

Managing chronic conditions care across primary care and hospital systems: lessons from an Australian Hospital Avoidance Risk Program using the Flinders Chronic Condition Management Program

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Abstract

Objective. The study aimed to determine the impact of the Flinders Chronic Condition Management Program for chronic condition self-management care planning and how to improve its use with Bendigo Health's Hospital Admission Risk Program (HARP).

Methods. A retrospective analysis of hospital admission data collected by Bendigo Health from July 2012 to September 2013 was undertaken. Length of stay during admission and total contacts post-discharge by hospital staff for 253 patients with 644 admissions were considered as outcome variables. For statistical modelling we used the generalised linear model.

Results. The combination of the HARP and Flinders Program was able to achieve significant reductions in hospital admissions and non-significant reduction in emergency department presentations and length of stay. The generalised linear model predicted that vulnerable patient groups such as those with heart disease ($P=0.037$) and complex needs ($P<0.001$) received more post-discharge contacts by HARP staff than those suffering from diabetes, renal conditions and psychosocial needs when they lived alone. Similarly, respiratory ($P<0.001$), heart disease ($P=0.015$) and complex needs ($P=0.050$) patients had more contacts, with an increased number of episodes than those suffering from diabetes, renal conditions and psychosocial needs.

Conclusion. The Flinders Program appeared to have significant positive impacts on HARP patients that could be more effective if high-risk groups, such as respiratory patients with no carers and respiratory and heart disease patients aged 0–65, had received more targeted care.

What is known about the topic? Chronic conditions are common causes of premature death and disability in Australia. Besides mental and physical impacts at the individual level, chronic conditions are strongly linked to high costs and health service utilisation. Hospital avoidance programs such as HARP can better manage chronic conditions through a greater focus

on coordination and integration of care across primary care and hospital systems. In support of HARP, self-management interventions such as the Flinders Program aim to help individuals better manage their medical treatment and cope with the impact of the condition on their physical and mental wellbeing and thus reduce health services utilisation.

What does this paper add? This paper sheds light on which patients might be more or less likely to benefit from the combination of the HARP and Flinders Program, with regard to their impact on reductions in hospital admissions, emergency department presentations and length of stay. This study also sheds light on how the Flinders Program could be better targeted towards and implemented among high-need and high-cost patients to lessen chronic disease burden on Australia's health system.

What are the implications for practitioners? Programs targeting vulnerable populations and applying evidence-based chronic condition management and self-management support achieve significant reductions in potentially avoidable hospitalisation and emergency department presentation rates, though sex, type of chronic condition and living situation appear to matter. Benefits might also accrue from the combination of contextual factors (such as the Flinders Program, supportive service management, clinical champions in the team) that work synergistically.

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Introduction

In Australia, chronic conditions such as heart disease, diabetes, respiratory, and behavioural disorders feature as common causes of premature death and disability.¹ In 2012, ischaemic heart disease was the leading cause of death in Australia, responsible for 21 300 deaths.² Besides mental and physical impairments at the individual level, chronic conditions are strongly linked to high costs and health services utilisation. The Australian government spent approximately \$21 billion on healthcare for chronic conditions in 2008–09, accounting for 29% of total health expenditure.¹ Over half of this expenditure was for hospital-based admitted patient services, a significant portion of which was potentially avoidable.³

Hospital avoidance programs can better manage chronic conditions through a greater focus on coordination and integration of care across primary care (including general practice and community-based primary healthcare nursing and allied healthcare providers) and hospital systems.^{4–6} Improved discharge processes, follow-up and monitoring, quality use of medicine to minimise medication errors in the community, and chronic condition self-management education are some core components of such programs.^{3,7,8} Self-management interventions aim to help individuals better manage their medical treatment and cope with the impact of the condition on their physical and mental wellbeing.⁸ One such intervention is the Flinders Chronic Condition Management (CCM) Program, which was initiated during 2000–2004.⁹

The Flinders Program has been implemented as the model of care underpinning CCM and self-management support across a range of service types within Australia, such as a community aged care, general practice, primary health care community clinics, transition care from hospital to community services, and rehabilitation services. It has been used by a rehabilitation service in Adelaide for more than 12 years, and a large primary healthcare service serving a large area of western Victoria for more than 10 years. Evidence for the acceptability and effectiveness of the Flinders Program has been found among patients with a range of chronic physical and behavioural health conditions.^{10–13}

The Bendigo Health Hospital Admission Risk Program (HARP) in Victoria is an example of a service that has implemented the Flinders Program as the model of care planning for

their high-cost and high-needs patients, and has collected clinical data from patients over several years. Both programs are largely based on the principles of Wagner's Chronic Care Model, which is an evidence-based systems framework that assists in the coordination, communication and management of care through a more collaborative approach between patient and healthcare professionals.^{14,15}

This generic person-centred approach also supports disease-specific care planning and provides an inherent structure for doctors, nurses and allied health professionals within a practice or service to implement CCM.¹⁵ The health professional uses cognitive behavioural principles for cycles of care planning, review and monitoring to facilitate patient behavioural change. The health professional is trained to act as coach and coordinator of the person's services.¹⁰ More information about the Flinders Program process is provided in Box 1.

This study sought to better understand the impact of the Flinders Program on Bendigo Health's HARP in managing chronic conditions by investigating whether there were any differences in impact for patients (length of hospital stay and number of contacts post-discharge from hospital) according to broad chronic condition type and sociodemographic variables such as age, sex, living situation, and presence of informal carer support.

Methods

Study design

This study is a retrospective analysis of hospital admission data collected by Bendigo Health from July 2012 to September 2013.

Bendigo Health and the Bendigo HARP Services

Bendigo Health is located regionally in central Victoria, in South Eastern Australia. It serves 56 965 km², or 26%, of Victoria and a population of ~102 000. The city of Bendigo (population ~310 000) is located approximately 2 hours inland of the state's capital, Melbourne. The Greater Bendigo region also includes several smaller rural towns and remote regions.¹⁷ The Bendigo HARP is one of several HARP services that have been mainstreamed following extensive piloting between 2007 and 2010 in Victoria. Victoria's HARP services now sit within the larger Hospital Independence Program (HIP) that covers the state. The

Box 1. Description of the Flinders Program⁹

The Flinders Program is a generic chronic condition self-management support care planning process aiming to tailor medical and psychosocial interventions to meet a person's needs while simultaneously motivating them to achieve their medical, social, emotional, and lifestyle risk factor goals. The person's self-management capabilities are assessed by the person and health professional using a validated Likert self-rated tool known as the Partners in Health Scale,¹⁶ containing 12 questions covering the domains for effective self-management (knowledge of conditions and treatments; engagement with healthcare providers; access to services; monitoring and responding to signs and symptoms; physical, social and emotional impacts; and lifestyle risk factors such as smoking, diet, exercise, alcohol and stress).

The person and health professional then undertake a motivational interview to elicit more information about the person's strengths and barriers to self-management in these domains, agreeing on areas of self-management that the person is doing well and not so well, and where they have discrepant views. From this shared dialogue, and comparison of their Likert scores for each domain, areas for further work are agreed and form the basis for the care plan (issues, aims, steps to get there, who is responsible, review data). For this dialogue the person also identifies a key problem for them, which can be medical or psychosocial, and sets a SMART (specific, measurable, action-based, realistic, timely) goal to address that problem, and this is also listed on the care plan which is then communicated across service providers, with a copy also provided to the person with the chronic condition(s).

HARP service delivery model is based on the Kaiser Permanente Chronic Care framework (serving the needs of patients in Levels 1 and 2 – Intensive Care Coordination) and the Chronic Care Model.^{14,15,18} The HARP team is made up of several health professionals and includes specialist nursing, occupational therapy, physiotherapy, psychology, and social work staff. An interdisciplinary approach to patient care ensures team members work together towards the common goal of improving patients' journey. Staff specialise in providing psychosocial care coordination to patients with complex medical conditions, as well as complex aged care issues (e.g. chronic respiratory, heart or kidney disease, diabetes).^{19,20} Patients who require psychosocial management include those who are homeless, have mental health issues, or drug and alcohol issues. Psychosocial management is flexible, to better adapt to the complexities of presenting needs of the target patient cohort.¹⁹ HARP provides specialist medical care and multidisciplinary services through an integrated response by hospital and community services, delivered in hospital, community and home-based settings. Victoria led the way in implementing the HARP approach in Australia and it has been emulated by many other Australian states. HARP provided strong evidence to the 2015 Senate Select Committee hearings across Australia that reviewed best evidence to guide policy directions for CCM across the Australian primary healthcare system.

The Bendigo HARP adopted full integration of the Flinders Program into their service systems early, aiming to build chronic condition self-management (CCSM) support for patients with chronic and complex care needs. Flinders Program training was provided to HARP health professionals in early 2012, with implementation support provided to the HARP team from mid-2012 to September 2013 (Fig. 1), by which time the program was fully embedded within the HARP and associated clinical systems.

The training demonstrated how Flinders Program care planning tools supported the HARP's core mission, key performance indicators and outcomes (mitigating the risk of emergency department (ED) presentations and inpatient admissions and readmissions), and this benefit was also recognised and supported by those managing the HARP service (R Liddicoat,

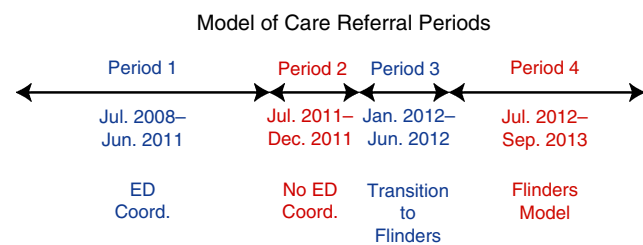


Fig. 1. Model of care referral periods. ED Coord, emergency department coordinator.

C. Miller unpubl. data, 22 July 2014). A model of implementation was also developed to better integrate the Flinders Program into the HARP. The Flinders Program allowed person-centred care to develop and encouraged the HARP clinicians to step back and allow patients to have more say in their own care. Stepwise implementation of the Flinders Program included detailed negotiation with local community services and general practices to establish clinical pathways for patients to be retained and transferred back into the community once the self-management support was completed. This support lasted for up to 6 months. This enabled the clinical team to maintain a throughput of new cases, engaging with up to 750 new patients per year.

Precursor to the current study and its methods

During the initial months of implementation of the Flinders Program, the HARP data custodian conducted some statistical comparisons among the four periods (1, development of focus on emergency department coordination; 2, reduced emergency department focus; 3, transition to Flinders Program; 4, full Flinders Program adoption and implementation) (Fig. 1) and found that the Flinders Period (period 4) seemed to be having a positive impact on the services and on admission rates. They contacted the Flinders Program research team at Flinders University to alert them to these positive results, prompting the present analysis (K. Masman pers. comm. 16 June 2015). These initial results encouraged the authors to look into demographic

and clinical predictors that impacted patients' length of stay (LOS) during the Flinders Program period, because it is an important metric of quality care assessment and resource management.²¹ This paper also looked into the predictors that determined the number of contacts made with the patients once they were discharged from the hospital. Together, understanding these data and processes can help guide policy makers and clinical leaders to make more precise and selective decisions on how to implement the Flinders Program, and CCSM support more generally, into practice in the future.

Source of data, ethical clearance and sample characteristics

For this study, basic demographic, episode, and patient contact information was extracted by the HARP team. The ED data is stored in the Bendigo Health clinical repository database. The study was approved by the Bendigo Health Human Research Ethics Committee.

Statistical analysis

Statistical analyses were conducted using Stata 14.1 (StataCorp, College Station, TX, USA) for Flinders Period data drawn from the wider study conducted at Bendigo Health. For the current study, 644 admissions were analysed. LOS data was positively skewed and therefore recoded into a categorical variable based on the initial mean LOS of the current study (6.8 days), most recent average LOS in Australia (5.7 days) for leading chronic conditions¹ and other similar studies.²¹ The three LOS categories were: shorter stay (0–4 days, *n* = 330, 51.2%); average stay (5–7 days, *n* = 134, 20.8%); and longer stay (>7 days, *n* = 180, 20.8%).

Similarly, the variable 'total contact counts' was log-transformed to minimise its skewness.²² The new variable showed a mean of 0.85 (s.d. = 0.43). For statistical modelling of predictors of LOS we used multinomial logistic regression. To account for patient clustering, robust standard errors were calculated. Variable selections for regression models commenced with univariate analyses and were selected for model advancement based on *P* < 0.25.²³ Subject matter knowledge (previous literature and expert's opinion) was also used in some instances in selecting variables even if *P* > 0.25. The final model was created with all selected variables at *P* < 0.05. To interpret effect sizes, relative risk ratios were calculated to represent the outcome of experiencing one level of outcome category (shorter or longer stay) relative to the reference category 'average LOS'. A generalised linear model²⁴ was conducted for modelling predictors of total contact counts and effect sizes were interpreted using odds ratios.

Results

In total, 253 patients experienced 644 admissions during the study period. Table 1 presents patient demographic and clinical characteristics.

Regression models

Predictors of length of hospital stay

To investigate the variables and their statistical impacts on the outcome variable LOS, a multinomial regression model was undertaken. Table 2 presents each variable's association with LOS for univariate analyses.

Table 1. Demographic and clinical characteristics of 253 patients with chronic conditions assessed in the study
HARP, Hospital Admission Risk Program; LOS, length of stay

	<i>n</i> (%)
Demographics	
Sex	
Male	153 (60.5%)
Female	100 (39.5%)
Age group	
0–65 years	89 (35.2%)
Over 65 years	164 (64.8%)
Carer availability	
Has a carer	53 (20.9%)
Has no carer	73 (28.9%)
Not stated	127 (50.2%)
Living arrangement	
Lives alone	46 (18.2%)
Lives with family	144 (56.9%)
Lives with others	13 (5.1%)
Not stated	50 (19.8%)
Clinical characteristics	
HARP main diagnosis stream	
Respiratory disease	102 (40.3%)
Complex needs	62 (24.5%)
Heart disease	53 (20.9%)
Others (diabetes/renal/psychosocial needs)	36 (14.2%)
	Mean (standard deviation)
Age at referral	66.66 (21.43)
Count of episodes	1.2 (0.45)
LOS during admission	6.58 (7.91)
Total contacts	10.57 (14.52)

Table 2. Predictors of hospital length of stay among patients with chronic conditions study
HARP, Hospital Admission Risk Program

Variables	Univariate analysis		
	Wald	<i>P</i> -value	Advanced to final model ^A
Sex	3.54	0.170	Yes
Age group	2.97	0.226	Yes
HARP main diagnosis streams	13.88	0.031	Yes
Living arrangement	11.61	0.071	Yes
Carer availability	6.30	0.177	Yes
Count of episodes	7.33	0.319	Yes
Age × sex	13.56	0.034	Yes

^AAdvanced to the final model if *P* < 0.25 or if variables were considered to have clinical importance.

As seen in Table 2, all variables except 'count of episodes' met the cut-off criteria of *P* < 0.25 and therefore, were included in the final model. However, the variable 'count of episodes' was still advanced to the final model as Martin-Carrasco *et al.* suggested that more previous episodes lead towards longer stay in the hospital for people with chronic conditions such as those with greater psychosocial needs.²⁵ The final model presented the combined effect of sex, episodes, age group, HARP diagnosis stream, living arrangement, carer availability and age bysex on patients' LOS, which is presented in Table 3.

Table 3. Multivariate model of predictors of hospital length of stay (LOS)^A
 HARP, Hospital Admission Risk Program; RR, relative risk; CI, confidence interval

Variables	LOS RR (95% CI)					
	Shorter LOS	Wald	<i>P</i> -value ^B	Longer LOS	Wald	<i>P</i> -value ^B
Sex						
Male	1.22 (0.45–3.32)	0.4	0.69	1.4 (0.58–3.35)	0.76	0.447
Female	1.00	–	–	1.00	–	–
Age group						
Over 65	0.7 (0.32–1.52)	–0.89	0.376	2.85 (1.27–6.35)	2.56	0.011
0–65	1.00	–	–	1.00	–	–
HARP streams						
Heart disease	1.15 (0.64–2.06)	0.48	0.632	0.88 (0.45–1.73)	–0.35	0.726
Others (diabetes/ renal/ psychosocial needs)	0.71 (0.32–1.60)	–0.80	0.421	1.66 (0.81–3.43)	1.38	0.168
Respiratory disease	1.99 (1.07–3.69)	2.20	0.028	0.89 (0.55–1.43)	–0.45	0.654
Complex needs	1.00	–	–	1.00	–	–
Carer availability						
Has no carer	2.04 (1.09–3.79)	2.26	0.024	2.35 (1.11–4.98)	2.24	0.025
Not stated	1.99 (1.07–3.69)	2.20	0.028	1.68 (0.81–3.46)	1.42	0.156
Has a carer	1.00	–	–	1.00	–	–
Living arrangement						
Lives with family	2.66 (1.48–4.78)	3.29	0.001	1.27 (0.65–2.48)	0.72	0.469
Lives with others	1.14 (0.58–2.23)	0.41	0.685	1.21 (0.62–2.36)	0.56	0.574
Not stated	1.74 (0.79–3.82)	1.4	0.162	1.25 (0.53–2.95)	0.53	0.598
Lives alone	1.00	–	–	1.00	–	–
Age × sex						
Over 65 × male	1.22 (0.45–3.32)	0.40	0.69	0.33 (0.11–0.97)	–2.01	0.044
Over 65 × female	1.00	–	–	1.00	–	–
Episodes	1.28 (0.84–1.95)	1.15	0.248	0.99 (0.59–1.65)	–0.04	0.969

^AAverage LOS as referent using multinomial logistic regression model.

^BBold type indicates statistically significant results.

Table 3 shows that male patients aged over 65 years were 0.33 times less likely to be in the ‘longer LOS’ category than females of the same age. The results also showed that patients aged over 65, and those without any carer, were more likely to be in the ‘longer LOS’ category than their respective reference categories.

On the other hand, patients who had respiratory diseases were more likely to be in the ‘shorter LOS’ category than those who had ‘complex needs’. Also, patients who lived with their family were 2.66 times more likely to be in the ‘shorter LOS’ category than those who lived alone. There were no statistically significant effects for the remaining variables.

Predictors of total contacts

This study also looked into the predictors of total number of contacts post-discharge (Table 4).

The sex variable and the HARP streams variable were advanced to the final model as intuitively they were deemed relevant predictors of post-discharge total contacts. Table 5 presents results of the final model.

Table 5 shows that patients who lived alone, with family or others, diagnosed with complex needs or heart disease, respiratory patients with or without carer, heart disease patients with carer, and both respiratory and heart disease patients aged 0–65 were less likely to be contacted by hospital staff than their respective reference categories. There were also fewer contacts with patients with increased number of episodes.

Table 4. Predictors of total number of contacts post-discharge
 HARP, Hospital Admission Risk Program; LOS, length of stay

Variables	Univariate analysis		
	Wald	<i>P</i> -value	Advanced to final model ^A
Sex	0.11	0.744	Yes
Age group	2.94	0.086	Yes
HARP main diagnosis streams	2.98	0.394	Yes
Living arrangement	1.67	0.244	Yes
Carer availability	4.58	0.101	Yes
Count of episodes	1.49	0.335	Yes
LOS	1.41	0.494	No
Age × sex	3.31	0.347	No
Age × HARP streams	13.38	0.063	Yes
Sex × HARP streams	6.90	0.439	No
Sex × carer availability	5.22	0.389	No
HARP streams × episodes	12.63	0.245	Yes
HARP streams × carer availability	14.57	0.203	Yes
HARP streams × living arrangement	25.69	0.028	Yes
Carer availability × episodes	12.28	0.139	Yes

^AAdvanced to final model if *P* < 0.25 or if variables were considered to have clinical importance.

Alternatively, patients with heart disease or complex needs, whether living alone or with family, and respiratory patients living with family, had more contacts than their reference categories. Similarly, the model showed that with an increased number of episodes, patients diagnosed with respiratory, heart

Table 5. Multivariate prediction of total number of contacts
OR, odds ratio; confidence interval; HARP, Hospital Admission Risk Program

Variables	Total contacts OR (95% CI)	Wald	P-value ^A
Sex			
Male	1.03 (0.96–1.10)	0.719	0.396
Female	1.00	–	–
Age			
0–65	1.06 (0.90–1.25)	0.632	0.427
Over 65	1.00	–	–
Carer availability			
Has a carer	1.18 (0.74–1.87)	0.511	0.475
Has no carer	0.75 (0.47–1.22)	1.30	0.254
Not stated	1.00	–	–
Living arrangement			
Lives alone	0.48 (0.33–0.70)	14.32	<0.001
Lives with family	0.65 (0.52–0.82)	13.35	<0.001
Lives with others	0.72 (0.54–0.95)	5.25	0.022
Not stated	1.00	–	–
Episodes	0.74 (0.48–1.13)	3.84	0.050
HARP streams			
Respiratory	0.92 (0.60–1.63)	1.63	0.215
Complex needs	0.62 (0.43–1.04)	3.94	0.039
Heart disease	0.57 (0.37–1.16)	2.59	0.049
Others	1.00	–	–
HARP streams × living arrangement			
Heart disease × lives alone	1.64 (1.03–2.63)	4.37	0.037
Complex needs × lives alone	2.66 (1.67–4.23)	17.16	<0.001
Others × lives alone	1.00	–	–
Respiratory × lives with family	1.53 (1.18–1.99)	10.15	<0.001
Heart disease × lives with family	1.62 (1.18–2.23)	9.05	<0.001
Complex × lives with family	1.51 (1.10–2.07)	6.78	0.009
Others × lives with family	1.00	–	–
HARP streams × carer availability			
Respiratory × has a carer	0.59 (0.43–0.79)	12.29	<0.001
Respiratory × has no carer	0.67 (0.51–0.90)	7.25	0.007
Respiratory × not stated	1.00	–	–
Heart disease × has a carer	0.62 (0.45–0.86)	8.25	0.004
Heart disease × not stated	1.00	–	–
HARP streams × age group			
Respiratory × 0–65	0.78 (0.65–0.94)	6.81	0.009
Respiratory × over 65	1.00	–	–
Heart disease × 0–65	0.65 (0.52–0.81)	14.78	<0.001
Heart disease × over 65	1.00	–	–
HARP streams × episodes			
Respiratory × episodes	1.52 (1.27–1.79)	22.95	<0.001
Heart disease × episodes	1.30 (1.12–1.93)	5.95	0.015
Complex × episodes	1.69 (0.99–2.17)	3.84	0.050
Others × episodes	1.00	–	–
Carer availability × episodes			
Has a carer × episodes	1.31 (0.89–1.91)	1.97	0.160
Not stated × episodes	1.00	–	–

^ABold type indicates statistically significant results.

disease or complex needs, and those who had carers had more contacts following discharge from hospital.

Discussion

Globally, encouraging self-management care planning has been viewed as one means of reducing health service utilisation and contributing to improved demand management among

patients with chronic conditions.^{26–29} Existing research has already identified population subgroups that are at greater risk of both future hospitalisation and rehospitalisation.^{3,30–33} The findings of this study have also revealed subgroups of patients who may warrant a more concentrated focus on self-management practices to reduce healthcare utilisation.³⁴

Hospital LOS is one such vital metric of resource utilisation and patient care. Predictors of hospital LOS provide essential information to help identify and reduce rehospitalisation rates in subgroups of patients. The final model of predictors of LOS showed that male patients, patients aged 0–65 and those diagnosed with respiratory disease were less likely to be in ‘longer LOS’ category. Initial HARP results reported that outcomes for respiratory disease were less positive than other disease streams (R Liddicoat, C. Miller unpubl. data, 22 July 2014). A possible reason could be respiratory patients’ shorter LOS (<5 days; 57.5%, *n* = 142). Carey and Lin found that, for every 1-day increase in LOS, there was a corresponding reduction in the risk of readmission for patients with similar chronic conditions such as heart disease.³⁵ This is of particular importance as Erny-Albrecht *et al.* reported that respiratory disease is the most common chronic disease with potentially avoidable hospitalisation through a continuum of care model.³ Interestingly, male patients responded better to the Flinders Program than females (R Liddicoat, C. Miller unpubl. data, 22 July 2014), although most of them also had shorter LOS (48.7%, *n* = 184), which warrants further research.

Another important way to prevent rehospitalisation is for health professionals to contact patients regularly post-discharge. As Pruitt *et al.* recommended, the most prevalent health problems such as diabetes, asthma, heart disease, and depression require extended and regular healthcare contact.³⁶ The Flinders Program aims to achieve that goal by making face-to-face, telephone or email contacts as part of planned care. Overall results showed that patients diagnosed with heart disease or complex needs and without a carer received more contacts whether they lived alone or with family. This is particularly positive given having no carer and living alone are acknowledged as barriers to effective CCM.³⁰ Similarly, respiratory, complex needs and heart disease patients with an increased number of episodes received more contacts. Previous research has shown that respiratory³ or heart disease patients^{31,37} and patients with more previous hospital episodes²⁵ needed long-term contact and intense monitoring for better management. Thus, some vulnerable patient groups received effective health intervention through HARP and the Flinders Program; whereas, results also showed that patients who lived alone, male patients diagnosed with complex needs, heart disease patients aged 0–65 and respiratory patients who did not have any carer were less likely to be able to be contacted, indicating further research is needed.

Findings of the HARP research team

The HARP team reported that diabetic patients responded well to the Flinders Program compared with others, most likely due to diabetes’ manageable nature (K. Masman pers. comm. 16 June 2015). Elderly males (over 65) also showed more improvement than elderly females, and this demands further exploration. The

Flinders Program was least effective among patients with end-stage chronic diseases (K. Masman pers. comm. 16 June 2015). A possible reason is that this cohort (aged over 85) is too complex,³⁴ suggesting the need for further research to determine the boundary between active CCM and palliative care, and the concepts of CCM and CCSM for this population.

Finally, although neither this study nor the original HARP study found any significant differences in age groups (K. Masman pers. comm. 16 June 2015), existing literature suggests that people aged 0–4, 20–29³⁸ and those over 75^{39,40} are the most vulnerable populations in terms of CCM. Of particular importance are younger populations who tend to gain more out of self-management programs due to a generally more positive attitude towards new interventions.⁴¹ Older populations also need special monitoring, as Fan *et al.* suggested that regular follow-up can reduce ED presentations in this population cohort.⁴²

Study limitations

This cross-sectional study was unable to explain causal links between variables. Also, categorical variables such as living arrangements and carer availability have levels such as ‘not stated’ ($n=122$ and $n=281$ respectively), which potentially hampered results of the overall model and made it harder to interpret the outcomes. Some of the variables such as age group and HARP stream needed to be collapsed and thus we could not analyse impacts of all subcategories. These limitations suggest that more robust studies are needed, including a prospective longitudinal study to better understand individual trajectories of change over time and the role of self-management interventions from a temporal perspective.

Conclusion

Pruitt *et al.* state that healthcare for patients with chronic conditions does not end or begin at the doorway of the hospital.³⁶ It has to extend beyond hospital walls and infuse patients’ living and working environments. Demographic, clinical and social contexts related to one’s experience of living with a long-term illness and history of health service utilisation are relevant to understand the impact of CCSM support programs aimed at bringing about changes in service use.²⁶ Programs targeting vulnerable populations and those including multidisciplinary teams achieve the greatest significant reductions in potentially avoidable hospitalisation and ED presentation rates.^{3,43} The HARP incorporating the Flinders Program was able to achieve significant reduction in hospital admissions and non-significant reduction in ED presentations and LOS. The HARP research team noted that benefits might accrue from the combination of contextual factors (Flinders Program, supportive service management, clinical champions in the team, etc.) that work synergistically.¹⁸ This study sheds some light on how the Flinders Program could be better targeted and implemented with high-need, high-cost patients to lessen chronic disease burden on Australia’s health system in the future.

Competing interests

The authors have no competing interests to declare.

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