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Beyond multimorbidity: primary care and the older person with complex needs

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Abstract

The aim of this study was to present the health and social characteristics of community-dwelling older people within the Cairns region who were identified by their GP as having complex care needs. This paper reports the subanalysis of baseline data from the Older Persons Enablement and Rehabilitation (OPEN ARCH) stepped wedge randomised controlled trial of an integrated model of care for community-dwelling older people. Data were analysed at the level of the participant and the level of the participant cluster (group of participants from the one GP). Median quality of life, as assessed by the EQ-5D, was higher for females than males (80 vs 70 respectively; P ¼ 0.05) and for people living alone than living with family (80 vs 60 respectively; P ¼ 0.0940). There was greater functional independence among non- Indigenous than Indigenous participants (median Functional Independence Measure scores of 122 vs 115 respectively; P ¼ 0.0937) and the incidence rate (95% confidence intervals) of presentation to the emergency department was sevenfold higher for Indigenous than non-Indigenous participants (11.47 (5.93–20.03) vs 1.65 (0.79–3.04) per 1000 person days respectively). Finally, 61.3% of participants required support to remain living in the community and 44% accessed allied health, with podiatry the most common intervention. The findings indicate that previous hospital utilisation is not a consistent indicator of complexity. Multimorbidity, cultural context and the living and caring situation are considered as matters of complexity, yet variation exists at the participant level.

Introduction

As the population ages and multimorbidity becomes the norm, the capacity for health and social systems to respond to the older person with complex needs is compromised (Tieman et al. 2007). Across Australia, older people with complex health and psychosocial needs are more likely to have longer hospital stays and be readmitted and are at risk of avoidable functional decline and institutionalised care (Bird et al. 2007; Beswick et al. 2008). Health and social systems must adapt to assist older people with complex needs to manage their health and remain living at home for as long as possible. To do so, an understanding of the multiple interrelated factors that create complexity is required (Bird et al. 2007; Beswick et al. 2008).

The presence of multiple chronic conditions, frailty and geriatric syndromes contribute to poor health and functional vulnerability for the older person. However, it is the relationship between these diagnoses and personal contextual dynamics, such as socioeconomic realities, culture and environment, that increases the difficulty of optimising health outcomes (Kuipers et al. 2011; Agency for Clinical Innovation 2014). The community-dwelling older person with complex needs may have multiple medical diagnoses, may be unable to afford their medication and may have no stable support at home. Complexity directly affects an older person's ability to access and use the support required to address healthcare needs, experience a decent quality of life and continue to live in the community (Kuipers et al. 2011; Agency for Clinical Innovation 2014).

In Cairns, Far North Queensland, the interrelationship between health and context is evident. The Cairns region has a high rate of socioeconomic disadvantage (60% of the population is in the lowest two quartiles of disadvantage), an absolute proportion of Aboriginal and Torres Strait Islander peoples (referred to as Indigenous peoples for the purpose of this paper) almost fourfold that of the state average (14% vs 4% respectively) and a higher proportion of older people (Queensland Government 2018). Cairns also has the highest rate of potentially avoidable hospital admissions of any primary healthcare region of Queensland (Queensland Government 2018). Complexity at the population level places excess demand on all levels of the health system, producing fragmented services and gaps in care that ultimately result in poor health outcomes across the community (Foster et al. 2017).

An understanding of complexity transcends a purely medical approach to health outcomes and provides the basis for a well- connected, patient-focused approach to care. In consideration of this, this paper presents the health and social characteristics of community-dwelling older people within the Cairns region identified by their GP as having complex care needs and suitable for participation in the Older Persons Enablement and Rehabili- tation (OPEN ARCH) program (Kinchin et al. 2018). This paper details the relationship between social context, function and quality of life among participants of the OPEN ARCH program to not only assist in further analysis of the OPEN ARCH program, but also to inform possible future health and social care innovation for this population.

Methods

OPEN ARCH intervention

This paper discusses the characteristics of participants within the OPEN ARCH study (Kinchin et al. 2018). Funded by the Queensland Health Clinical Excellence Division and the North Queensland Primary Health Network, OPEN ARCH is an Australian-first model of care that aligns health and social care systems to provide pivotal access to preventative, coordinated multidisciplinary interventions for the older person with com- plex needs (Mann et al. 2020).

Study design

The OPEN ARCH study is a multicentre randomised controlled trial with a stepped wedge cluster design that was conducted in Far North Queensland between February 2018 and April 2019. GP 'clusters' (n ¼ 14; n ¼ 1–9 participants in each cluster) were randomised at baseline to three intervention conditions (steps) using a simple randomisation method. All participants commenced the trial with a baseline data collection and a control period. Detailed information on the OPEN ARCH study methodology, including study setting, stepped wedge design and recruitment is reported elsewhere (Kinchin et al. 2018). This paper reports baseline (pre-intervention) information collected from patient participants of the OPEN ARCH study. The OPEN ARCH study received ethics approval from the Far North Queensland Human Research Ethics Committee (HREC/17/QCH/104 – 1174). This study has been registered with the Australian New Zealand Clinical Trials Registry (ID: ACTRN12617000198325p).

Participants

GPs identified all patients within their practice who, through their clinical decision making, they deemed to be complex and at risk of functional decline, hospitalisation or institutionalised care. Of the patients identified, 92 were randomly selected and invited to participate in the study. Only patients who were community dwelling (not residing in a residential aged care facility) and .70 years of age if non-Indigenous and .50 years of age if Indigenous were eligible for inclusion in the study. In recognition of the specific health needs of Aboriginal and Torres Strait Islander people, the Commonwealth Government has determined that those aged 2:50 years are able to access aged care services (Australian Institute of Health and Welfare

(AIHW) 2019), and so were eligible for this study. Patients were excluded if they were residents of an aged care facility, currently under the care of a geriatrician, already receiving a program of coordinated care or had a cognitive deficit without a substitute decision maker. Participants who were eligible for the study were approached by their GP and provided verbal consent to be contacted by the OPEN ARCH team. An OPEN ARCH team member then facilitated a face-to-face meeting during which the participants were provided with a participant information form and the study was discussed. For those participants agreeing to participate in the study, written consent was obtained.

Data collection

Baseline data for all participants were collected as an in-person point-in-time assessment by six research assistants with nursing or allied health qualifications. The in-person assessment took approximately 60 min to complete with each participant. All data were self-reported. Approximately 1 month was taken to assess all study participants.

Functional independence was assessed through the Functional Independence Measure (FIM), an 18-item validated tool that quantifies physical, psychological and social function on scale ranging from 18 (total dependence) to 126 (total independence; University of Wollongong Australia 2020). The risk of hospitalisation was assessed through the validated Identification of Seniors At Risk – Primary Care (ISAR-PC) tool on a scale of 0–7.5, with scores .4 indicating increased risk, based on age, dependence in activities of daily living and memory function (Suijker et al. 2014). Quality of life (QoL) was assessed through the validated EQ-5D using a visual analogue scale from 0 (low QoL) to 100 (high QoL) (Oppe et al. 2014). Further information on the baseline data collection tools is available in Table S1, available as Supplementary Material to this paper.

Information about the number and type of appointments with community-based allied health, nursing and social support services was collected. The time period for these data was the 3-month period before each individual's baseline data collection date.

Data regarding the number of emergency department (ED) presentations and hospital admissions at the local public health service for each participant were provided by the Cairns and Hinterland Hospital and Health Service from routinely collected health service data within the casemix data collection system (Queensland Health 2010). The time period for these data was also the 3-month period before each individual's baseline data collection. For admitted patient data, admissions for haematology and renal dialysis were excluded.

Data analysis

Except for age, the continuous measures were not normally dis- tributed. As a result, these data are described using medians and interquartile ranges (IQRs). The Wilcoxon rank-sum test and Kruskal–Wallis one-way analysis of variance (ANOVA) were used to statistically compare the distribution of continuous measures between dichotomous and multilevel variables respectively. Where there were evident differences in median measures (e.g. QoL) by categories of variables (e.g. living situation), these tests of significance and their results are reported in the text. The number of person days in the study was considered as the number of participants multiplied by the number of days in the study before baseline (i.e. 90 days). This was calculated as a total and for each GP cluster. In cases where an individual had a hospital admission and/or ED presentation, the length of stay for these events was subtracted from their person days in the study. The incidence rate (rate) of ED presentations and hospital admissions were calculated as the number of events divided by the participant days in the study multiplied by 1000. Rates were compared between groups using incidence rate ratios (IRR) and tested using Poisson regression, with the number of events as the outcome variable and study days as the exposure variable.

Prior to the main analyses, confounding was explored by comparing relationships between demographic variables. These analyses are reported in the results section. When two variables were associated with each other and with an outcome, these were considered as potential

confounders and adjusted for during analyses. For example, age was associated with Indigenous status and both variables were significantly related to ED presentations. Significance was set at two-tailed $P < 0.05$ and all analyses were conducted using STATA 14 (StataCorp, College Station, TX, USA).

Results

Demographic characteristics

Twelve possible OPEN ARCH participants were unable to be contacted following initial GP consent and another 7 did not provide secondary consent for inclusion in the study. Thus, 92 patients were recruited to the OPEN ARCH study from 14 GPs. Following enrolment, 12 participants were removed from the study because they withdrew consent (n ¼ 7), commenced support through a separate enhanced care service (n ¼ 4) or changed GP (n ¼ 1). These 12 participants were broadly similar in age (median 81 years), sex (58% males) and Indigenous status (16% Indigenous) compared with the 80 participants who proceeded with the study (Table 1).

Among the 80 remaining participants, there were more females (55%) than males, and more than half the sample was aged .80 years (56.3%; Table 1). Indigenous people comprised 15% of the sample, with the median age of these participants (70.5 years; IQR 66.5–78 years) being 6.5 years less than that of non-Indigenous participants ($P < 0.001$; Table 1). Almost the entire sample (92%) was on either a full or part pension, and most lived with their partner (47.5%; Table 1). More than half the participants did not have a carer at baseline (56.3%; Table 1). In terms of the interrelationship between variables, the mean (±s.d.) age of Indigenous participants was significantly less than that of non-Indigenous participants (70.7 ± 2.3 vs 82.5 ± 0.6 years respectively; $P < 0.001$). Females were more likely to be living alone than males (47.3% vs 19.4% respectively; P ¼ 0.023) and less likely to be cared for by a family member (15.9% vs 44.4% respectively; P ¼ 0.039; Table 1). Indigenous participants were more likely to be living with family members than non-Indigenous participants (41.7% vs 13.2% respectively; P ¼ 0.021). Living situation and caring situation were also related, because most participants living alone did not have a carer (89.3%) compared with those who lived with family (42.9%; P ¼ 0.017; Table 1).

INSERT TABLE 1 HERE

Health conditions

The median number of health conditions listed by the GP on referral was 7 per person for both males and females, as well as Indigenous and non-Indigenous participants (Table S2). Hypertension was the most commonly reported condition across the entire sample, with 72.7% of Indigenous and 38.7% of non-Indigenous participants' GP referrals containing this diagnosis. Osteoarthritis among non- Indigenous participants (37.1%) and hyperlipidaemia (72.7%) amongst Indigenous participants were as commonly reported as hypertension. There were two participants who had any type of cognitive decline included on their referral.

QoL, functional independence and risk of hospitalisation

The median QoL score was higher among females than males (80 vs 70 respectively; P ¼ 0.05) and for people living alone compared with those living with family (80 vs 60 respectively; P ¼ 0.094; Table 2). Functional independence, using the FIM, was ranked higher among non-Indigenous than Indigenous participants (median 122 and 115 respectively; P ¼ 0.094). The total median ISAR-PC score (4; IQR 2.5–5.5) identified that many participants were at risk of hospitalisation (i.e. ISAR-PC .4). Indigenous participants were the only partici pant group that recorded a median ISAR-PC score ,4 (Table 2), although this group was also younger than non- Indigenous participants and the difference in ISAR-PC scores was not significant (P ¼ 0.269). Those participants living with family had a significantly higher median ISAR-PC score than living alone or with a partner (5.5 vs 4 and 4 respectively; P ¼ 0.018).

ED presentations and hospital admissions

There were 22 ED presentations for 11 individuals during the 3-month time window preceding baseline data collection (3.10 presentations per 1000 person days; Table S2). Age was negatively associated with ED presentations, with the rate highest in the younger age groups (i.e. ,70 years; IRR 0.91, 95% confidence interval (CI) 0.87–0.96, P , 0.001). The rate of presentation to the ED by Indigenous participants was sevenfold greater than that of non-Indigenous participants (11.47 (95% CI 5.93–20.03) and 1.65 (95% CI 0.79–3.04) per 1000 person days respectively; Table S2), and the difference remained significant after adjusting for age, albeit with wide CIs (adjusted (a) IRR 5.10, 95% CI 1.60–16.22, P ¼ 0.006).

There were 21 hospital admissions during the pre-baseline period (2.96 per 1000 person days, 95% CI 1.83–4.52 per 1000 person days), with the rate negatively associated with age. Although the rate for Indigenous participants was higher than that for non-Indigenous participants after adjusting for age, the difference was not significant (aIRR 1.52, 95% CI 0.39–5.93, P ¼ 0.540). Those residing with family had a significantly higher rate of hospital admissions than those living with a partner (7.46 (95% CI 2.59–12.34) vs 1.17 (95% CI 0.02–2.33 per 1000 person days) respectively). This association remained after adjusting for age, albeit with wide CIs (aIRR 5.02, 95% CI 1.47–17.14, P ¼ 0.010) and after adjusting for Indigenous status (aIRR 3.47, 95% CI 1.37–8.75, P ¼ 0.041).

Health and social service utilisation

Almost two-thirds of participants (61.3%) received support to remain living in the community, with domestic assistance (e.g. home cleaning) the most commonly used service (45% of participants; Table S2). Participants tended to access these services through the Community Home Support Program (43.7% of participants) rather than a coordinated Home Care Package (7.6%). Approximately 44% of participants accessed allied health services in the 3-month baseline period, with podiatry the most commonly used health intervention (31.3% of those who received allied health services). Few participants had engaged restorative allied health interventions, with only 6.3% having seen a physiotherapist and 5% having participated in an exercise group during the data collection period.

Variation in participant characteristics between general practices

Table 3 indicates substantial variability between the participants from each OPEN ARCH GP (cluster). For example, six of the 14 GP clusters included participants who identified as Indigenous, with two clusters comprising entirely Indigenous participants (Table 3). There was also substantial variability in median age and sex, caring situation and function; for example, median FIM scores range from 106 to 126 and the presence of a carer varied from 12.5% to 66.6% of participants in the cluster (Table 3). Cluster 6 is notable for the low median ISAR-PC score of 2.5 among this group of 8 participants, as is Cluster 7, with a median FIM score of 126 indicating full independence within this group (Table 3).

Discussion

The aim of this paper was to present the health and social characteristics of community-dwelling older people within the Cairns region identified by their GP as having complex needs. The results of this descriptive study indicate that, collectively, the older person with complex needs is likely to be female, .80 years of age and in receipt of a pension. The older person is likely to live with his or her partner and maintains functional independence despite the presence of multiple comorbidities.

Despite this collective view, distinct variability within health and contextual characteristics deserves attention, particularly when considering Indigenous status. The results of this study are consistent with those found nationally: Aboriginal and Torres Strait Islander (Indigenous) peoples have a lower life expectancy, less access to health and social supports, experience a higher rate of dementia and have a greater prevalence of multi- morbidity than their non-Indigenous peers (AIHW 2015). These factors influence QoL and well-being; Indigenous people are half as likely to assess their health as very good or excellent (AIHW 2018; Butler et al. 2019).

Previous hospital utilisation was not a consistent indicator of complexity. In fact, only a handful of participants in this study contributed to the absolute number of ED presentations and hospitalisations. This finding is not consistent with the literature. Contextual themes such as rurality, socioeconomic disadvantage, age and ethnicity have been found elsewhere to be associated with high rates of potentially avoidable hospitalisations (Ansari 2007; Katterl et al. 2012). The results of the present study could be explained by there being no eligibility criteria for prior hospital utilisation and the advertised preventative nature of the OPEN ARCH program.

Each of the OPEN ARCH GPs consistently referred patients with multiple comorbidities. This is not unexpected; managing multimorbidity, chronicity and severity is challenging for the health system, particularly the GP as the primary contact physician (Beswick et al. 2008; Herzog et al. 2015). Applying standardised guidelines to medically complex circumstances is difficult, and polypharmacy is common (Bird et al. 2007; Beswick et al. 2008). Multimorbidity is directly associated with a decline in independence and reduced QoL, the management of which requires a function-focused approach to care (Poulos and Poulos 2019).

Insert table 2 here

Insert table 3 here

Despite the known impact of multimorbidity on function, this study found that GPs did not engage the assistance of restorative or re-ablement programs of care. Physiotherapy and occupational therapy are examples of interventions that, alongside medical management from the GP, can optimise physical and cognitive function (Poulos and Poulos 2019). This finding has significant clinical implications for the older person who relies on their GP to identify and refer for interventions most likely to impact the capacity for continued community living.

Although not found to be statistically significant, the difference in QoL scores between those participants living alone and those living with family is of note. Informing this result is likely to be the lower functional independence and higher rate of hospitalisation of participants living with family. The literature suggests that poor physical functioning is associated with a lower QoL and that for women the subsequent reduced participation in daily activities, such as meal preparation and finances, has a significant negative effect on QoL (Fusco et al. 2012). In response to this, programs that maintain social, mental and physical wellness during life course transitions (e.g. a move from independent to family living) are becoming increasingly important in Australia (Cubit and Meyer 2011).

The broader OPEN ARCH study did not present a preconceived notion of the community-dwelling older person with complex needs, beyond that described in the eligibility criteria. GPs at the front line of patient care are well placed to identify those older people who are most vulnerable to functional decline, hospitalisation or institutionalised care. GPs identified many patients with complex medical and social needs to OPEN ARCH, yet distinct variability among participants was evident, particularly related to living and caring situations. This is consistent with the findings of Drewes et al. (2014), who identified that GPs share a unique perspective on medical complexity but differ in the way they interpret function and social context (Drewes et al. 2014).

Given the contextual nature of complexity, there is a pressing need for GPs to be given tools to identify and address complex presentations in primary care. The literature suggests that although physicians recognise the impact of psychosocial con- text on health, they will often avoid questioning about these domains because they are unsure of how to intervene (Andermann 2016). The ISAR-PC was used in this study as a post-referral measure of complexity but was not a good fit for the Cairns population because of its inability to identify those younger Aboriginal and Torres Strait Islander people at risk of hospitalisation. A scoping review by Marcoux et al. (2017) identified 14 screening tools to help GPs identify patients with complex needs, with medical domains the most frequently cited, and only one specific to the Australian context but limited in its transferability to older people.

Limitations

This is a small study of 80 participants, but it does provide evidence for closer investigation of the concept of complexity among GPs. Collection of health and social support data by self-report compromised the accuracy of these data. The QoL of people with cognitive deficit is underrepresented in the sample because the EQ-5D visual analogue scale was not completed if it could not be answered independently. Accurate reporting for Aboriginal and Torres Strait Islander participants may have been compromised in this study. For example, the EQ-5D has not been validated for use by Indigenous people, for whom connection with their inner spirit is central to QoL (Smith et al. 2020). Furthermore, the ISAR-PC is designed for people over the age of 75 years and, as such, was not an appropriate tool to measure the risk of hospitalisation for many Indigenous participants. Unfortunately, due to small cell sizes, it was not possible to examine the confounding effect of certain variables. For example, living situation and caring situation were interrelated and both were associated with the ISAR-PC scores.

Conclusion

An understanding of complexity among older people transcends a purely medical approach to health outcomes and provides the basis for a well-connected, patient-focused approach to care. This study identified that older people with complex needs may not present frequently to the ED but are people for whom multimorbidity, cultural context and access to formal and informal social supports interact to create a vulnerability to functional decline, placing them at increased risk of hospitalisation and institutionalised care. An inability to identify complexity among community-dwelling older people is a missed opportunity for care that is responsive, preventative and com- prehensive. GPs are vital to older people's care, but must be supported by a coordinated approach to the identification and management of complex needs that helps the older person to maximise their function and to live at home for longer.

Conflicts of interest

Acknowledgements

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Table 1. Demographic and domestic characteristics of participants in the Older Persons Enablement and Rehabilitation (OPEN ARCH)study (n580)

Data are given as median [interquartile range] or n (%). FIM, Functional Independence Measure (scale 18–126); ISAR-PC, Identification of Seniors At Risk – Primary Care tool (scale 0–7.5, scores.4 indicate increased risk); QoL, quality of life, evaluated using the EQ-5D visual analogue scale from 0 to 100;,5, fewer than five observations, numbers not published to preserve participant anonymity

Sex	
Male	36 (44)
Female	44 (55)
Age (years)	81 [77–85]
Males	82.5 [77–86]
Females	80 [77.5–84.5]
Non-Indigenous	83 [78–86.5]
Indigenous	70.5 [66.5–78]
Age group (years)	
50-69	6 (7.5)
70-79	29 (36.3)
80-89	38 (47.5)
90+	7 (8.8)
Indigenous status	
Non-Indigenous	68 (85)
Indigenous	12 (15)
Income	
Pension	57 (71.3)
Self-funded	6 (7.5)
Part-pension	17 (21.3)
Living situation	
Alone	28 (35)
With partner	38 (47.5)
With family	14 (17.5)
Caring situation	
No carer	53 (56.3)
Family carer	23 (28.8)
Cares for others	<5
Other	< 5
ISAR-PC score	4 [2.5–5.5]
QoL score	70 [57.5–80]
FIM score	121 [115–124]

Table 2. Exploration of the association between demographic variables and quality of life, functional performance, risk of hospitalisation, emergency department presentations, hospitalisations and the utilisation of home and allied health services

*P,0.05, **P,0.01. ED, emergency department; FIM, Functional Independence Measure (scale 18–126); IQR, interquartile range; IRR, incidence rate ratio; ISAR-PC, Identification of Seniors At Risk –Primary Care tool (scale 0–7.5, scores .4 indicate increased risk); QoL, quality of life, evaluated using the EQ-5D visual analogue scale from 0 to 100; z, two-sample Wilcoxon rank-sum (Mann–Whitney) test; x2, Kruskal–Wallis or Chi-squared test for independence; ,5, fewer than five observations, numbers not published to preserve participant anonymity

	Median QoL [IQR]	Median FIM score [IQR]	Median ISAR-PC score [IQR]	Rate of ED presentations (per 1000 person days (95% CI)	Rate of hospitalisations (per 1000 person days) (95% CI)	No. using home support services (%)	No. using allied health services (%)
Indigenous status							
Non-Indigenous (reference)	70 (60–80)	122 (116.5–124)	4 (3–5.5)	1.65 (0.63–2.68)	1.82 (0.74–2.89)	42 (61.8)	29 (42.7)
Indigenous	70 (50–80)	115 (110–119)	2.5 (2.5–4.5)	11.47 (4.98–17.96)	9.55 (3.63–15.48)	7 (58.3)	6 (50)
Test value	$z \frac{1}{4} 0.527$	$z \frac{1}{4} 1.676$	$z \frac{1}{4} 1.104$	IRR 6.94 (2.99–16.07)**	IRR 5.25 (2.23–	$x^2 \frac{1}{4} 0.050$	$x^2 \frac{1}{4} 0.224$
					12.38)**		
Sex							
Male (reference)	70 (59–75)	121 (108–125)	4 (2.5–5.5)	4.11 (1.87–6.34)	2.21 (0.57–3.85)	20 (55.6)	15 (41.7)
Female	80 (60–85)	121.5 (117–124)	4 (2.5–4.5)	2.28 (0.79–3.78)	3.56 (1.69–5.42)	29 (65.91)	20 (45.45)
Test value	$z \frac{1}{4}$ 1.960	$z \frac{1}{4}$ 0.544	$z \frac{1}{4} 0.986$	IRR 0.55 (0.23-1.30)	IRR 1.60 (0.64–3.98)	$x^2 \frac{1}{4} 0.894$	$x^2 \frac{1}{4} 0.115$
Living situation							
Alone (reference)	80 (65–90)	123 (119.5–125)	4 (2.5–5.5)	3.20 (0.98–5.42)	3.12 (0.98–5.42)	21 (75)	17 (60.7)
With family	60 (50–70)	112 (80–117)	5.5 (4–7.5)	5.81 (1.50–10.11)	7.46 (2.59–12.34)	8 (57.1)	13 (92.9)
Test value				IRR 1.81 (0.65–5.00)	IRR 2.33 (0.90–6.04)		
With partner	70 (60–80)	121 (116–124)	4 (1.5–4)	2.06 (0.53–3.59)	1.17 (0.02–2.33)	20 (52.6)	5 (13.2)
Test value	$x^2 \frac{1}{4} 4.728$	$x^2 \frac{1}{4} 12.797$**	$x^2 \frac{1}{4} 7.983$*	IRR 0.64 (0.23–1.77)	IRR 0.36 (0.11–1.22)	$x^2 \frac{1}{4} 3.519$	$x^2 \frac{1}{4} 5.046$
Caring situation							
Family carer (reference)	55 (50–70)	109.5 (94–121)	5.5 (4–7.5)	5.49 (2.24–8.73)	2.99 (0.60–5.39)	13 (56.5)	9 (39.1)
No carer	78 (65–85)	123 (118–125)	(2–4)	2.32 (0.95–3.69)	3.16 (1.56–4.77)	35 (66)	25 (47.2)

Test value				IRR 0.42 (0.18–0.97)*	IRR 1.05 (0.41–2.72)		
Cares for others	75 (70–92)	125 (123–126)	1.5 (1.5–4)	0.0	0.0	1 (33.3)	1 (33.3)
Other	50 (50–50)	119 (119–119)	4 (4–4)	0.0	0.0	,5	,5
Test value	x^2 ¼ 12.593	x^2 ¼ 23.784**	x^2 ¼ 17.835**			x^2 ¼ 3.294	x^2 ¼ 1.361
Income							
Pension (reference)	75 (60–85)	121 (114.5–124)	4 (2.5–5.5)	3.57 (1.92–5.22)	3.77 (2.08–5.47)	34 (59.7)	31 (54.4)
Part-pension	70 (50–80)	122 (117–124)	4 (3–4)	2.62 (0.05–5.20)	1.31 (0.51–3.13)	12 (70.6)	,5
Test value				IRR 0.73 (0.24–2.17)	IRR 0.34 (0.08–1.49)		
Self-funded	67.5 (60–70)	122 (105–125)	4 (1.5–6)	0.0	0.0	,5	,5
Test value	x^2 ¼ 1.509	x^2 ¼ 0.237	x^2 ¼ 0.701			x^2 ¼ 1.006	x^2 ¼ 10.111**

Table 3: **Variations in selected demographic variables, functional independence and quality of life of participants in the Older Persons Enablement and Rehabilitation (OPEN ARCH) study by cluster (GP)**

Unless indicated otherwise, data are given as *n* (%). ED, emergency department; FIM, Functional Independence Measure (scale 18–126); IQR, interquartile range; ISAR-PC, Identification of Seniors At Risk – Primary Care tool (scale 0–7.5, scores .4 indicate increased risk); QoL, quality of life, evaluated using the EQ-5D visual analogue scale from 0 to 100; ,5, fewer than five observations, numbers not published (np) to preserve participant anonymity. Demographic and living and caring information was also suppressed at the cluster level for participant anonymity.

Cluster	No participants	No person days	n	ED presentations rate (per 1000 person days)	n	Hospitalisations rate (per 1000 person days)	Median age [IQR] (years)	Male Sex	Indigenous	Lives alone	Family carer	Median ISAR-PC score [IQR]	Median FIM score [IQR]	Median QoL score [IQR}
Step 1														
5	8	714	2	2.80	2	2.80	82.5 [77.5–88.5]					4 [2.75–7.5]	123.5 [120–125]	77.5 [65–82.5]
7	9	807	1	1.24	1	1.24	82 [78–83]					4 [1.5–4]	126 [122–126]	80 [70–85]
9	,5	np	1	np	0	0.00	67 [67–67]					2.5 [2.5–2.5]	110 [110–110]	40 [40–40]
13	8	720	0	0.00	0	0.00	78.5 [77–83.5]					4 [2.75–5.75]	121 [115.5–122]	75 [70–80]
14	,5	np	2	np	1	np	79 [73–82]					4 [2.5–4]	107 [79–115]	70 [70–70]
Total	29	2585	6	2.32	4	1.55	79 [77–84]	10 (34.4)	6 (20.6)	12 (41.3)	8 (27.5)	4 [2.5–5.5]	121 [114–126]	75 [70–80]
Step 2														
2	,5	np	4	np	4	np	82 [78.5–87]					4.75 [2.75–5.5]	116 [106–124.5]	50 [45–60]
3	6	501	0	0.00	1	2.00	88 [87–92]					6.5 [5.5–7.5]	117 [64–122]	62.5 [50–90]
8	8	720	0	0.00	0	0.00	77.5 [73–78.5]					4 [3.25–5.75]	117 [110.5–120.5]	72.5 [35–90]

10	,5	np	0	0.00	0	0.00	82 [78–83]					4 [1.5–4]	122 [121–123]	80 [60–92]
11	5	432	9	20.84	9	20.84	68 [66–73]					3.5 [2.5–5]	116.5 [113–122.5]	60 [50–60]
Total	26	2276	13	5.71	14	6.15	78.5 [74–87]	14 (53.8)	6 (23.0)	6 (23.0)	12 (46.1)	4 [3.5–5.5]	118 [112–123]	60 [50–80]
Step 3														
1	8	715	1	1.40	1	1.40	82 [78–85]					4 [2.5–5.5]	124.5 [110–125.5]	70 [70–85]
4	5	446	2	4.49	2	4.49	85 [85–85]					5.5 [3–5.5]	123 [122–124]	79 [64–85]
6	8	720	0	0.00	0	0.00	80.5 [78.5–83]					2.5 [1.5–4]	121.5 [120–123]	72.5 [40–92.5]
12	,5	np	0	0.00	0	0.00	87 [82–89.5]					4 [3–5.25]	122.5 [114.5–123]	60 [45–80]
Total	25	2240	3	1.34	3	1.34	83 [80–86]	12 (48)	0 (0)	10 (40)	3 (12)	4 [2–5]	122 [120–124]	72.5 [60–85]
All	80	7101	22	3.10	21	2.96	81 [77–85]	36 (45)	12 (15)	28 (35)	23 (28.7)	4 [2.5–5.5]	121 [115–124]	70 [57.5–80]