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Value-based health care for Aboriginal peoples with chronic conditions in the Northern Territory: a cohort study

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ABSTRACT

Objective. This study aimed to investigate associations between patient activation, healthcare use and clinical outcomes for Aboriginal peoples living with a chronic condition in remote Northern Territory (NT) communities. **Methods.** A retrospective cohort study was undertaken between 2 April 2020 and 1 April 2022 to measure activation and its associations with chronic conditions secondary prevention treatment targets and healthcare usage: hospitalisations, potentially preventable hospitalisations and patient travel. All Aboriginal peoples enrolled at NT Government health services, who had one or more preventable chronic conditions and were prescribed one or more oral chronic condition medications identified in the Primary Care Information System, were included in the study. Patient activation was defined as a 90-day medicine possession ratio ≥80%. An activated patient has the belief, knowledge, skills and behaviours to manage their chronic conditions. **Results.** A total of 5356 patients met the inclusion criteria; 9% of these patients were activated. Activated patients were older and sicker but were significantly more likely to achieve treatment targets for glycosylated haemoglobin, blood pressure and total and low-density lipoprotein cholesterol. Activated patients used more primary healthcare and outpatient resources and had a non-significant trend for less acute care use. **Conclusions.** The remote NT Government primary healthcare system is providing low-value chronic conditions care for patients. As identified by Aboriginal peoples, strengthening culturally appropriate self-management support could lead to more patients becoming activated, better health outcomes and decreased acute care demand.

Keywords: health policy, Indigenous health, primary health care.

Introduction

In the Northern Territory (NT), chronic conditions account for 80% of the gap in life expectancy between Aboriginal and non-Aboriginal peoples.[1] Aboriginal peoples suffer a burden of disease 3.4 times that of non-Aboriginal people,[2] and a preventable hospitalisation rate for chronic conditions 4.3 times higher than that of non-Aboriginal people.[3] Over 30% of the NT population of 250,398 identify as Aboriginal peoples, of whom more than 75% reside in remote or very remote areas.[4]

Remote primary health care (PHC) in the NT is predominantly provided by the NT Government and Aboriginal Community Controlled Health Organisations. Remote communities vary in population size from less than 70 to 3000 people and vary in environmental landscape from desert to equatorial, leading to unique logistical service challenges including a high burden of acute care and staff turnover.[5] The NT Government provides PHC services in 52 remote health clinics and custodial settings to approximately 23,000 Aboriginal patients. Remote health clinics in the NT are

predominantly run by remote area nurses and Aboriginal Health Practitioners, with remote medical practitioner services delivered on a fly/drive in/out basis. In addition to the delivery of PHC services, remote clinics provide pharmacy services, population and public health programs, after-hours acute care and emergency retrieval services.[6]

Aboriginal peoples in the NT have identified significant shortcomings in the remote PHC system.[7] The current model of PHC is described as having poor access, low acceptability, inadequate patient education and poor cultural safety. This erodes trust in health services, leading to disengagement and poor health outcomes.[7] Value-based health care (VBHC) provides a method to quantify the value and resulting (in)efficiency of health care by identifying and measuring health outcomes that matter to patients.[8] A key gap, identified by Aboriginal patients in the current remote PHC model, is culturally appropriate self-management support.[7] It is unknown what impact the gap in self-management support is having on patient activation in chronic care and the use of healthcare resources.

Self-management support is a pillar of the Chronic Care Model[9] and critical to VBHC, as it must align with what matters to patients (their preferences), to lead to a high level of activation to effectively self-manage chronic conditions. An activated patient has the belief, knowledge, skills and behaviours (including medication adherence) to manage their chronic conditions.[10] Higher levels of activation are associated with reaching treatment targets for chronic conditions, preventative health behaviours and preventative care, while lower levels of activation are associated with delays in accessing care, unfilled prescriptions, low medications possession ratio (MPR) and inattention to medical needs.[11,12] The Patient Activation Measure has been validated internationally to measure patient activation,[10] with items directly and indirectly related to medication and treatment and behaviour change; however, it has not been validated for Aboriginal peoples. In lieu of a validated measure of activation for Aboriginal peoples, a health behaviour indicative of activation is adherence to prescribed medications, using MPR as a proxy marker for activation.

Using MPR as a pragmatic proxy marker for patient activation, our objectives are to investigate associations between activation and (i) achieving chronic conditions secondary prevention treatment targets and (ii) healthcare usage.

Methods

Study design

A retrospective cohort study was undertaken between 2 April 2020 and 1 April 2022 and reported in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement.[13]

Participants

Inclusion criteria for this study were Aboriginal patients enrolled at an NT Government PHC clinic, alive for the whole study period, with one or more chronic conditions (autoimmune diseases, cancer, cardiovascular disease, diabetes, disability, infectious diseases, lung disease, musculoskeletal disease, renal disease and rheumatic heart disease) and who were prescribed one or more oral medications for chronic conditions. Exclusion criteria were dialysis patients, as there was a lack of access to medication dispensing data and distortion of hospitalisation rates due to each dialysis session being recorded as a hospital admission. Patients with MPR >120% were deemed as data entry errors and were excluded.

Data extraction

The NT Government uses a single electronic health record system – Primary Care Information System (PCIS) to document chronic care, including quantifying chronic conditions medications dispensed. Upon diagnosis of a chronic condition, based on the Central Australian Remote Practitioners Association (CARPA) standard treatment manual[14] used in remote PHC, the diagnosis is recorded within PCIS. Medication dispensing episodes were counted as face-to-face consultations.

PCIS data extracted included age, sex, ethnicity, number of PHC face-to-face consultations, non face-to-face consultations (e.g. telehealth, chart reviews etc.), provider profession, number of chronic conditions, prescribed medications and MPR. Clinical results extracted included systolic and diastolic blood pressure (SBP and DBP), glycated haemoglobin (HbA1c), total and low-density lipoprotein (LDL) cholesterol and albumin-creatinine ratio (ACR). PCIS data were extracted covering the 2-year study period.

Secondary prevention targets were sourced from the CARPA standard treatment manual: SBP <130 mmHg; DBP <80 mmHg; HbA1c ≤7.0%; total cholesterol <4.0 mmol/L; LDL cholesterol <2.0 mmol/L; ACR for microalbuminuria <3.5 mg/mmol (female, F) and <2.5 mg/mmol (male, M); and ACR for macroalbuminuria <35 mg/mmol (F) and <25 mg/mmol (M).[14]

At a patient level, MPR is the number of days' worth of medication supplied to a patient over the previous 90 days (MPR90).[15] In lieu of a validated measure of activation for Aboriginal peoples, MPR90 ≥80% was used as a proxy marker for activation for the NT, because adherence to prescribed medications is a behaviour consistent with effective self-management.[16] MPR was calculated on 1 April 2022.

Linked hospitalisation data (inpatient, outpatient, emergency department and associated patient travel) between 2 April 2020 and 1 April 2022 were extracted from the NT Government inpatient data collection for all six NT public

hospitals. Potentially preventable hospitalisation (PPH) for chronic conditions were identified using ICD-10 codes.[17] Patient travel undertaken by medical retrieval services (transfer of critically ill patients from remote areas within the NT) were provided by the NT Government between 2 April 2020 and 1 April 2022 for the same period, linked via a unique patient identifier.

Statistical analysis

Statistical tests of association (unpaired *t*-test, chi-squared, Wilcoxon rank-sum test, *z*-score between Poisson rates and two-proportion *z*-test) were used to assess patient activation against categorical outcomes, proportions and rates for demographics and healthcare usage over 2 years. Odds ratio was used to determine associations between patient activation and secondary prevention treatment targets. Analysis was performed using Stata SE 17.0 and Microsoft Excel 2016.

Ethics

Ethics approval was granted by the Human Research Ethics Committee of NT Health and Menzies School of Health Research (HREC-2020-3934).

Results

Between 2 April 2020 and 1 April 2022, 5356 patients met the inclusion criteria (Fig. 1), of whom 2764 were female and 2592 were male. Ninety-four patients were excluded from the study as per the above exclusion criteria (Fig. 1). Two patients had missing MPR data, for which 0 was imputed. Of the study participants, only 9% (n = 498) were found to be activated and 91% (n = 4858) were found to be unactivated (Table 1). The mean and median patient age were 53 years for activated patients, significantly higher than for unactivated patients (mean of 48.5 years old and median of 49 years old).

Chronic conditions secondary prevention

Patient activation was associated with living with a greater number of preventable chronic conditions and number of medications prescribed (Table 1). However, patient activation was significantly associated with achieving chronic condition secondary prevention treatment targets for SBP, DBP, HbA1c, total cholesterol and LDL cholesterol in both males and females and microalbuminuria in females (Table 2).

Healthcare usage

Patient activation was significantly associated with more episodes of PHC and a higher rate of hospital outpatient visits. As a corollary of greater ambulatory care, non-

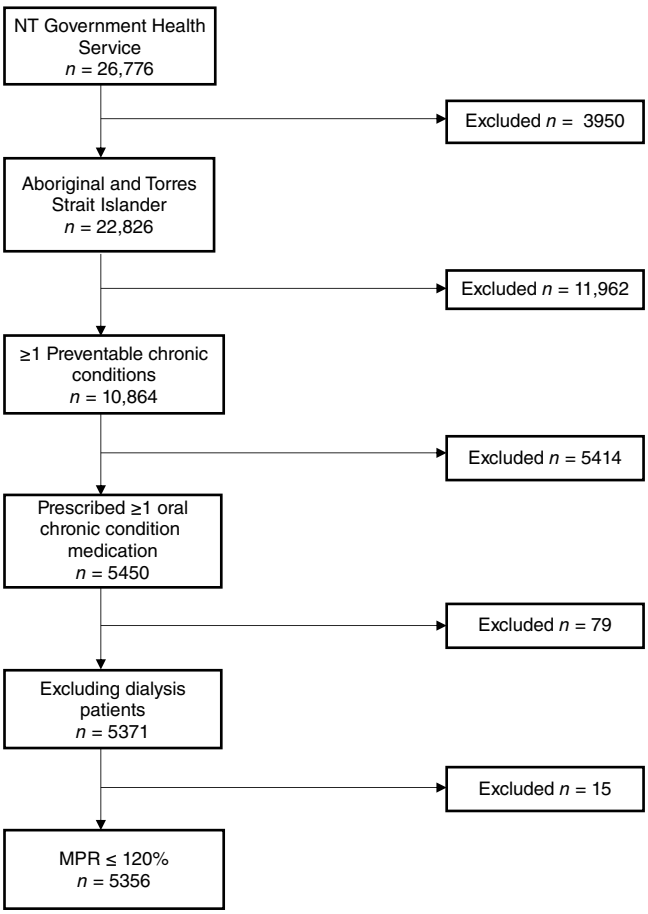

Fig. 1. Study population.

significant trends for decreased use of acute care were observed; activated patients had lower rates of hospitalisation, PPH and emergency department care (Table 3). Patient activation was significantly associated with a higher rate of medical retrievals, however, with a lower non-significant trend of patient travel, inclusive of inpatient, outpatient and emergency department episodes of care.

Discussion

Aboriginal patients in the NT have voiced dissatisfaction over the current PHC model, specifically the lack of self-management support for chronic conditions.[7] Poor access, low acceptability, inadequate patient education and cultural safety have all been identified as further areas of dissatisfaction.[7] In lieu of a validated measure of patient activation for Aboriginal peoples, we used MPR as a proxy marker of activation to determine whether the remote PHC system is delivering value for Aboriginal patients with a chronic condition.

We found 9% of patients with chronic conditions were activated, significantly lower than comparable adherence rates (51%) reported in the general Australian population.[18]

Table 1. Patient demographics and healthcare use over 2 years.

Characteristic	Patient activation		*P*-value
	MPR90 <80% *n* (%)	MPR90 ≥80% *n* (%)	
Total number of patients	4858 (90.70)	498 (9.30)	
Sex			
Female	2521 (51.89)	243 (48.80)	0.173
Male	2337 (48.11)	255 (51.20)	
Age in years			
Mean (s.d.)	48.49 (13.52)	53.54 (12.72)	<0.001
Median (IQR)	49 (39–57)	53 (45–62)	<0.001
Preventable chronic conditions			
1	1104 (22.73)	61 (12.25)	<0.001
2	1247 (25.67)	96 (19.28)	
≥3	2507 (51.61)	341 (68.47)	
Number of medications			
1	1087 (22.38)	41 (8.23)	<0.001
2	916 (18.86)	77 (15.46)	
3	898 (18.48)	93 (18.67)	
4	892 (18.36)	123 (24.70)	
≥5	1065 (21.92)	164 (32.93)	

MPR90, medication possession ratio over a 90 day period. s.d., standard deviation; IQR, interquartile range.

Table 2. Association between patient activation and achieving treatment targets.

Chronic condition treatment target	Odds ratio (95% CI)
Systolic blood pressure (<130 mmHg)	1.30 (1.06–1.60)
Diastolic blood pressure (<80 mmHg)	1.23 (1.01–1.50)
Glycated haemoglobin (≤7.0%)	1.87 (1.47–2.38)
Total cholesterol (<4.0 mmol/L)	2.05 (1.67–2.52)
Low-density lipoprotein (<2.0 mmol/L)	2.1 (1.70–2.58)
Albumin creatinine ratio (<3.5 mg/mmol) (F)	1.49 (1.10–2.01)
Albumin creatinine ratio (<2.5 mg/mmol) (M)	1.04 (0.76–1.42)
Albumin creatinine ratio (<35 mg/mmol) (F)	1.33 (0.96–1.82)
Albumin creatinine ratio (<25 mg/mmol) (M)	1.11 (0.81–1.51)

F, female; M, male; CI, confidence interval.

Activated patients were older, had more chronic conditions and more medication prescribed – that is, they were more unwell; however, they achieved better clinical outcomes. As expected, activated patients also used more healthcare resources in PHC, outpatients and patient travel. Although not significant, there was a trend favouring lower rates of hospitalisation, PPH and emergency department episodes of care and a lower rate of PPH. Notably, unactivated patients also used a high amount of PHC and outpatient care, providing ample opportunities for 'activation' if the model of remote PHC can be adjusted to suit Aboriginal patient preferences for cultural safety and self-management support.

Table 3. Healthcare usage over 2 years.

Characteristic	Patient activation		*P*-value
	MPR90 <80% *n* (%)	MPR90 ≥80% *n* (%)	
Inpatient hospitalisation			
Total EOC	6435	648	
Rate per 1000 patient years	662.31	650.60	1.00
Proportion ≥1 hospitalisation	0.46	0.48	0.22
Mean inpatient EOC per patient	2.99	2.65	0.44
PPH	573	57	
PPH rate per 1000 patient years	58.97	57.23	1.00
Proportion ≥1 PPH	0.06	0.07	0.42
Primary health care			
EOC	302,346	53,515	
Mean EOC (s.d.)	62.24 (49.46)	107.46 (111.96)	<0.001
Median EOC	51	81	
Hospital outpatients			
Total EOC	13,933	1962	
Rate per 1000 patient years	1434.03	1969.88	<0.001
Proportion ≥1 EOC	0.58	0.70	<0.001
Mean outpatient EOC per patient	4.96	5.61	0.58
Patient travel			
Total medical retrievals[A] retrievals	1403	160	
Rate of medical retrievals[A] per 1000 patient years	144.40	160.64	<0.001
Proportion ≥1 medical retrieval[A]	0.19	0.21	0.17
Mean EOC[B] requiring patient travel per patient	14.01	13.40	0.45
Emergency department			
Mean ED EOC per patient	3.62	3.20	0.44

EOC, episode of care; PPH, potentially preventable hospitalisation due to angina, hypertension, congestive cardiac failure, diabetes, chronic obstructive pulmonary disease and rheumatic heart disease; MPR90, medication possession ratio over a 90 day period; s.d., standard deviation; ED, emergency department.
[A]Patient travel provided by medical retrieval service.
[B]Inpatient, outpatient or emergency department EOC.

Our study supports previous findings that patient activation is associated with achieving treatment targets for blood pressure and lipids.[11,19] Studies by Harvey and colleagues in Aboriginal communities in South Australia similarly found patient activation is associated with improvements in treatment targets (HbA1c, body mass index, triglycerides, total cholesterol and LDL), a decrease in the number of general practice, specialist and hospital visits ($P \leq 0.05$) and a significant improvement in inpatient self-management and skill following self-management support.[20,21] In contrast, the activation-associated increase in PHC contacts observed in our study includes medication dispensing episodes, a finding that is expected in the remote model of PHC that includes pharmacy services.

Our work helps identify an opportunity cost of failing to implement effective self-management support programs for remote and vulnerable populations in the NT. The result shows the current system is acute-care focused, inefficient in chronic conditions care, inappropriate and likely of low value to patients.[7] Self-management support was an identified priority in the NT Chronic Conditions Prevention and Management Strategy 2010–2020; however, responsibility for implementation was unclear.[22] If younger patients with less chronic conditions were activated, then cost savings could accrue due to prevention or delay of chronic condition complications. Further research is required to understand the financial implications of improving self-management support and improving patient activation in a costly healthcare delivery environment.

The strengths of this study are the completeness of the PCIS data, data linkage across the health system, a high level of Aboriginal identification and remote PHC clinics acting as the sole dispensary of chronic condition medications. This enabled person-level analysis across the health system. Activated patients achieving treatment targets would be expected to confer a survival advantage, however, a limitation of our study is that survival analysis was not possible due to the short timeframe and small sample size. Noting the value of a statistical life year, A$227,000,[23] we suggest longitudinal research on patient activation outcomes in remote Aboriginal PHC warrants consideration. The absence of a validated instrument to assess patient activation in Aboriginal PHC settings is a further limitation. While we have attempted to capture this concept through a pragmatic proxy, the development of an instrument for use in Aboriginal PHC settings would contribute greatly to service evaluation and improvement, particularly for services where dispensing data is not routinely available. Further prospective research over longer time frames, inclusive of Aboriginal patient perspectives, is required to further understand associations between activation, health service use and health outcomes. Finally, activation was only assessed once in this study. MPR is tracked as a routine service metric across our system and there has been a persistently low activation rate of around 9% between April 2020 and April 2022.

Our study provides a novel application of VBHC methods to Aboriginal PHC. First, by using a patient-centred proxy for activation, we were able to quantify current activation levels or inefficiency of current chronic care that was previously unknown, with 91% of patients remaining unactivated despite significant service engagement. Although our activated cohort were older and sicker and used greater resources, they achieved better clinical outcomes. Second, we suggest that if more patients could be activated at earlier stages in their disease journey, through culturally safe self-management support, more patients would reach their treatment targets and likely reduce demands on more expensive acute care. In addition to increasing value for patients, this would extend gains in Aboriginal life expectancy in the NT from better chronic conditions management and increase value for health system funders through more efficient PHC.[24]

Conclusion

The current NT Government remote PHC system is providing low-value chronic conditions care for patients. Patient activation is an important metric of healthcare efficiency in Aboriginal PHC settings; we found activated patients achieved better clinical outcomes despite being older and sicker. High-levels of PHC use by unactivated patients posits opportunities for activation if the model of care can be reorientated to suit patient needs. VBHC methods can help identify the low value and resulting inefficiencies generated through failing to align service delivery with patient preferences. Thus, co-designing and implementing models of care with Aboriginal service users can be considered a high value proposition.

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