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Patterns of primary health care service use of Indigenous Australians diagnosed with cancer

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Contributors: PCV, RB, GG and AdW contributed to the conception and design of the study. PCV performed the data analysis and takes responsibility for the integrity and the accuracy of the data. PCV drafted the report. All authors contributed the interpretation of data, revising draft critically for important intellectual content, and approved the final version.

Abstract

Purpose

The role of general practitioners in cancer care has expanded in recent years. However, little is known about utilization of primary health care (PHC) services by patients with cancer, particularly among socio-economically disadvantaged groups. We describe utilization of PHC services by patients with cancer, and the nature of the care provided. The study focus on a disadvantaged group in Australia, namely Indigenous Australians.

Methods

A retrospective audit of clinical records in ten PHC services in Queensland, Australia. Demographic and clinical data of Indigenous Australians diagnosed with cancer during 2010-2016 were abstracted from patient's medical records at the PHC services. The rates of cancer-related visits were calculated using person years at risk as a denominator.

Results

A total of 138 patients' records were audited. During 12 months following the cancer diagnosis, patients visited the PHC service on average 5.95 times per year. Frequency of visits were relatively high in remote areas and among socioeconomic disadvantaged patients (IRR=1.87, 95%CI 1.61-2.17; IRR=1.79, 95%CI 1.45-2.21, respectively). Over 80% of visits were for seeking attention for symptoms, wound care, and emotional or social support. Patients who did not undergo surgery, had greater comorbidity, received chemotherapy and/or radiotherapy, and male gender had significantly greater rate of visits than their counterparts.

Conclusion

The frequency of utilization of PHC services, especially by patients with comorbidities, and the range of reasons for attendance highlights the important role of PHC services in providing cancer care. The reliance on PHC services, particularly by patients in remote and disadvantaged communities has important implications for appropriate resourcing and support for services in these locations.

Introduction

Overall cancer survival has improved over the past decades in many high income countries. In the UK, for example, cancer survival has doubled in the last 40 years [1]. In Australia, five-year relative survival from all cancers combined increased from by 41% over a 30-year period (1984–2013) [2]. However, significant disparities in cancer outcomes exist between minority groups and mainstream populations. Cancer disproportionately affects the most disadvantaged groups in affluent countries, namely people living in more deprived areas [1, 3], ethnic minorities [3], patients who live in rural areas [4], and indigenous populations [5-7].

Primary health care (PHC) services have a vital role in supporting patients living with and beyond cancer [8, 9]. In recent years, in countries with universal health-care systems, the role of general practitioners (GPs) in cancer care has expanded [10, 11]. With the prevalence of cancer survivors increasing [1, 2] in line with improvements in early detection and treatment and aging populations, continued involvement of GPs is increasingly seen as a way to enhance cancer care [8, 9, 11, 12]. High quality PHC is especially important for disadvantaged groups who experience disproportionate barriers to access to care (e.g. people who live in rural areas).

Australia is a geographically vast country, and availability of health services generally decreases with increase in remoteness [13, 14]. Australians in rural and remote areas generally have less access to health services, with shortages in health professions and health-related infrastructure, including oncology services which are provided mostly through tertiary and regional cancer centers [14, 15]. Rural Australians have worse cancer outcomes than those living in major cities [16, 17]. Psychosocial morbidity and unmet needs have also been reported important issues and challenges facing rural Australians with cancer [18]. While community-based PHC services play a fundamental role in prevention and management of disease in general, GP involvement in cancer care in Australia is varied and may depend on where they are based. GPs in rural and remote areas are reported to have a greater role in cancer care than their major city counterparts [19].

Aboriginal and Torres Strait Islander people in Australia (referred to here as Indigenous Australians) are among the most disadvantaged groups in Australia and experience persistent socioeconomic and health disparities [20]. High quality PHC is especially important for this group as they experience disproportionate barriers to access to care. Rates of morbidity and mortality are high for most conditions, including cancer, the second leading cause of death for this group [21]. The marked inequalities in cancer mortality [22] and survival [6, 7, 23] for Indigenous and non-Indigenous cancer patients in Australia is largely attributed to being diagnosed later [6, 7, 24], receiving less treatment [6, 7], and experiencing higher rates of comorbidities [6, 7]. Many Indigenous Australians face challenges within the health system, namely language barriers, racism, cultural misunderstandings, and emotional, physical, and financial stresses which can affect their cancer outcomes [25, 26]. Indigenous Australians with cancer have high unmet needs, particularly in the

'physical/psychological' and 'practical/cultural' domains [27]. As a higher proportion of Indigenous Australians live in rural and remote areas [28], they also face additional barriers to accessing cancer services [22, 28].

In order to improve access to first level healthcare delivered through the general practice sector, community controlled PHC services (referred to here as the Aboriginal community controlled health services (ACCHSs)) exist in many parts of Australia. Indigenous Australians value their accessibility [29], facilitated by welcoming social spaces, culturally safe and appropriate care that is responsive to holistic needs [30].

The aim of this study was to describe utilization of primary health care (PHC) services by patients with cancer, and the nature of the care provided. The study described here focused on a disadvantaged group in Australia, namely Indigenous Australians. We described the characteristics of patients, and the frequency and reasons for visits to PHC services after cancer diagnosis. As previous reports [27] have shown that financial and psychosocial concerns are prominent areas of unmet needs of Indigenous Australians with cancer, we described access and referrals to psychological counselling and assistance with travel and accommodation.

Methods

We conducted a retrospective audit of PHC service records of Indigenous cancer patients in Queensland, Australia. The details about the selection of PHC services have been described previously [31]. In brief, a purposive convenience sample of Queensland Health-operated and ACCHSs with at least ten Indigenous cancer patients currently attending their service(s) (referred to as "active patients") were invited to take part in the study. Ten PHC services agreed to participate; except for one service, all were ACCHSs [31].

PHC services were asked to provide a list of all adult patients who were identified as Aboriginal or Torres Strait Islander, had a cancer diagnosed after 2010, and were active patients. Additional searches of the service's database were conducted in eight services by study staff to identify any other potentially eligible patients. Patients identified as Aboriginal or Torres Strait Islander, who had a cancer (any type except non-melanoma skin cancers) diagnosed after 2010, who were 18 years or older at diagnosis, and were active patients were eligible. The audit took place between 18 February 2015 and 1 December 2016. Data were collected for the period from the date of cancer diagnosis to the date of audit ("audit period").

Demographic characteristics and clinical data were abstracted from patients' medical records at the PHC services. Clinical data included: cancer type; date of diagnosis and source of information; cancer stage; presence of comorbidities; and treatment received (e.g. type, date). A modified Charlson comorbidity index (CCI) score was calculated based on the

presence and severity of comorbid conditions with higher scores indicating higher comorbidity burden [32]. Detailed information on patient's visits to the services (e.g. date, reason) that were related to their cancer were collected. We also describe access and referrals to psychological counselling and assistance with travel/accommodation. Data were abstracted by trained reviewers (AdW, CB and JM) using a structured data collection form. CB (registered nurse) and IUR (clinician) independently reviewed and categorized cancer type and stage [33]; where there was disagreement, a discussion was held to facilitate consensus.

Data analysis

Analyses were conducted using Stata/SE (Version 15; Stata Corporation, College Station, TX). Patients' and PHC services' characteristics were presented as mean and standard deviation (data normally distributed), and proportions. Chi-square tests were used to compare proportions (Fisher exact test was used when expected counts <5). Statistical significance was set at alpha=0.05, and p values were 2-sided.

The rate of visits was calculated using person years at risk (PYAR) as a denominator (e.g. a patient who supplied six months of data to the study [e.g. from cancer diagnosis to the date of medical chart audit] would contribute 0.5 years to the denominator). All patients had follow up data for the audit period (all assumed to be alive at the time we audited their records). Poisson regression was undertaken to compare rate of visits by PHC service, health service and patient characteristics. The vce(robust) option was used to obtain robust standard errors for the parameter estimates to control for mild violation of underlying assumptions. Incidence rate ratios (IRR) and 95% confidence interval (CI) were reported.

Results

Patient population

Of 475 patients identified, after medical chart review, 193 patients did not have cancer, 111 were excluded based on eligibility criteria, and 16 did not have enough information to decide on eligibility (see **Figure 1** for more details). Data was not collected for 17 patients due to change of management at one service during the data collection period and inadequate time to renegotiate this service's participation. Data described hereafter includes 138 patients who were on average 56.6 years at diagnosis (SD=11.9). Most resided in areas categorized as regional (48.2%) or remote/very remote (26.3%), and low-intermediate (34.3%) or most disadvantaged (46.0%) (**Table 1**).

The most common primary cancer diagnosis was breast cancer (29.0%), followed by cancers of the female genital (15.9%), and digestive organs (11.6%). An estimated date of diagnosis was available for 124 patients (89.9%); for 14 (10.1%) only the year of diagnosis was available. Most medical charts (74.6%) had cancer stage recorded or stage was not applicable; for 35 (25.4%) this information was missing. Forty-three percent of patients had localized cancers. Most

patients (n=124, 89.9%) received cancer treatment (67.4% had surgery, 40.6% chemotherapy, and 39.1% radiotherapy) and 65.2% had at least one comorbidity (CCI \geq 1); 34.8% patients had none.

The demographic and clinical characteristics of patient included here were on the whole similar to a previous study which recruited 248 Indigenous cancer patients from hospitals in Queensland (**Supplementary Table 1**) [34]. The main exception was cancer stage, where patients audited had a higher proportion of localized cancers and of missing cancer stage.

Most patients (n=115, 83.3%) visited the PHC service for patient care during the audit period (e.g. presented with symptoms, wound care, emotional and/or support for social issues). Twenty-three patients (16.7%) only visited the service to check or request pathology or imaging tests, or for administrative reasons.

Patient visits to the PHC service

During the 12-month period following cancer diagnosis, the rate of patient visits to the PHC service to see a GP was 5.95 per PYAR. The rate of visits during the 12-month period following cancer diagnosis was nearly double the rate for the audit period (7.78 vs. 4.08 per PYAR for all visits, 6.62 vs. 3.45 per PYAR for visits which included patient care, and 5.95 vs. 3.21 per PYAR for GP visits, respectively). The rate of visits to PHC services varied significantly by service (**Table 2**), and by service and patients' characteristics (**Figure 2**). Frequency of visits were relatively high in services located in remote/very remote areas (IRR=1.87, 95%CI 1.61-2.17) and among socioeconomic disadvantaged patients (IRR=1.79, 95%CI 1.45-2.21). Patients who did not undergo surgery, had greater comorbidity, received chemotherapy and/or radiotherapy, and male gender had significantly greater rate of visits compared to their respective counterparts.

Nature of the care provided

A total of 1325 visits to the PHC services that were related to the patient's cancer were identified (**Table 3**). Most visits (84.6%) involved patient care (e.g. request of medical prescription, patient presented with symptoms, wound care, scheduled appointment for check-up or review, emotional and/or support for social issues); the remainder were exclusively for or included administrative reasons (25.1%; e.g. arrangement of transport/accommodation, administrative forms) or to check or request pathology, imaging or other tests (22.0%). Common reasons for a visit included request of medical prescription (31.0%), patient presented with symptoms (26.5%) and for check-up or review (25.8%). A total of 868 visits occurred within 12 months following the patient's cancer diagnosis with similar distributions of reasons for visit.

Overall, most PHC service visits for patient care involved a consultation with a GP (n=911, 81.3%) and/or a health worker (n=425, 37.9%), 11.1% involved a nurse (n=124), 1.8% (n=20) a care coordinator, and <1.5% involved a social worker, a

psychologist or counsellor, a physiotherapist, a dietician, a specialist, other allied health professional, or others service staff (e.g. driver, receptionist, practice manager). **Figure 3** displays PHC service staff seen by patients when they visited PHC services for patient care during the audit period by service location.

Regarding referral to other services or health professionals, there were 303 visits (27.0%) with a referral. The most common referrals were to pathology, radiology or imaging services (32.7%), followed by pharmacy (28.1%), specialists (21.1%), transport/accommodation (5.0%), a hospital (4.6%), a physiotherapist (4.6%), a nurse (3.0%), and a psychologist or counsellor (2.6%). Less than 2.0% of visits resulted in a referral to a dietician, a social worker, a dentist, a GP, palliative, support services or other allied health professionals. **Figure 4** displays patient referrals by service location. In contrast to services located in major city or inner/outer regional areas, for services in remote and very remote areas the most common referrals were to pharmacy, followed by referrals to pathology, radiology or imaging services.

Overall, <1.5% of the visits involved a social worker, a psychologist or counsellor, and there were 8 referrals to a psychologist or counsellor recorded in the medical records. There were 84 (6.3%) PHC service visits during the audit period for which the reason for the visit included emotional support and/or support for social issues. Of these, in 8 visits (9.5%) patients were seen by a psychologist or counsellor at the PHC service, in 4 visits (4.8%) they were seen by a social worker (one also was seen by the GP), in 57 visits (67.9%) patients were seen by a GP, and in 15 (17.9%) patients were not seen by any of these health professionals (one saw the service nurse and 8 a health worker).

Discussion

The role of the GP in cancer care is growing. The frequency of contact with PHC services of Indigenous cancer patients highlights the important role of the GP in providing cancer care, particularly for services located in remote areas where the frequency of patient visits for cancer care was significantly higher. In a review of GPs and patients' perspectives across 58 studies [8], many supported a greater GP role in coordinating follow-up screening, symptom relief, psychosocial care, general medical care and palliative care, particularly for rural GPs having a greater role than their urban counterparts. Our findings regarding greater number of GP visits in PHC services located in remote/very remote areas compared to their major city counterparts are in line with high involvement of GPs in cancer care in these areas [8, 19, 35].

National efforts to close the health disparities gap support initiatives such as the Aboriginal community controlled health service sector. In Queensland, which constitutes 23% of Australia's land mass, there are 25 ACCHSs and, where there is an ACCHS, Indigenous Australians may have a preference for using it [29]. Quantifying PHC use by Indigenous cancer patients is not straightforward as Indigenous identification is defined by self-assessment and not all PHC services have the systems in place to identify the patient group [31]. In a report of the pattern of PHC service use (in general) by

Indigenous Australians, the average number of GP visits was 4 per person per year, and this number declined with increasing remoteness [36]. Patients audited frequently visited PHC services for GP care related to their cancer, and services located more remotely had more frequent visits than their major city counterparts. With a lack of cancer treatment and support services in rural and remote areas [13, 14, 37], from the patients' perspectives, out of preference or necessity, some cancer patients may, regardless of advice to use the emergency arrangements of their oncology service provider, contact their PHC service about cancer-related issues. From the perspectives of Australian GPs, out of necessity many rural GPs play a more direct role in cancer care than metropolitan GPs [19].

Similar to previous reports of Indigenous Australians with cancer, two-thirds of the patients audited had at least one comorbidity [6, 7]. Patients with comorbidities may be more likely to have existing relationships with PHC services or GPs, which may be in part due to pre-existing health problems. This is reflected in the greater number of GP visits for patients with higher levels of comorbidities in the study sample.

While many GPs report that they are well positioned to provide comprehensive, holistic approach to follow-up cancer care,[19] they also report barriers for GP involvement, namely: transfer of information, GP knowledge [38, 39], time[8] and resource[19] constraints experienced by GPs. In our study, for example, for over one-quarter of patients audited cancer stage was not recorded in their medical charts. While up to 10% of Indigenous cancer patients with no information on stage in their hospital medical chart have been previously reported [6, 7, 34], the higher proportion of medical records at the PHC services with missing cancer stage may be attributed to poor communication between hospitals and PHC services.

The routine assessment of psychosocial concerns and supportive care have been incorporated into many clinical guidelines for cancer care [40]. GPs who often have many interactions with patients and existing knowledge of prior risk factors (e.g. poor social support, personality factors) are well placed to detect and address psychosocial concerns [8]. However, many GPs reported having insufficient knowledge to effectively meet the psychosocial needs of cancer patients, and some reported often lacking opportunity to discuss psychosocial aspects with their patients due to lack of privacy, lack of time, or workload.[8] In our study, most visits to PHC services for which the reason included emotional support and/or support for social issues appeared to have been addressed by the local GP. For a small proportion of visits patients have seen the local psychologist or counsellor. Notably, for nearly one in five visits for which the reason included emotional support and/or support for social, patients included in this audit appeared to have missed out on such services. Our findings highlight the disparity between the patient's visits to PHC service seeking emotional and/or support for social issues and the low availability of specialist health workforce (e.g. social workers, psychologists, and counsellors), and the corresponding low rates of referrals. These data also concur with a recent senate enquiry into mental health services in regional areas where a cross sectional audit of over 3,000 Indigenous client records from 100

PHC services across Australia showed that most services lacked clear guidelines on best practice for screening and follow-up of patients with emotional and/or support for social issues [41]. It is likely that patients audited are not accessing psychological counselling because these services are lacking where they live [13, 28, 37], local GPs are managing these patients [19], patients under-recognize mental illness [42], or patients are not being routinely assessed for psychosocial concerns. The use of the validated and culturally specific supportive care needs assessment tool for Indigenous Australians has been shown to be feasible and acceptable in routine cancer care [43]. Routine screening with a culturally specific tool coupled with greater availability of appropriate support services and with adequate communication, training and support for psychological care for GPs, particularly in rural and remote areas, have the potential to improve cancer care for Indigenous people with cancer.

The need for financial assistance as well as need for support with practical issues (e.g. transport, accommodation) have been reported in previous studies of Indigenous cancer patients [27]. The financial concern as a result of having cancer may be partially explained by the remoteness of residence and socioeconomic disadvantage of many Indigenous people [22, 44]. The relatively high proportion of patients visiting the PHC services to organize transport or accommodation is a reflection of such need.

To the best of our knowledge, this is the first study to examine the pattern of cancer care in the PHC setting of Indigenous people diagnosed with cancer. Although slightly older and having more localized cancers [6, 7], with respect to socioeconomic characteristics, patients audited appeared to be similar to the Indigenous cancer patients recruited in previous studies in Queensland [6, 7, 34]. Despite the inclusion of PHC services from a mixture of remote, rural, and urban areas, our findings may not necessarily be transferrable to all PHC services in Queensland. While the aim was not to include only ACCHSs, with refusals or ineligibility of some non-ACCHSs invited to take part [31], most PHC services included here were ACCHSs. Nevertheless, it is important to highlight that the quality of care delivered by ACCHSs are generally at least on par with mainstream services [29, 45]. Lastly, results should be interpreted with caution due to the small sample size, resulting in little statistical power to assess differences between groups with certainty; consequently, there may have been differences between group comparisons that the study did not detect.

From an international perspective, Indigenous Australians with cancer described here form a useful case study as they are a relatively disadvantaged group that experience poor health outcomes and relatively poor access to care. The frequency of contact with PHC services of Indigenous cancer patients - especially by patients with comorbidities - and the range of reasons for attendance, highlights the important role of the GP in providing cancer care. PHC services have the potential to play a key role in supporting the most disadvantaged cancer patient groups, namely people living in more deprived areas [1, 3], ethnic minorities [5-7], and patients who live in rural areas [4]. The high reliance on PHC services, particularly by patients in remote and disadvantaged communities has important implications for appropriate

resourcing and support for services in these locations. With clear guidance, good communication between all care providers, and adequate support and resourcing [10], GPs can potentially minimize the gap in access to health services and improve cancer outcomes for disadvantaged groups.

Conflict of interest

There is no conflict of interest. Authors have no financial relationship with the organizations that sponsored the research. PCV had full control of all primary data and agree to allow the journal to review our data if requested.

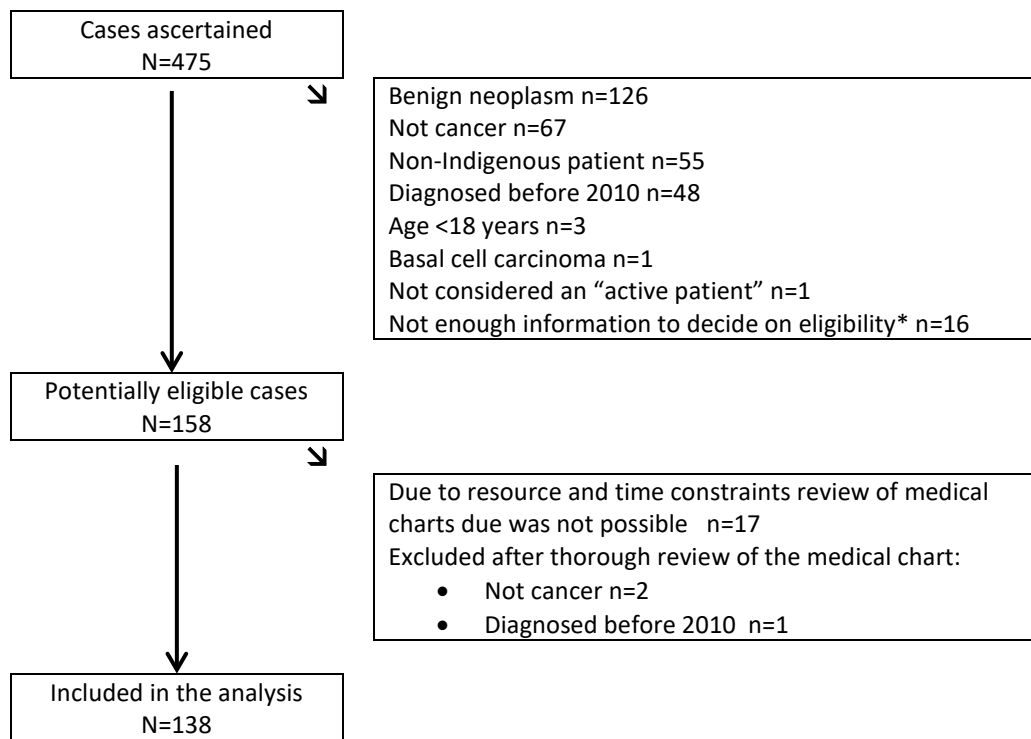
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Figure 1. Flow chart of case ascertainment



*A diagnosis of cancer was recorded on the clinical notes but details about diagnosis date, treatment, or communications to and from hospital or specialists related to the cancer were not available in the notes

Table 1. Sociodemographic and clinical characteristics of 138 Indigenous cancer patients

	N=138	%
Age at diagnosis*		
20-39	13	9.4
40-59	69	50.0
≥60	56	40.6
Sex		
Male	52	37.7
Female	86	62.3
Indigenous status		
Aboriginal	126	91.3
Torres Strait Islander	6	4.3
Aboriginal & Torres Strait Islander	6	4.3
Socioeconomic advantage/disadvantage[§]		
Most affluent	27	19.7
Low to intermediate	47	34.3
Most disadvantaged	63	46.0
Rurality of residence (ARIA)[§]		
Major city	35	25.5
Outer/inner regional	66	48.2
Remote/very remote	36	26.3
Cancer type[¶]		
Breast	40	29.0
Female genital organs	22	15.9
Digestive organs	16	11.6
Respiratory and intrathoracic organs	15	10.9
Male genital organs	14	10.1
Lymphoid, haematopoietic and related tissue	8	5.8
Lip, oral cavity and pharynx	7	5.1
Eye, brain and other parts of central nervous system	3	2.2
Other cancers**	11	8.0
Cancer stage		
Local	59	42.8
Regional	20	14.5
Distant	16	11.6
Not applicable (e.g. leukaemias, lymphomas)	8	5.8
Missing	35	25.4
Cancer treatment		
Yes	124	89.9
No	10	7.2
Not clear in the medical notes	4	2.9
Cancer treatment by type[¥]		
Surgery	93	67.4
Radiotherapy	54	39.1
Chemotherapy	56	40.6
Charlson comorbidity index		
CCI=0 (no comorbidity)	48	34.8
CCI=1	43	31.2
CCI≥2	47	34.1

* Approximate age for 14 patients for whom we had year of diagnosis; ** Other cancers include thyroid and other endocrine glands, bone and articular cartilage, urinary tract, and skin (excluding squamous cell and basal cell carcinoma); ¥ Totals do not add up to 100% as patients could have received more than one treatment, and it was not clear in the notes whether patients had surgery (n=4), chemotherapy (n=10) or radiotherapy (n=17); § Post code for place of residence was missing for 1 case; ¶ For 2 cases it was recorded in the notes that patient had cancer but cancer type was not clear.

Table 2. Variation between services in frequency of cancer-related visits by Primary Health Care services

Service	Location	GP*	N active patients	All visits					Visits for patient care				
				Audit period**		Within 12 months [§]			Audit period**		Within 12 months [§]		
				N visits	Rate per PYAR	IRR (95% CI)	Rate per PYAR	IRR (95% CI)	N visits	Rate per PYAR	IRR (95% CI)	Rate per PYAR	IRR (95% CI)
1	Major city	yes	>2000	185	3.72	1.00 [¶]	7.71	1.00 [¶]	163	3.27	1.00 [¶]	6.72	1.00 [¶]
2	Major city	yes	>2000	97	3.07	0.83 (0.65-1.06)	6.66	0.86 (0.64-1.17)	66	2.09	0.64 (0.48-0.85)	4.19	0.62 (0.44-0.89)
3	Outer regional	no	≤2000	28	2.42	0.65 (0.44-0.97)	4.90	0.64 (0.39-1.02)	23	1.99	0.61 (0.39-0.94)	3.68	0.55 (0.32-0.94)
4	Outer regional	yes	>2000	160	3.91	1.05 (0.85-1.30)	9.01	1.17 (0.90-1.52)	140	3.42	1.05 (0.83-1.31)	8.32	1.24 (0.94-1.63)
5	Very remote	yes	≤2000	157	9.44	2.54 (2.05-3.14)	14.60	1.89 (1.41-2.55)	146	8.78	2.68 (2.14-3.35)	13.20	1.96 (1.44-2.69)
6	Very remote	no	≤2000	138	4.29	1.16 (0.93-1.44)	11.32	1.47 (1.12-1.92)	91	2.83	0.86 (0.67-1.12)	8.05	1.20 (0.88-1.62)
7	Inner regional	yes	>2000	128	2.83	0.76 (0.61-0.96)	5.40	0.70 (0.52-0.94)	115	2.54	0.78 (0.61-0.99)	4.75	0.71 (0.52-0.97)
8	Outer regional	yes	>2000	182	4.65	1.25 (1.02-1.54)	8.82	1.15 (0.89-1.48)	156	3.99	1.21 (0.98-1.52)	7.95	1.18 (0.90-1.55)
9	Remote	no	≤2000	113	8.27	2.23 (1.76-2.81)	14.17	1.84 (1.38-2.44)	94	6.88	2.10 (1.63-2.71)	12.31	1.83 (1.35-2.49)
10	Major city	yes	>2000	137	3.10	0.83 (0.67-1.04)	4.01	0.52 (0.39-0.69)	127	2.87	0.88 (0.70-1.11)	3.77	0.56 (0.42-0.76)
						p<0.001		p<0.001			p<0.001		p<0.001
Overall				1325	4.08		7.78		1121	3.45		6.62	

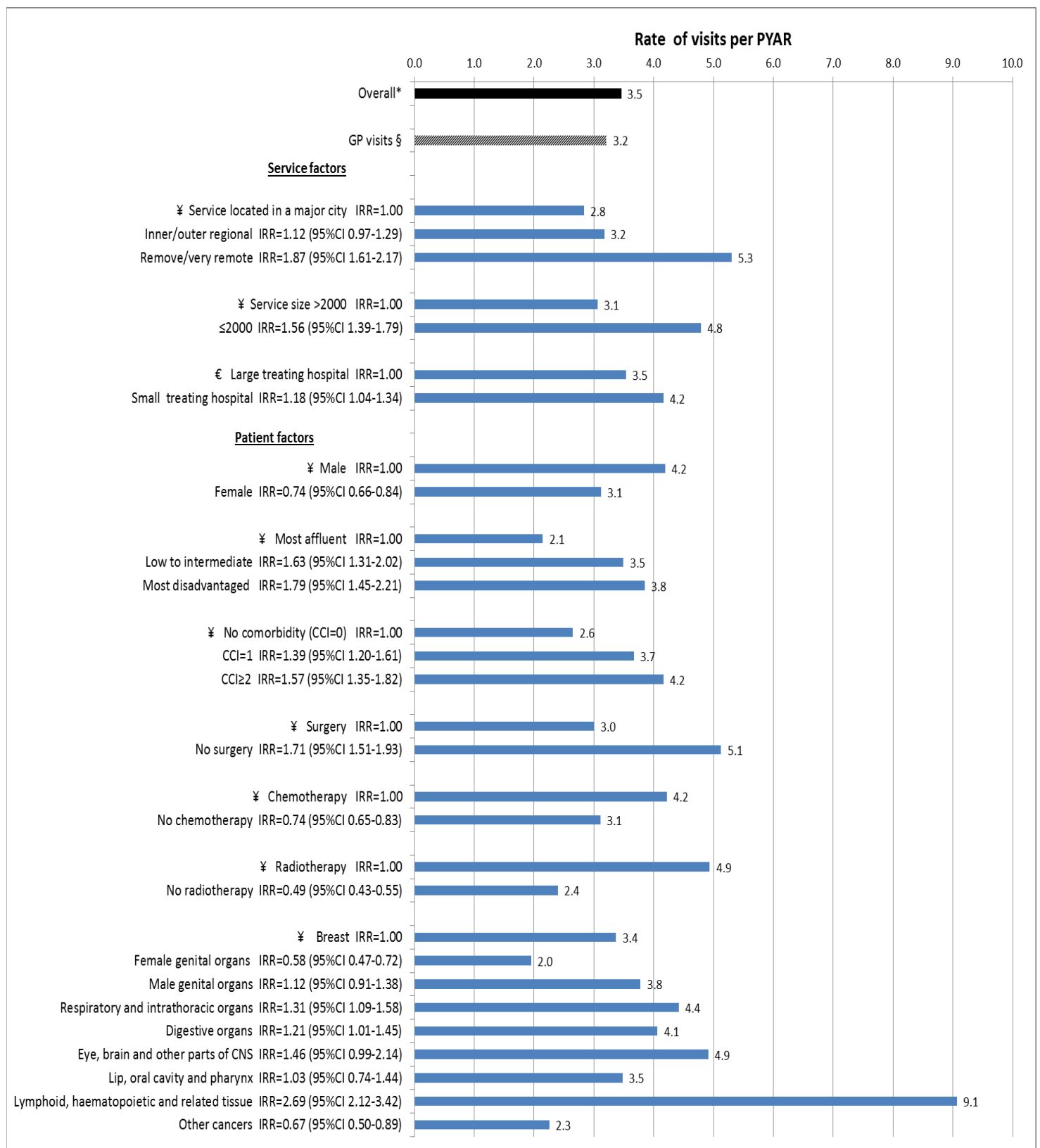
Rate per person years (PYAR); Incidence rate ratios (IRR); *PHC service had a permanent GP; **A mid-year date of diagnosis was assumed for 14 patients for whom an approximate date of diagnosis (year only) was recorded in the medical charts; [§] Data from 14 patients with an approximate date of diagnosis (mid-year date) were excluded; [¶]Service 1 was used as the 'reference' for purpose of comparison because its rates were similar to the overall rates and a large number of patients were audited.

Table 3. Frequency of visits to Primary Health Care services by reason

	Within 12 months N (%)	Audit period N (%)
Reason for visits*	Total N=868	Total N=1325
Patient care	739 (85.1)	1121 (84.6)
Medical prescription (<i>e.g. provision or review of scripts</i>)	274 (31.6)	411 (31.0)
Patient presented with symptoms (<i>e.g. pain</i>)	222 (25.6)	351 (26.5)
Scheduled appointment for check-up, review, palliative care	188 (21.6)	341 (25.8)
Treatment plan, care coordination (<i>e.g. case conference, discussion of or review of multidisciplinary team meeting reports, coordination of hospital transfer</i>)	121 (14.0)	167 (12.6)
Wound care	106 (12.2)	112 (8.5)
Emotional support and/or support for social issues	57 (6.6)	84 (6.3)
Education or counselling (<i>e.g. counselling to quit smoking, pre admission information</i>)	55 (6.3)	84 (6.3)
Provision of medical certificate	32 (3.7)	52 (3.9)
Home or hospital visit (<i>e.g. visit to patient's home or to ward/emergency department</i>)	61 (7.1)	102 (7.7)
Post-operative review or post-operative complications	112 (12.9)	123 (9.2)
To check or request tests	181 (20.9)	292 (22.0)
Pathology tests (<i>e.g. blood tests, swab, urine test</i>)	140 (16.1)	214 (16.2)
Radiology / imaging tests (<i>e.g. x-ray, CT scan</i>)	53 (6.1)	96 (7.2)
Other tests (<i>e.g. electrocardiogram, spirometry, endoscopy, colonoscopy</i>)	5 (0.6)	6 (0.5)
Administrative	226 (26.0)	332 (25.1)
Arrangement of transport or accommodation	133 (15.3)	173 (13.1)
Referrals (<i>e.g. specialists, allied health, support services</i>)	59 (6.8)	112 (8.5)
Centrelink and other administrative forms (<i>e.g. carer allowance, sickness benefit allowance, transfer medical record, new patient</i>)	42 (4.9)	65 (4.9)

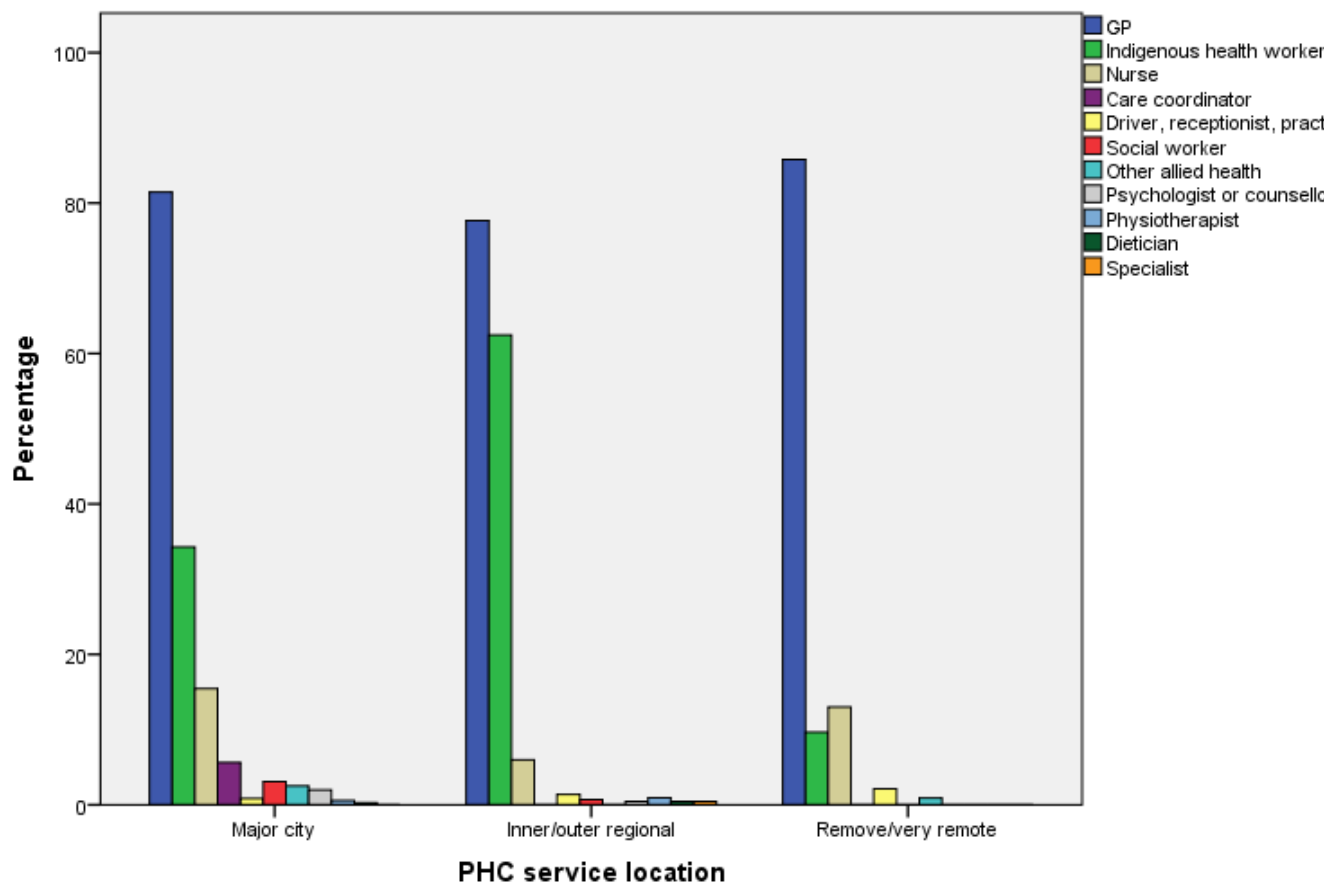
* Percentages are calculated out of the total number of visits and they do not add up to 100% because more than one reason could be present for the visit; reason missing for 5 visits;

Figure 2. Rate of visits to PHC services for patient care during the audit period and incidence rate ratios by key health service and patient characteristics



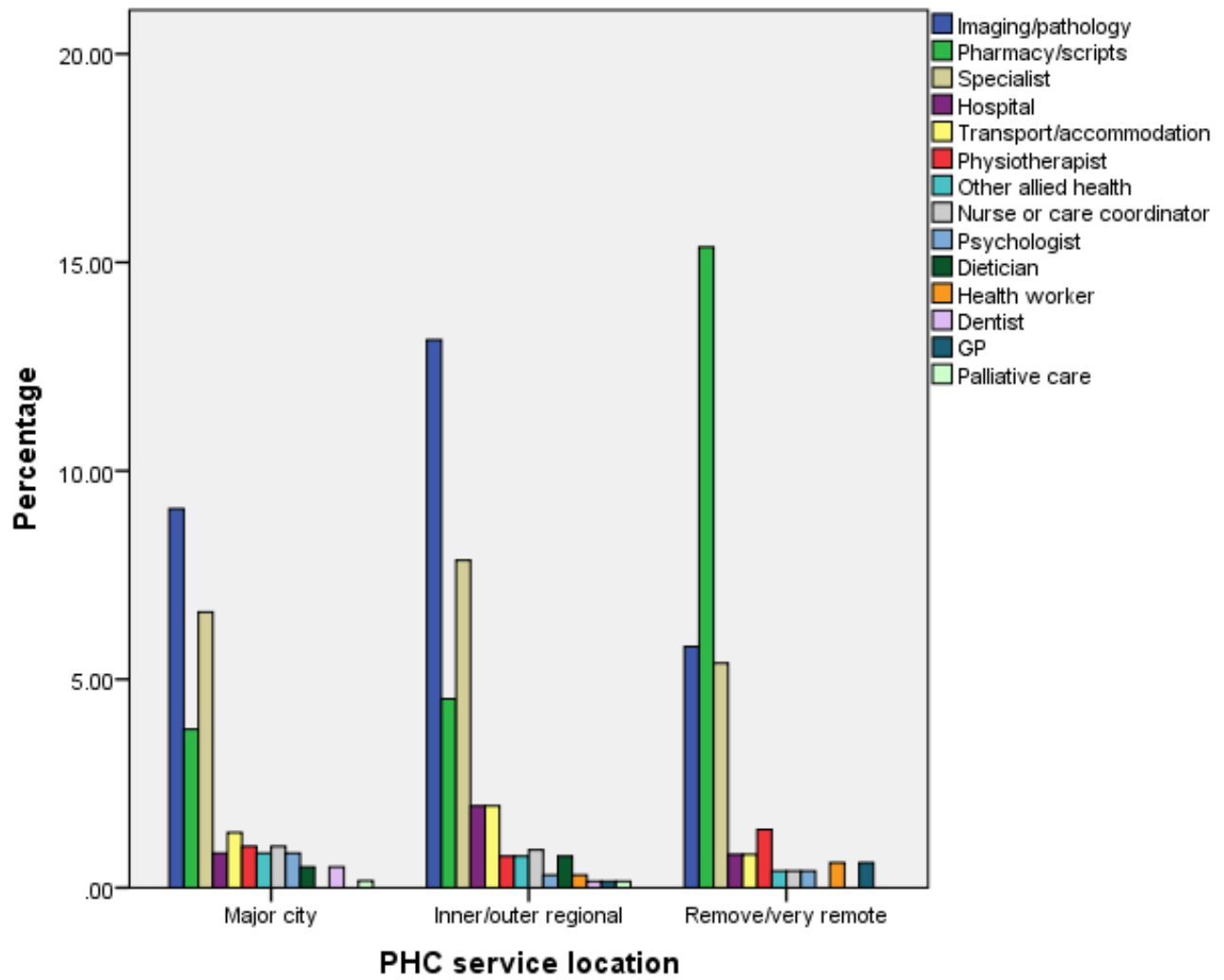
Rate per person years (PYAR); Incidence rate ratios (IRR) (Poisson regression); For permanent GP vs. not the rate of visits to PHC services were similar, p-value=0.431 (data not shown); § All PHC visits to see a GP; ¥ p-value <0.001; € p-value=0.012;

Figure 3. Health professionals seen by patients when they visited PHC services **for patient care** during the audit period, overall and by service location



* All sites combined, and percentages do not add up to 100% as patients could have seen more than one health professional in one visit.

Figure 4. Referrals made during 303 patient visits to the PHC service during the audit period, overall and by service location



* All sites combined, and percentages do not add up to 100% as patients could have seen more than one health professional in one visit.

Supplementary Table 1. Sociodemographic and clinical characteristics of 138 Indigenous cancer patients identified through primary health care services compared with 248 Indigenous cancer patients identified as attending four large treating hospitals in Queensland[34]

	PHC service cohort		SCN Study		p-value
	N=138	%	N=248	%	
Age at diagnosis*					
20-39	13	9.4	39	15.7	0.082
40-59	69	50.0	136	54.8	0.365
≥60	56	40.6	73	29.4	0.025
Sex					
Male	52	37.7	107	43.1	0.302
Female	86	62.3	141	56.9	0.302
Indigenous status					
Aboriginal	126	91.3	189	76.2	<0.001
Torres Strait Islander	6	4.3	47	19.0	<0.001
Aboriginal & Torres Strait Islander	6	4.3	12	4.8	0.823
Socioeconomic advantage/disadvantage[§]					
Most affluent	27	19.7	44	17.7	0.627
Low to intermediate	47	34.3	132	53.2	<0.001
Most disadvantaged	63	46.0	72	29.0	<0.001
Rurality of residence (ARIA)[§]					
Major city	35	25.5	80	32.3	0.162
Outer/inner regional	66	48.2	112	45.2	0.570
Remote/very remote	36	26.3	56.0	22.6	0.414
Cancer type[¶]					
Breast	40	29.0	60	24.2	0.302
Female genital organs	22	15.9	18	7.3	0.008
Digestive organs	16	11.6	31	12.5	0.796
Respiratory and intrathoracic organs	15	10.9	34	13.7	0.429
Male genital organs	14	10.1	18	7.3	0.339
Lymphoid, haematopoietic and related tissue	8	5.8	32	12.9	0.028
Lip, oral cavity and pharynx	7	5.1	22	8.9	0.175
Eye, brain and other parts of central nervous system	3	2.2	12	4.8	0.204
Other	11	8.0	16	6.5	0.581
Cancer stage**					
Local	59	42.8	61	24.6	<0.001
Regional	20	14.5	73	29.4	0.001
Distant	16	11.6	65	26.2	<0.001
Not applicable	8	5.8	35	14.1	0.013
Missing	35	25.4	14	5.6	<0.001

* Approximate age for 14 patients for whom we had year of diagnosis; ** Other cancers indicate thyroid and other endocrine glands, bone and articular cartilage, urinary tract, and skin (excluding squamous cell and basal cell carcinoma); [§] Post code place of residence was missing for 1 case; [¶] For 2 cases it was recorded in the notes that patient had cancer but cancer type was not clear;