

# Characteristics of a stratified random sample of New Zealand general practices

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## ABSTRACT

**INTRODUCTION:** Practice size and location may affect the quality and safety of health care. Little is known about contemporary New Zealand general practice characteristics in terms of staffing, ownership and services.

**AIM:** To describe and compare the characteristics of small, medium and large general practices in rural and urban New Zealand.

**METHODS:** Seventy-two general practices were randomly selected from the 2014 Primary Health Organisation database and invited to participate in a records review study. Forty-five recruited practices located throughout New Zealand provided data on staff, health-care services and practice ownership. Chi-square and other non-parametric statistical analyses were used to compare practices.

**RESULTS:** The 45 study practices constituted 4.6% of New Zealand practices. Rural practices were located further from the nearest regional base hospital (rural median 65.0 km, urban 7.5 km ( $P < 0.001$ )), nearest local hospital (rural 25.7 km, urban 7.0 km ( $P = 0.002$ )) and nearest neighbouring general practitioner (GP) (rural 16.0 km, urban 1.0 km ( $P = 0.007$ )). In large practices, there were more enrolled patients per GP FTE than both medium-sized and small practices (mean 1827 compared to 1457 and 1120 respectively,  $P = 0.019$ ). Nurses in large practices were more likely to insert intravenous lines ( $P = 0.026$ ) and take blood ( $P = 0.049$ ). There were no significant differences in practice ownership arrangements according to practice size or rurality.

**CONCLUSION:** Study practices were relatively homogenous. Unsurprisingly, rural practices were further away from hospitals. Larger practices had higher patient-to-doctor ratios and increased nursing scope. The study sample is small; findings need to be confirmed by specifically powered research.

**KEYWORDS:** New Zealand; general practice; primary health care; practice characteristics; rural health

## Introduction

Practice characteristics including rurality and size influence access to health care,<sup>1–3</sup> the type and frequency of screening and testing,<sup>4–6</sup>

chronic disease management<sup>7</sup> and hospital admission.<sup>8–11</sup> The size and location of practices may affect the quality and safety of health care in other ways. Little is known about the structural

characteristics of contemporary New Zealand (NZ) general practices.

In the Safety, Harms and Risk Reduction Project (SHARP), we postulated that the size and location of general practices may affect patient safety.<sup>12</sup> European research found doctors worked more hours in smaller practices.<sup>13</sup> In the United States, small practices judged themselves safer<sup>14</sup> and more responsive to quality improvement incentives,<sup>15</sup> yet were less likely to introduce quality improvement activities than large practices.<sup>16,17</sup> Canadian research found no differences between large and small practices meeting national quality standards for diabetes care,<sup>18</sup> but in the United Kingdom, larger practices had higher-quality scores for diabetes and provided a greater range of health services.<sup>19</sup> Larger European practices had more patient safety features than smaller practices, but the effect on care was not assessed.<sup>20</sup>

Rural health provider shortages and maldistribution are common internationally.<sup>21</sup> Rural practices are inevitably located at a greater distance from other medical services, but no other differences or effects on patients' health outcomes have been clearly defined. However, one Australian study has suggested rural general practitioners (GPs) manage chronic conditions differently.<sup>22,23</sup> A NZ study reported rural patients are concerned about primary health-care costs, lack of access to emergency health care, and inappropriate early discharge from hospitals.<sup>24</sup>

Understanding practice characteristics may assist funders and providers to appropriately distribute resources. Workforce surveys typically focus on clinicians and do not capture information about practices. Primary Health Organisations (PHOs) capture some practice data, but these have seldom been published. The National Primary Medical Care (NatMedCa) survey of general practices in 2001–02 was the first comprehensive analysis of a stratified sample of rural and non-rural GPs, but the focus was on patients, providers and care rather than practices.<sup>25</sup>

SHARP is a study using retrospective records review over the calendar years 2011, 2012 and 2013, aiming to describe the epidemiology of

## WHAT GAP THIS FILLS

**What is already known:** New Zealand general practices have not been described since 2001–02. Practice size and location may affect the safety and quality of patient care.

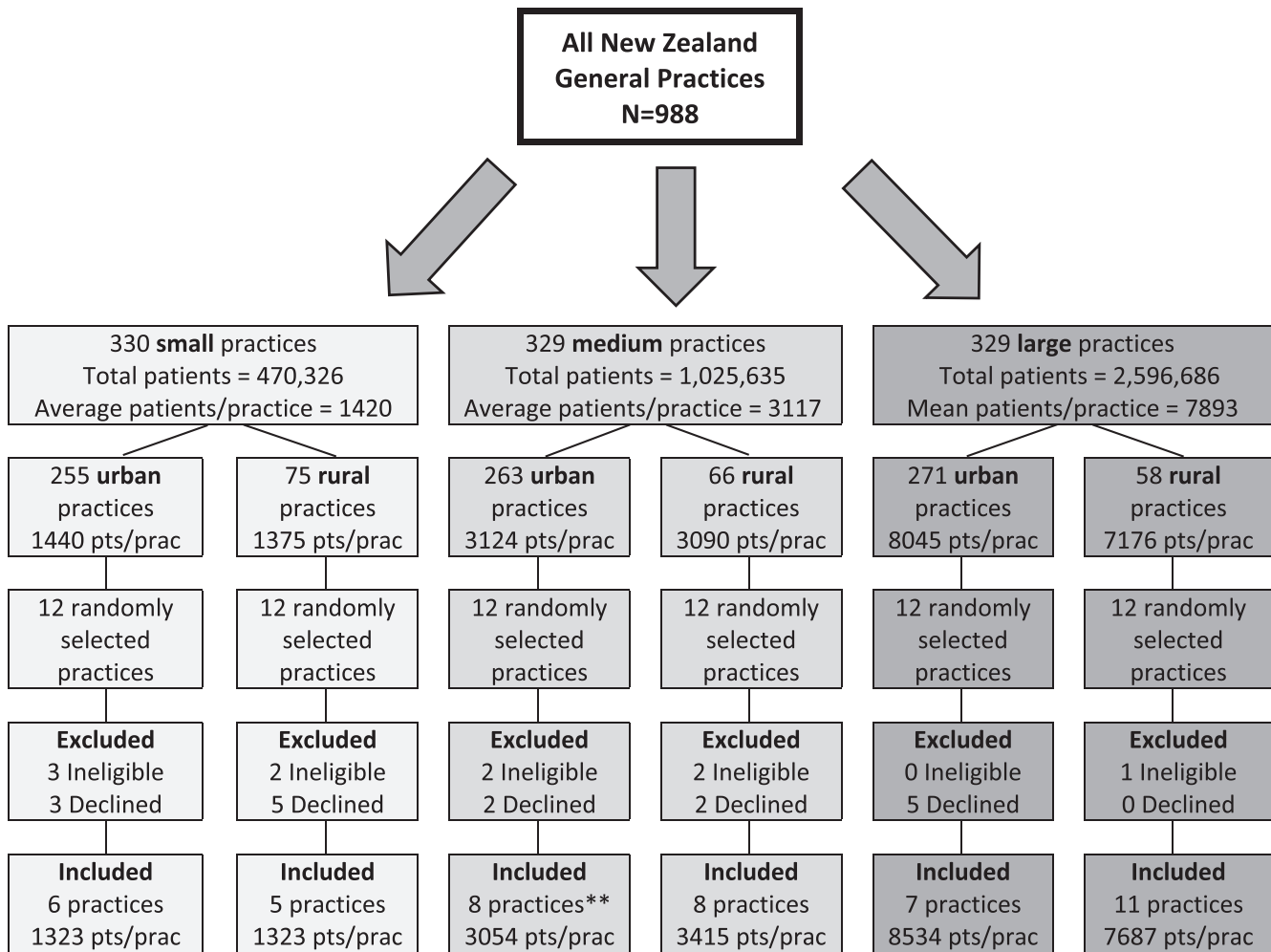
**What this study adds:** We found a high degree of homogeneity in practice staff composition and services provided in urban and rural small, medium and large practices in New Zealand. Larger practices have fewer general practitioner FTEs per enrolled patient.

patient harm observable in general practice records.<sup>12</sup> The protocol for this stratified, two-level cluster, retrospective records review study has been described elsewhere.<sup>12</sup> The study design allows comparison between six study groups: small rural, medium rural, large rural, small urban, medium urban and large urban general practices. The current research aims to describe the characteristics of the SHARP practices, and to compare the characteristics of the six study groups of practices to assist the interpretation of study data later when we compare differences between study groups in terms of patients' experiences of harm rates arising from health care.

## Methods

At the study commencement, July 2014, there were 989 general practices in the NZ PHO database, excluding 29 (2.9%) speciality practices (eg sports medicine, appearance medicine, men's health and residential and educational-based practices). The study's bespoke data extraction software could access only the MedTech patient management system (PMS), so its use was a prerequisite for participation.<sup>12</sup> We aimed to enrol 10 general practices in each study group to ensure SHARP achieved national geographic distribution by the sampling process. Before sampling, we estimated that 80% of general practices used MedTech, and oversampled to account for expected ineligibility (due to incompatible PMSs), drawing a simple random sample of 12 general practices in each study group. Each selected practice was contacted, checked for eligibility and invited to participate in the study (Figure 1).

Figure 1. Safety, Harms and Risk Reduction Project (SHARP) practice recruitment flowchart



\*\*8 Medium-sized urban practices were recruited to the study and provided information regarding their practice characteristics. At the time of data extraction it was found one practice was ineligible to participate due to a non-Medtech PMS system. That practice's characteristics were included in this paper.

## Definitions

### Practice size

We adopt the method used in some European studies, defining practice size by number of registered patients, not number of clinicians.<sup>13,19</sup> For all NZ practices, the number of enrolled patients per practice ranged from 101 to 35 060. Tertiles fell at 2095 and 4367, defining practice size for this study. Small practices had <2095 patients,

large practices  $\geq 4367$  patients and medium-sized practices had 2095–4366 patients.

### Rurality

Rurality was defined by practice address using Statistics New Zealand definitions of urban and rural.<sup>26</sup> However, 'independent urban communities' (eg Wanaka) are included in the rural general practice group because they are small centres lacking speciality services available at

large hospitals, and many patients attending these practices live in surrounding rural areas.<sup>27,28</sup>

### Practice characteristics

We collected practice characteristics data from a practice representative at the time of enrolment (Appendix 1). Measures of rurality included Rural Ranking Score and distances to other health services. Missing distances were calculated using Google Maps. Missing Scores could not be calculated because these require detailed knowledge about clinic activities and on-call responsibilities.<sup>25</sup> We asked about practice ownership, services and clinicians (doctors and nurses). Clinician workload and clinician turnover were calculated from the information provided.

### Analysis

Non-parametric statistical analyses (Mann–Whitney *U*-test for comparing two groups, Kruskal–Wallis test when comparing more than two groups) were used to investigate distance from other health services, clinician workload and turnover, as we assumed that distance and clinician numbers would not be normally distributed. Other statistical analyses used chi-square tests, with Fisher's exact test used when more than 20% of cells were <5. This is a small,

exploratory, observational study, so the level of significance was set at  $P = 0.050$ .

### Consultation

SHARP was approved by the University of Otago ethics committee (HD14/32), and reviewed by the Ngāi Tahu Research Consultation Committee.

### Results

Seventy-two general practices were randomly selected and invited to participate in SHARP. Sixty-two practices (86.1%; 62/72) were eligible to participate as they used a compatible PMS during the study period. Forty-five practices participated (72.6% (45/62) of eligible practices, 62.5% (45/72) of sampled practices), providing information about their practice characteristics. Table 1 shows that the 72 sampled practices and the 45 practices participating in the study had mean numbers of enrolled patients that were similar to the mean number of enrolled patients in all NZ general practices of each study group.

Although nearly 80% of NZ general practices are in urban areas, our stratified random selection process ensured that half of the general practices invited to participate were rural, half urban, and a third each were small, medium-sized and

Table 1. Numbers of New Zealand general practices and patients in size-stratified and location-stratified study groups

	All New Zealand practices (As per the fourth quarter 2014 PHO database) <i>n</i> = 1018-29=989*			Randomly selected practices <i>n</i> = 72, 12 practices in each study group		Recruited practices <i>n</i> = 45		
	Practices <i>n</i> (%)	Patients <i>n</i> (%)	Mean patients per practice	Patients <i>n</i> (%)	Mean patients per practice	Practices <i>n</i> (%)	Patients <i>n</i> (%)	Mean patients per practice
Urban large	271 (27.4)	2,180,460 (53.3)	8046	104,336 (34.3)	8695	7 (15.6)	59,735 (28.0)	8534
Urban medium	263 (26.6)	821,663 (20.1)	3124	37,836 (12.4)	3153	8 (17.8)	24,434 (11.6)	3054
Urban small	255 (25.8)	367,213 (9.0)	1440	17,089 (5.6)	1424	6 (13.3)	7940 (3.8)	1323
<b>Total urban</b>	<b>789 (79.9)</b>	<b>3,369,336 (82.3)</b>	<b>4270</b>	<b>159,261 (52.3)</b>	<b>4424</b>	<b>21 (46.7)</b>	<b>92,109 (43.7)</b>	<b>4386</b>
Rural large	58 (5.9)	416,226 (10.2)	7176	90,138 (29.6)	7512	11 (24.4)	84553 (40.1)	7687
Rural medium	66 (6.7)	203,972 (5.0)	3090	38,574 (12.7)	3215	8 (17.8)	27321 (13.0)	3415
Rural small	75 (7.6)	103,149 (2.5)	1375	16,363 (5.4)	1364	5 (11.1)	6616 (3.1)	1323
<b>Total rural</b>	<b>199 (20.1)</b>	<b>723,347 (17.7)</b>	<b>3635</b>	<b>145,075 (47.7)</b>	<b>4030</b>	<b>24 (53.3)</b>	<b>118,490 (56.3)</b>	<b>4937</b>
<b>Total overall</b>	<b>988* (100.0)</b>	<b>4,092,683 (100.0)</b>	<b>4142</b>	<b>304,336 (100.0)</b>	<b>4227</b>	<b>45 (100.0)</b>	<b>210,559</b>	<b>4680</b>

\* Note total number of practices is one short of the total from the PHO database figures (989). We are unable to account for this missing practice, which accounts for 0.1% of the total number of NZ practices.

large (Figure 1). Participating practices were 46.7% urban and 53.3% rural; 40.0% large, 35.6% medium and 24.4% small. There was no evidence of selection bias; no significant differences were found between the proportions of recruited and excluded practices in each study group ( $P = 0.171$ ), or when this was analysed by rurality ( $P = 0.465$ ) and practice size ( $P = 0.099$ ).

### Rurality

A Rural Ranking Score was recorded by 14 of 24 (58.3%) rural practices. The range of Scores was 20–75, the mean 42.7 (95% confidence interval [CI] 36.5–49.9) and the median 40 (interquartile range [IQR] 35.0–46.5). There were no significant differences in Rural Ranking Score between large, medium-sized and small rural practices providing a Score ( $P = 0.574$ ).

### Nearest regional base hospital

Most urban practices were clustered near a regional base hospital; median distance from urban general practices to a base hospital was 7.5 km (IQR 2.7–12.5), whereas for rural practices, the median distance was 65.0 km (IQR 42.0–115.0) (Table 2). Differences in distances between the practice and nearest regional base hospital were significant when analysed by study group ( $P < 0.001$ ) and by rural or urban location ( $P < 0.001$ ), but not by practice size ( $P = 0.915$ ).

### Nearest hospital

The median distance from urban practices to the nearest hospital was 7.0 km (IQR 2.3–11.8),

and from rural practices, it was 25.7 km (IQR 12.5–48.0) (Table 2). Differences in distances between practices and the nearest hospital were not significant when analysed by study group ( $P = 0.058$ ) or by practice size ( $P = 0.770$ ). However, when analysed by location, there was significant differences found between rural and urban practices in the distance to the nearest hospital ( $P = 0.002$ ).

### Nearest general practice

Urban practices were tightly clustered adjacent to the nearest general practice; the median distance was 1.0 km (IQR 0.5–2.7), but the median distance from rural practices to the nearest general practice was 16.0 km (IQR 1.0–28.8) (Table 2). Differences in distance to the nearest general practice were significant when analysed by study group ( $P = 0.007$ ) and location ( $P = 0.002$ ), but not when analysed by practice size ( $P = 0.120$ ).

### Clinicians

Table 3 shows the information we collected about the clinicians (GPs and nurses) in the study general practices. There were many missing results in this section. Twenty-nine practices provided answers for all clinician questions. Missing values were excluded pairwise from analyses.

Clinician workload (number of patients per clinician) varied widely across the sample, but no significant differences were found between the six study groups ( $P = 0.053$ ) or when analysed by practice location ( $P = 0.342$ ). When analysed by practice size, the distribution of GP workload

Table 2. Distance from study practices to nearest regional base hospital, hospital and general practice by practice location

	Nearest regional base hospital			Nearest hospital			Nearest general practice		
	Range (km)	Median (IQR)	Mean (95% CI)	Range (km)	Median (IQR)	Mean (95% CI)	Range (km)	Median (IQR)	Mean (95% CI)
All $n = 45$	0.3–200.0	30.0 (7.6–82.5)	48.8 (32.9–64.7)	0.0–120.0	12.0 (4.0–33.5)	21.9 (14.5–29.3)	0.0–200.0	2.0 (1.0–18.5)	14.4 (4.8–23.9)
Rural $n = 24$	7.7–200.0	65.0 (42.0–115.0)	79.2 (56.6–101.8)	0.0–120.0	25.7 (12.5–48.0)	32.8 (20.7–44.8)	0.0–200.0	16.0 (1.0–28.8)	24.5 (7.1–41.9)
Urban $n = 21$	0.3–100.0	7.5 (2.7–12.5)	14.1 (4.1–24.1)	0.3–40.0	7.0 (2.3–11.8)	9.5 (5.0–14.1)	0.1–12.0	1.0 (0.5–2.7)	2.7 (1.1–4.4)

IQR (interquartile range); CI (confidence interval).

Distance to the nearest regional base hospital was provided by 42/45 practices, nearest hospital by 44/45 and to the nearest general practice by 43/45. Missing distances were calculated using Google maps.

was significantly different when analysed per whole GP ( $P = 0.020$ ) and per full-time equivalent (FTE) GP ( $P = 0.019$ ). GPs working in large practices had more patients (mean 1826.7 patients per FTE, 95% CI 1478.6–2226.8) than GPs working in medium-sized practices (mean 1457.3, 95% CI 1221.5–1670.0) and small practices (mean 1120.3, 95% CI 852.7–1383.2). This trend was not observed when nurse workload was analysed by practice size ( $P = 0.079$ ).

Analysis of annual clinician turnover (ratio of current clinicians to the annual number of clinicians working in the practice) found no statistical differences between the six study groups ( $P = 0.334$ ), between rural and urban practices ( $P = 0.365$ ) or between different sized practice groups ( $P = 0.111$ ).

### Staff and services

Nineteen practices (42%) employed nurses with advanced training, including five nurse practitioners, three nurse practitioner trainees, 25 emergency responders and seven nurses with postgraduate qualifications (multiple responses per practice). There were no significant differences between the six study groups with regard to advanced nursing ( $P = 0.416$ ) or when groups were analysed by size ( $P = 0.470$ ) and location ( $P = 0.083$ ) (Table 4).

There were no significant differences in the nursing procedures provided between the six study groups or between rural and urban practices. When nursing procedures were analysed by practice size, nurses in larger practices were more likely to insert IV lines ( $P = 0.026$ ) and take blood ( $P = 0.049$ ).

There were no significant differences regarding the presence of other clinicians or other services available when the data were analysed by study group, by rurality or practice size.

### Practice ownership

All 45 practices provided information about practice ownership. Of these, 60.0% (27) were GP owned, 15.6% (seven) were trust owned and the remaining 24.4% had a variety of owners

(mixed ownership type: five, iwi; two, company; two, District Health Board; one, Regional Health Network). No significant differences were found between practice ownership type in the six study groups ( $P = 0.373$ ) or when this was analysed by practice size ( $P = 0.225$ ) or location ( $P = 0.765$ ).

## Discussion

The 45 study practices were representative of the sample frame in terms of size, rurality and staff composition. Despite the stratified nature of the sample, practices were relatively homogenous, apart from distances to rural practices and two exceptions pertaining to practice size.

### Practice size

Integration of primary health services by location has been the focus of successive NZ government health strategies, influencing the amalgamation of smaller practices in favour of integrated family health centres.<sup>29</sup> General practices do appear to be increasing in size over time, as measured by staff FTE. In 2001–02, NatMedCa practices reported a mean doctor FTE of 2.2 and a mean nurse FTE of 1.6.<sup>25</sup> By 2014, our study practices

Table 3. Clinician data for 45 New Zealand general practices

	<i>n</i>	Mean	Median	IQR	Range
No. of whole clinicians and FTE clinicians					
GPs (current)	42	4.5	3.0	4.0	1.0–21.0
GP FTE (current)	35	3.5	3.0	3.2	0.6–12.5
GPs in past 5 years	41	8.9	7.0	7.5	0–38.0
Nurses (current)	42	4.7	4.0	4.3	0.1–15.0
Nurse FTE (current)	38	3.3	2.2	3.7	0.1–15.0
Nurses past 5 years	42	7.3	6.0	6.0	1.0–21.0
Clinician workload: no. of patients per clinician					
Per 1 whole GP	42	1106.1	1060.8	534.5	386–2530
Per FTE GP	35	1529.9	1426.0	625.0	426–4512
Per 1 whole Nurse	42	1369.8	920.7	776.9	320–11,860
Per FTE Nurse	38	2022.7	1703.0	1287.8	376–11,860
Annual clinician turnover: ratio of current whole clinicians to annual number of clinicians					
GP turnover	37	2.8	2.0	2.5	1.0–6.7
Nurse turnover	39	3.4	3.8	3.3	0.5–7.0

IQR (interquartile range); GP (general practitioner); FTE (full-time equivalent).



reported a mean doctor FTE of 3.4 and a mean nurse FTE of 3.3.

Literature on the effect of practice size is sparse, inconsistent and difficult to translate to NZ. Previous research suggests that practice size may affect patient care.<sup>13,14,16,17,19,20</sup> Our study found

two differences between study practices related to practice size. First, each GP working in larger practices cares for more patients ( $P = 0.020$ ) and there are also more patients per GP FTE ( $P = 0.019$ ), which is consistent with European findings.<sup>13</sup> Larger practices may be able to arrange GP workflow more efficiently by economies of

Table 4. New Zealand general practice staff and service characteristics grouped by rurality and size (%)

	All <i>n</i> = 45	Rural <i>n</i> = 24	Urban <i>n</i> = 21	<i>P</i> -value Rurality	Large <i>n</i> = 18	Med <i>n</i> = 16	Small <i>n</i> = 11	<i>P</i> -value Size
<b>Nursing procedures</b>								
Advanced nurse	19 (42.2)	13 (54.2)	6 (28.6)	0.083	8 (44.4)	5 (31.3)	6 (54.5)	0.470
Vaccinations	45 (100)	24 (100)	21 (100)	–	18 (100)	16 (100)	11 (100)	–
Smear	42 (93.3)	24 (100)	18 (85.7)	0.094	17 (94.4)	15 (93.8)	10 (90.9)	1.000
LTC management*	36 (80.0)	18 (75.0)	18 (85.7)	0.469	15 (83.3)	12 (75.0)	9 (81.8)	0.894
Standing Rx	33 (73.3)	17 (70.8)	16 (76.2)	0.685	16 (88.9)	10 (62.5)	7 (63.6)	0.147
Phlebotomy	30 (66.7)	15 (62.5)	15 (71.4)	0.526	14 (77.8)	12 (75.0)	4 (36.4)	0.049
IV lines	27 (60.0)	16 (66.7)	11 (54.2)	0.329	14 (77.8)	10 (62.5)	3 (27.3)	0.026
Risk assessment	24 (53.3)	13 (54.2)	11 (52.4)	0.905	8 (50.0)	9 (60.0)	7 (63.6)	0.578
Other†	13 (28.9)	6 (25.0)	7 (33.3)	0.538	7 (38.9)	2 (12.5)	4 (36.4)	0.182
Independent Rx	11 (24.4)	5 (20.8)	6 (28.6)	0.547	5 (27.8)	5 (31.3)	1 (9.1)	0.456
Insulin initiation	3 (6.7)	2 (8.3)	1 (4.8)	1.000	3 (16.7)	0	0	0.109
<b>Other clinicians</b>								
Radiologist	8 (17.0)	6 (25.0)	2 (9.5)	0.252	6 (33.3)	1 (6.3)	1 (9.1)	0.083
Pharmacist	14 (31.1)	7 (29.2)	7 (33.3)	0.763	9 (50.0)	4 (25.0)	1 (9.1)	0.064
Physiotherapist	15 (33.3)	9 (37.5)	6 (28.6)	0.526	8 (44.4)	4 (25.0)	3 (27.3)	0.431
Social Worker	6 (13.3)	2 (4.2)	4 (19.0)	0.396	2 (11.1)	3 (18.8)	1 (9.1)	0.744
Counsellor	24 (53.3)	13 (51.2)	11 (52.4)	0.905	11 (61.1)	9 (56.3)	4 (36.4)	0.414
Laboratory staff	5 (11.1)	4 (16.7)	1 (4.8)	0.352	2 (11.1)	2 (12.5)	1 (9.1)	1.000
Other‡	17 (37.8)	8 (33.3)	9 (42.9)	0.526	7 (38.9)	5 (31.3)	5 (45.5)	0.604
<b>Services offered</b>								
IV fluids	34 (75.6)	20 (83.3)	14 (66.7)	0.194	14 (77.8)	14 (87.5)	6 (54.6)	0.145
IV drugs	34 (75.6)	19 (79.2)	15 (71.4)	0.547	13 (72.2)	14 (87.5)	7 (63.7)	0.308
Thrombolysis	4 (8.9)	3 (12.5)	1 (4.8)	0.611	3 (16.7)	1 (6.3)	0	0.430
Minor surgery	45 (100)	24 (100)	21 (100)	–	18 (100)	16 (100)	11 (100)	–
Minor orthopaedics	16 (35.6)	8 (33.3)	8 (38.1)	0.739	8 (44.4)	7 (43.8)	1 (9.1)	0.108
Other§	13 (28.9)	7 (29.2)	6 (28.6)	0.965	6 (33.3)	5 (31.3)	2 (18.2)	0.769

LTC (long term conditions); Rx (prescriptions); IV (intravenous).

\* Long-term condition management (eg asthma, diabetes, cardiac disease clinics, etc).

† Other nursing services: diagnostic testing (spirometry, ambulatory blood pressure monitoring, electrocardiogram, audiometry, drug testing, exercise testing, Pipelle biopsy), treatment (ear irrigation, contraception including Jadelle insertion), minor surgery (including suturing, biopsy and grafting), examinations for rehabilitation and occupational health and management roles.

‡ Other clinicians include: mental health (clinical psychologist, mental health nurse), maternity (midwife, maternity unit), dietician, audiologist, podiatrist, osteopath and visiting consultants (rheumatologist, paediatrician, etc).

§ Other services include: emergency clinics, PRIME (Primary Response In Medical Emergencies), vasectomy, Intra-uterine contraceptive device insertion, Pipelle biopsy, minor skin grafting, plaster casting and specialised medical examinations.

scale; however, this finding may also represent reduced quality of patient care. Second, nurses working in larger practices were more likely to insert IV lines ( $P = 0.026$ ) and take blood ( $P = 0.049$ ). Larger practices may be able to offer more services, such as a phlebotomy clinic or have a treatment room available for IV infusions.

### Rurality

Place of residence should not cause inequities in health care. Rural patients face increased barriers to accessing health care (eg travel time and expense, poor internet and cell phone coverage) and miss out on subsidised health care available in urban centres (eg sexual health clinics, emergency care and outpatient hospital care).<sup>1,28</sup> Geographical isolation means rural practices are often expected to provide more comprehensive services, more after-hours services and manage more complex cases than urban clinicians, with less collegial support.<sup>30</sup>

The Rural Ranking Score remains the most comprehensive measure of practice rurality. Study practices providing a Score were certainly 'rural' (mean 42, median 40), as practices with a Score  $\geq 35$  are considered substantially different from urban practices.<sup>31</sup> While 'rurality' is debated,<sup>27</sup> our pragmatic definition correlated with increased distances. Rural practices had significantly increased distances to the nearest base hospital (rural median 65.0 km, urban 7.5 km ( $P < 0.001$ )), nearest hospital (rural median 25.7 km, urban 7.0 km ( $P = 0.002$ )) and nearest GP (rural median 16.0 km, urban 1.0 km ( $P = 0.007$ )). Importantly, we found no other significant differences attributable to practice location.

### Clinicians

Study practices represent typical NZ staffing levels by current workforce measures. In 2012, NZ had 74 FTE GPs per 100,000 patients,<sup>32</sup> and SHARP practices had 64 FTE GPs per 100,000 patients. In 2015, NZ had 69.7 practice nurses per 100,000 patients,<sup>33</sup> and SHARP practices had 73.0 per 100,000 patients.

Practice nurses have more training and are conducting more procedures over time. In 2001–02,

only 28.8% of practice nurses had postgraduate qualifications,<sup>25</sup> but 42.0% of SHARP practices had nurses with advanced training. Procedurally, 98.3% of NatMedCa nurses gave immunisations, compared to 100% of SHARP nurses; cervical smears NatMedCa: 50.5%, SHARP: 93.3%; chronic disease management NatMedCa: 58.0%, SHARP: 80.0%; phlebotomy NatMedCa: 57.1%, SHARP: 66.7%. These findings are congruent with wider moves promoting integrated provision of health care and extended nursing practice.<sup>29</sup>

### Practice ownership

Practice ownership types appear to have changed since 2001–02. GP practice ownership increased slightly from 58.7% to 60.0%, trust ownership increased from 2.4% to 15.6% and company ownership diminished from 26.8% to 4.4%.<sup>25</sup>

### Strengths and weaknesses

Participating practices are representative of each study group when analysed by practice size and rurality. The description of SHARP practices will facilitate understanding of any observable difference in patient harms between study groups. However, this paper describes an exploratory study of practice characteristics, with small numbers when results are analysed by practice size and location. There were numerous missing data. While SHARP is appropriately powered to identify differences in harm rates between the patients in each study group and extrapolate the findings to NZ, this analysis of the SHARP practice characteristics was not powered to determine if observed differences are generalisable to all NZ general practices. The sample size and lack of power limits the generalisability of our findings, which require validation by further research.

### Conclusion

The 45 SHARP study practices are representative of NZ general practices, with similar proportions of patients and clinicians to the sample populations. Overall, study practice characteristics were relatively homogenous. However, we found that larger practices had fewer FTE GPs per enrolled patient, and practice nurses had increased



training and procedural scope than shown in the last national general practice survey in 2001–02.

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#### COMPETING INTERESTS

Murray W. Tilyard is the CEO of The Best Practice Advocacy Centre New Zealand (bpac<sup>NZ</sup>) Clinical Solutions, which provided IT support for SHARP.

**Appendix 1**

Can you please provide the following information about your practice so that we can better understand the context for your patients' care?

**CHARACTERISTICS OF PRACTICE**

Name of practice: .....

Who owns the practice (eg a GP, a trust etc)? .....

Rural ranking score (if appropriate): .....

What is the distance to the nearest other General Practice (km)? .....

What is the distance to the nearest public hospital (any type) (km)? .....

What is the distance to the nearest Base hospital (km)? .....

What on-site services do you offer?

IV fluids ☐ IV drugs ☐ Thrombolysis ☐ Minor surgery ☐  
Minor orthopaedics ☐ Other ☐ .....

What on-site facilities do you have?

Radiology ☐ Pharmacy ☐ Physiotherapy ☐ Social worker ☐  
Counselling ☐ Other ☐ .....

**Staff information**

How many GPs currently work here (excluding short-term locums)? .....

How many GP FTEs currently work here? .....

How many GPs have worked here over the past 5 years (including locums)? .....

How many nurses currently work here? .....

How many nurse FTEs currently work here? .....

How many nurses have worked here over the past 5 years? .....

Do your nurses have advanced nursing qualifications (eg PRIME, Nurse Practitioner, etc)? If YES, what qualifications? .....

**What procedures do your nurses do?**

Cervical smears ☐ IV line insertion ☐ Phlebotomy ☐ Independent Rx ☐  
Standing order Rx ☐ Vaccinations ☐ Risk assessment ☐ Chronic care management ☐  
Other ☐ .....