NESB	Yes	0.80 (0.73, 0.87)	<0.0001	0.81 (0.74, 0.89)	<0.0001
Patient/practice status	New to practice	1.80 (1.69, 1.92)	<0.0001	1.77 (1.66, 1.89)	<0.0001
Referent: Existing patient	New to registrar	1.65 (1.59, 1.71)	<0.0001	1.63 (1.57, 1.69)	<0.0001
Registrar age		1.00 (0.99, 1.00)	0.0583	1.00 (0.99, 1.00)	0.6616
Worked at practice previously	Yes	0.95 (0.91, 0.99)	0.0240	1.05 (1.00, 1.10)	0.0412
Qualified as doctor in Australia	Yes	1.07 (1.00, 1.14)	0.0523	1.01 (0.94, 1.08)	0.8504
Practice size	Small	0.83 (0.79, 0.87)	<0.0001	0.86 (0.82, 0.91)	<0.0001
Practice routinely bulk bills	Yes	0.91 (0.85, 0.98)	0.0094	0.97 (0.90, 1.05)	0.4728
Rurality	Inner Regional	0.91 (0.86, 0.97)	0.0018	0.93 (0.87, 1.00)	0.0648
Referent: Major city	Outer Regional Remote	0.89 (0.83, 0.96)	0.0016	0.95 (0.85, 1.05)	0.2795
RTP	2	1.01 (0.93, 1.10)	0.8223	0.98 (0.88, 1.08)	0.6340
Referent: 1	3	1.11 (1.03, 1.20)	0.0089	1.12 (1.02, 1.23)	0.0224
	4	1.18 (1.12, 1.26)	<0.0001	1.07 (1.00, 1.14)	0.0488
	5	1.07 (0.90, 1.27)	0.4458	1.03 (0.85, 1.25)	0.7456
SEIFA Index (decile)		1.03 (1.02, 1.04)	<0.0001	1.02 (1.01, 1.03)	0.0003
<i>Associations of within consultation variables with patients' paediatric status (adjusted for above registrar, patient and practice factors)</i>					
Sought help any source	Yes	1.10 (1.06, 1.15)	<0.0001	1.25 (1.19, 1.31)	<0.0001
Chronic disease	Yes	0.27 (0.26, 0.28)	<0.0001	0.38 (0.36, 0.40)	<0.0001
Consultation duration		0.97 (0.97, 0.97)	<0.0001	0.99 (0.98, 0.99)	<0.0001
Number of problems		0.47 (0.46, 0.48)	<0.0001	0.59 (0.57, 0.61)	<0.0001
<i>Association of consultation outcome variables with patients' paediatric status (adjusted for above registrar, patient, practice and within consultation factors)</i>					
Imaging ordered	Yes	0.45 (0.43, 0.47)	<0.0001	0.52 (0.49, 0.55)	<0.0001
Follow-up ordered	Yes	0.58 (0.56, 0.60)	<0.0001	0.85 (0.82, 0.89)	<0.0001
Learning goals	Yes	0.83 (0.80, 0.87)	<0.0001	1.12 (1.07, 1.18)	<0.0001
Referral ordered	Yes	0.60 (0.58, 0.63)	<0.0001	0.69 (0.65, 0.72)	<0.0001
Pathology ordered	Yes	0.38 (0.37, 0.40)	<0.0001	0.48 (0.45, 0.50)	<0.0001
Medication ordered	Yes	0.85 (0.82, 0.88)	<0.0001	0.91 (0.87, 0.94)	<0.0001

Table 4. Top 10 paediatric conditions seen by registrars overall and for which registrars generated learning goals or sought help from human or other sources of information.^a

Condition (n (%))	Condition seen	Learning goal generated	Human source of information i.e. supervisor, specialist, other health professional sought	Electronic, book or other source of information sought
Upper respiratory tract infections	6931 (22.01)	406 (7.56)	174 (5.81)	523 (14.87)
Immunisations	1910 (6.07)	174 (3.24)	84 (2.80)	255 (7.25)
Ear infections (including otitis media and otitis externa)	1860 (5.91)	207 (3.85)	105 (3.51)	255 (7.25)
Check-up, general health advice	1115 (3.54)	198 (3.69)	79 (2.64)	119 (3.38)
Asthma, asthma plan	1110 (3.53)	195 (3.63)	54 (1.80)	133 (3.78)
Viral illnesses	1099 (3.49)	131 (2.44)	124 (4.14)	149 (4.24)
Gastroenteritis, diarrhoea and vomiting	908 (2.88)	–	–	–
Eczema/dermatitis	848 (2.69)	152 (2.83)	104 (3.47)	138 (3.92)
Other skin rashes	678 (2.15)	220 (4.10)	174 (5.81)	166 (4.72)
Mood disorders	640 (2.03)	123 (2.29)	58 (1.94)	100 (2.84)
Gynaecological problems and contraception	–	171 (3.18)	–	116 (3.30)
Fracture	–	–	86 (2.87)	–

^aConditions that do not appear in the top 10 are marked as missing in their respective columns.

are similar to overall Australian registrar demographics. [19] Data were cross sectional so we cannot infer causality.

Implications for general practice

If we are to optimise the health of Australia's children and the adults they will become, we need a strong primary care workforce well trained in paediatrics. In the U.K. and Europe, there has been a call for a re-evaluation of delivery of care to children, including advocacy for better paediatric

training of GPs. It is recognised that 'decreasing numbers of GPs receive formal training in paediatrics, the alternative use of emergency services by parents is rising, and it is unclear where responsibilities for children with chronic longstanding illnesses and disabilities lie'. [20,21] Australia is facing similar pressure on paediatric services. Re-evaluation of paediatric health care delivery is essential to ensure sustainable, accessible healthcare access for children.

There is a significant shortage of hospital training paediatric residencies in the face of an increase in junior doctor

numbers. This makes appropriate pre-vocational access to paediatric training much harder. Innovative solutions are required. More accredited training in settings, such as hospital outpatient clinics, community health centres and private paediatricians' rooms, where children with common chronic, developmental and behavioural conditions present is needed.[10] Specifying a minimum number of children to be seen by age group and presenting condition, could ensure GP registrars develop the confidence to manage a broad range of paediatric presentations.

The current Royal Australian College of General Practitioners' paediatric term requirements focus on 'the development of competence in the detection and management of serious or potentially serious illness'. [22] Whilst important, broadening the focus to include chronic conditions as well as developmental and behavioural concerns may strengthen primary health care for children, reduce pressure on hospital services, and ultimately enhance the health of the Australian adult population.

Ethical approval

The ReCenT project has approval from the University of Newcastle Human Research Ethics Committee (reference H-2009-0323).

Disclosure statement

No potential conflict of interest was reported by the authors.

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