A transitional care service for elderly chronic disease patients at risk of readmission

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Abstract

Background: Multiple hospital admissions, especially those related to chronic disease, represent a particular challenge to the acute health care sector in Australia.

Objective: To determine whether a nurse-led chronic disease management model of transitional care reduced readmissions to acute care.

Design: A quasi-experimental controlled trial.

Setting: A large tertiary metropolitan teaching hospital. Participants: 166 general medical patients aged ⩾65 years with either a history of readmissions to acute care or multiple medical comorbidities.

Intervention: Implementation of a chronic disease management model of transitional care aimed at improving patient management and reducing readmissions to acute care.

Main outcome measures: Readmission rates and emergency department presentation rates at 3-and 6-month follow up. Secondary outcome measures include quality of life, discharge destination, and primary health care service utilisation.

Results: There was no difference in readmission rates, emergency department presentation rates, quality of life, discharge destination or primary health care service utilisation. The difficulties inherent in evaluating this type of multifactorial intervention are discussed and consideration is given to patient factors, the difficulty of influencing readmission rates, and local system issues.

Conclusion: The outcomes of this study reflect the tension that exists between implementing multifaceted integrated health service programs and attempting to evaluate them within complex and changing environments using robust research methodologies.

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What is known about the topic?

In response to increasing demand, Australian hospitals and health authorities are actively searching for effective ways of reducing the need for inpatient admissions.

What does this study add?

A nurse-led model of transitional care for older patients with chronic disease may not reduce readmission rates. Although inadequate sample size may have been the reason for this result, a qualitative evaluation identified that difficulties integrating this short-term trial into the existing system of care also contributed.

What are the implications?

Small-scale local studies may not be adequate to evaluate outcomes of complex interventions when clinical factors (disease progression) and other aspects of the changing service system are likely to swamp the effects of the intervention.

Funders should be encouraged to support multicentre investigation of health service interventions using rigorous research methodology.

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MULTIPLE HOSPITAL ADMISSIONS, especially those related to chronic disease, represent a particular challenge for the acute health care sector in Australia (DHS 2002). Demand for emergency hospital care increased at an average of 7% to 8% during 2001–2002 (DHS 2002). Key indicators of the pressure of service demand include high levels of ambulance bypass, admission blockage, and significant demand for limited residential and extended care services (Nosworthy et al. 2001).

A number of studies have indicated that a significant proportion of the rise in acute hospital admissions could be attributed to readmissions (Hobbs 1995; National Association of Health Authorities and Trusts 1994; Longley & Warner 1995). Reasons for the rise in readmissions are varied and complex, relating to system, patient and disease factors.

A review of the literature indicates that the factors most consistently associated with readmission to acute care are increasing age, history of previous admission, presence of a chronic disease and presence of medical comorbidities (Kwoks et al. 1999; Belcher & Alexy 1999; Di Iorio et al. 1998, Marcantonio et al. 1999). It is difficult to draw conclusions regarding the contribution of other factors, such as level of social support, self perceived health status or discharge destination, due to large variations in study design, populations studied and outcomes measured. In addition, evaluation of the literature related to effective interventions to reduce readmissions is limited by the heterogeneity of study designs, patient populations, local institutional factors and outcome measures chosen. This lack of comparable data limits the generalisability of identified interventions in the literature (Beney, Bero & Bond 2000; Naylor & McCauley 1999; Evans & Hendricks 1993; Hughes et al. 2000).

The Victorian Department of Human Services (DHS) has supported several initiatives at Melbourne Health including emergency demand initiatives that target emergency attendances (Care Coordination Team) and discharge initiatives that aim to improve the transition of patients from tertiary to primary care (Discharge Planning Strategy). These strategies focus on social support requirements for patients. A further Victorian DHS funding program, the Hospital Admission Risk Program (HARP), is now funding community-based disease management programs that facilitate implementation of best practice and improve inter-sectoral continuity of care in an effort to reduce the number of avoidable acute care re-presentations and readmissions.

These initiatives reflect a changing focus in health care from a single episodic model of management toward a comprehensive, patient-centred disease management model of care. The model of care reported in this article was developed in response to suggested principles for management of complex medical care needs of older persons (Institute of Medicine 2001; Wagner, Austin & Von Korff 1996). Evidence based guidelines and protocols formed the framework for management in association with system change (introduction of a nurse consultant), patient education and coordination of care across the acute and community sectors.

In this article, we report the outcomes of this transitional care service for older patients admitted to acute care with complex medical problems.

Methods

Setting
Royal Melbourne Hospital (RMH), a large tertiary acute metropolitan teaching hospital.

Study population
All patients admitted to a general medical unit at RMH from November 2002 to July 2003 were eligible for recruitment.

Protocol
The transitional care service model was implemented and evaluated within a quasi-experimental controlled-study design. The study was approved by the Melbourne Health Human Research Ethics Committee.

1 Selection criteria for patients enrolled in the transitional care service model

Inclusion criteria

Age ≥65 years *and* inpatient stay > 24 hours *and* informed consent given *and* at least one of the following:

■ A previous admission in the last 6 months related to current admission (ie, primary diagnosis the same for both admissions or current admission related to a comorbidity documented on previous admission)

■ Two or more actively treated medical comorbidities

■ An admission diagnosis of chronic heart failure

Exclusion criteria

■ Requiring dialysis or oncology services

■ Requiring palliative care

■ Major psychiatric diagnosis

■ Discharged to another hospital

■ From interstate or regional Victoria

■ Unable to give informed consent due to cognitive impairment (AMTS* <8, or greater than 12 months diagnosis of dementia, or neuropsychiatric evaluation stating they are cognitively impaired).

■ Primary diagnosis of chronic obstructive pulmonary disease (COPD) — these patients were eligible for a COPD specific transitional care service.

■ Discharged to a nursing home.

*AMTS = Abbreviated Mental Test Score (Hodkinson 1972)

Assignment

The RMH has four medical units — A, B, C and D. In general, two units share a single medical ward (ward AB and ward CD). One ward was assigned the intervention while the other ward acted as control. A pre-implementation analysis was conducted to determine that there were no systematic differences between the patients on ward AB compared with the patients on ward CD. For pragmatic reasons, staff involved in delivery and assessment of the service were not blinded to assignment.

Ascertainment

Two independent researchers ascertained patients by assessing daily ward lists and reviewing the medical records of appropriate patients using structured selection criteria outlined in Box 1. The inter-rater reliability of ascertainment between the two researchers was assessed.

Intervention

The intervention group received a comprehensive transitional care service with components allocated according to perceived and assessed need and patient preference.

The chronic disease nurse consultant (CDNC)

The patient was seen by the CDNC within 24 hours before discharge on the ward and the following were completed:

■ Collection of pre-discharge data;

■ Screen for risk factors for readmission;

■ Development of a plan for follow-up in clinic;

■ Liaison with discharge planners, nursing staff and allied health staff where appropriate;

■ Provision of an action plan for the patient (eg, chronic heart failure action plan, asthma action plan);

■ Copy of discharge summary faxed to the patient's general practitioner (GP).

The chronic disease clinic (CDC) assessment

The patient was seen again by the nurse in the CDC within 2 weeks of discharge (or when their medical condition allowed) and the following were completed:

■ Consultation with patient and identification of patient disease, medication, self management and social issues;

■ Fax of summary report to GP;

■ Review of action plan developed on the ward;

■ Collection of data;

■ And where necessary: coordination of liaison between consultant and GP; organisation of case conferencing; coordination of community services; referrals made to allied health; organisation of home visiting.

The CDNC was responsible for coordinating clinic bookings. Patients were sent a reminder letter one week before their appointment and were contacted by phone one day before their appointment by the CDNC, and transport was organised if necessary. The CDNC was available to the patient and their GP between clinics as needed by phone.

The control group received usual care. This included medical, nursing and allied health intervention consistent with the patient's diagnosis and resources available on the general medical wards. Usual care would also include discharge planning by the multidisciplinary team, and may or may not include outpatient follow-up as determined by the general medical team.
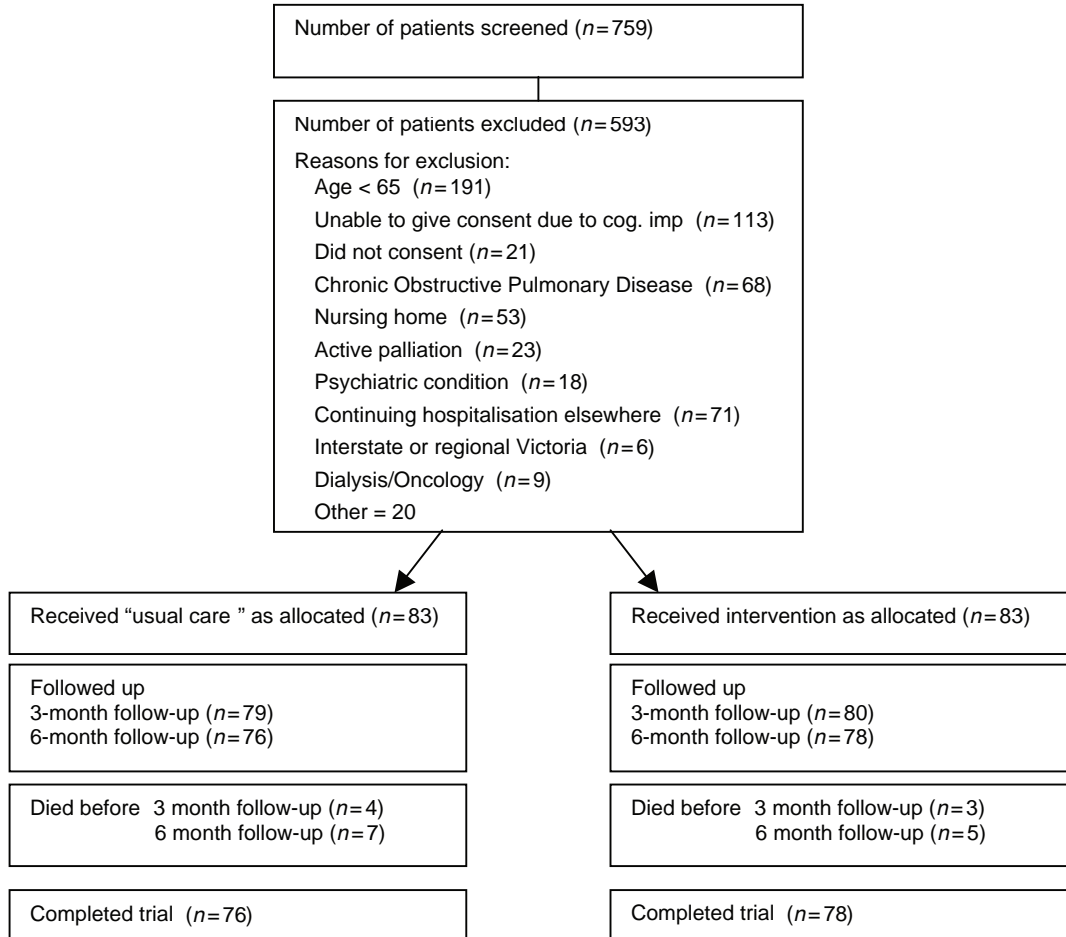
Outcome measures

The primary outcome measures were unplanned acute care readmissions (re-presentation and hospitalisation for ≥24hours) and emergency department presentations (discharge <24 hours after presentation) at 3 and 6 months post discharge from the index admission.

Secondary outcome measures were: quality of life measured using the Assessment of Quality of Life Instrument (AQoL) (Osborne et al. 2003); discharge destination recorded from hospital medical records; and primary health care service utilisation (GP visits) recorded by contacting the patient's GP.

Three month follow-up data was collected via a phone call to the patient at their place of residence and review of the RMH administrative database and patient's medical record. Six

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2 Patient flow diagram

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                    Number of patients screened (n=759)

                    Number of patients excluded (n=593)
                    Reasons for exclusion:
                       Age < 65  (n=191)
                       Unable to give consent due to cog. imp  (n=113)
                       Did not consent (n=21)
                       Chronic Obstructive Pulmonary Disease  (n=68)
                       Nursing home  (n=53)
                       Active palliation  (n=23)
                       Psychiatric condition  (n=18)
                       Continuing hospitalisation elsewhere  (n=71)
                       Interstate or regional Victoria  (n=6)
                       Dialysis/Oncology  (n=9)
                       Other = 20
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Received "usual care " as allocated (n=83)	Received intervention as allocated (n=83)
Followed up 3-month follow-up (n=79) 6-month follow-up (n=76)	Followed up 3-month follow-up (n=80) 6-month follow-up (n=78)
Died before 3 month follow-up (n=4) 6 month follow-up (n=7)	Died before 3 month follow-up (n=3) 6 month follow-up (n=5)
Completed trial (n=76)	Completed trial (n=78)

month follow up data was collected through review of the RMH administrative database only.

Sample size and statistical analysis

The sample size was calculated based on a power of 0.8 and an alpha 0.5, and an estimated reduction in readmissions of 25%. This resulted in an estimated sample size of 67 patients in each group.

A comparison was made between the groups at baseline to determine whether they were balanced with respect to variables likely to affect readmission rates including: age; gender; ethnicity; marital status; an admission in the previous 12 months; severity of illness (Duke Severity of Illness score — 1 = least severe, 10 = most severe; Parkerson, Broadhead & Tse 1993); nutritional status (Mini Nutritional Assessment — 1–11 possible malnutrition, 11–14 normal; Rubenstein et al. 2001); depression (Geriatric Depression Scale — 0–5 normal, 6–15 possible depression; Brink et al. 1982); and quality of life (Assessment of Quality of Life Instrument — 1–36 with higher scores indicating poorer quality; Osborne et al. 2003).

A Poisson regression model was conducted on the primary outcome. Baseline differences between the groups in age, number of previous admissions in last 12 months and severity of illness were adjusted for. Analysis was done on an intention to treat basis.

Qualitative process evaluation

A review of the integration of the service within the existing continuum of care was undertaken 8 months after the service was implemented, to investigate the impact of local system issues on the implementation of the transitional care service. The review was conducted by a senior nursing staff member and a safety and service improvement coordinator, both of whom were independent of the project team. The objective of the review was to examine the degree to which the service integrated with key contact points within the general medicine model of care, including the general medical wards, emergency department, outpatient clinics and the Medical Assessment and Planning Unit (MAPU). The review also involved the evaluation of the communication strategies utilised to engage key stakeholders in the project. The reviewers conducted key informant interviews with relevant members of staff and synthesised and thematically analysed the results.

Results

Participant flow and follow-up

Seven hundred and fifty-nine patients were screened (60% of the total admitted population) during the study period. One hundred and sixty six patients were included in the study. Patient flow is outlined in Box 2.

Inter-rater reliability of ascertainment

To determine reliability of ascertainment, both recruiters assessed a sample of 37 patients. The inter-rater reliability of ascertainment of patients was good (kappa value = 0.79).

Analysis

A pre-implementation analysis found that there were no systematic differences between patients on the two wards with respect to age, gender, length of stay (LOS), and number of medical comorbidities. The characteristics of the patients in the intervention and control groups at baseline are outlined in Box 3. The intervention group appears to have a higher proportion of males, individuals born in a country other than Australia, better nutritional status, and greater severity of illness.

Primary outcome — readmission and Emergency Department presentations

Primary outcome data were available for 96% (159/166) of patients for 3-month follow-up and 93% (154/166) of patients for 6-month follow-up. Box 4 demonstrates that there was no difference between the control and intervention groups with respect to readmission rates or emergency department presentation rates at 3- and 6-month follow-up.

3 Baseline characteristics of the patients allocated to the Transitional Care Service (intervention group) and patients that received usual care (control group).

Characteristic	Control (*n*=83)	Intervention (*n*=83)
Age [mean (SD)]	79.6 (+ 1.18)	77.5 (+ 0.81)
Gender [% female (*n*)]	68.3% (56)	48.2% (40)
Country of birth [%Australia (*n*)]	78.3% (65)	39.8% (33)
Marital status [% currently married (*n*)]	61.5% (51)	51.8% (43)
1 or more admissions in previous 12 months [%(*n*)]	49.4% (41)	55.4% (46)
Duke Severity of Illness score* [median (IQR)]	3.4 (0.0–6.0)	4.2 (0–7.5)
Mini Nutritional Assessment[†] status [% possible malnourishment (*n*)]	67.1% (51)	20.0% (15)
Geriatric Depression Scale[‡] [%screening positive (*n*)]	32.5% (27)	45.7% (37)
Assessment of Quality of Life[§] [mean (SD)]	9.2 (+ 0.48)	8.7 (+ 0.57)

* Parkerson, Broadhead & Tse 1993;† Rubenstein et al. 2001;‡ Brink et al. 1982; § Osborne et al. 2003.

SD = standard deviation; IQR = interquartile range

An initial Poisson regression model was performed using total number of inpatient hospitalisation events in the 6 months following recruitment as the outcome variable and using the number of months at risk as the exposure variable (accounting for patients who died before the completion of the 6-month follow-up period). Predictors entered into the model were group (control v intervention), age, rate of admissions in past 12 months (0, 1, ≥2), and severity of illness. However, due to over dispersion of the outcome measure, the assumptions of Poisson regression could not be met, so a negative binomial model was fitted. The same methods were used to model the rate of emergency department presentations.

These models show that the intervention did not influence readmission rates, after adjusting for key predictors. For inpatient admissions the adjusted rate ratio for group was 0.91 (95% CI; 0.59–1.40). For emergency department presentations the adjusted rate ratio for group was 0.90 (95% CI; 0.48–1.70).

Secondary outcomes

Quality of life scores at 3-month follow-up were available for 75% (62/83) and 67% (56/83) of patients in the intervention and control groups respectively. Scores for quality of life showed no difference between groups at 3-month follow-up. In the intervention group, 56% (35/62) of patients increased or maintained their existing levels of quality of life, and in the control group 50% (28/56) of patients increased or maintained their existing levels of quality of life (95% CI for difference in proportions = –23.5%– 2.4%). After adjusting for differences in baseline AQoL scores and age, the intervention did not influence quality of life at 3 months (coefficient = 0.008; 95% CI = –1.32–1.34).

There was no difference between the groups in rate of visits to a GP for the 3 months following their index admission (median number of visits: control group = 3, intervention group = 3; Mann–Whitney U test = –0.813; P = 0.42). Due to the very small numbers in each group who experienced a change in residence from their discharge destination at 3-month follow-up (control group = 3 , intervention group = 2) no further analysis was performed on this outcome variable.

Findings from the qualitative process evaluation:

The findings from the qualitative process evaluation identified major issues that impacted on the effectiveness and sustainability of the transitional care service model. These included:

4 Proportion (number) of patients with a readmission to acute care or an emergency department presentation at 3-month and 6-month follow-up.

	Control (*n*=83)	Intervention (*n*=83)	*P* value
Readmission to acute care			
3 months [%(*n*)]	36.1% (30)	36.1% (30)	1
6 months [%(*n*)]	25.3% (21)	31.3% (26)	0.39
Emergency department presentations			
3 months [%(*n*)]	8.4% (7)	8.4% (7)	1
6 months [%(*n*)]	18.1% (15)	21.7% (18)	0.70

Predictors entered into the model were: group (control v intervention); age; rate of admissions in past 12 months (0, 1, ⩾2); and severity of illness.

■ Inadequate integration of the CDNC into the existing general medical delivery of care model. It was recommended that the CDNC become part of the multidisciplinary team, be actively involved in patient conferencing, act as a resource for nursing staff in relation to discharge planning and be easily accessed by the multidisciplinary team.

■ Inadequate stakeholder understanding of the role of the CDNC and scope of the CDNC practice. It was recommended that the CDNC role complement rather than overlap other nursing roles such as discharge planning.

■ Inadequate clerical support resources for the CDNC and lack of backfill for leave coverage such that a 52-week-per-year service can be provided.

■ Inadequate integration of documentation into daily clinical practice.

Discussion

The aims of this intervention were twofold; to reduce health care utilisation in a group of elderly patients at high risk of readmission to acute care, and to provide best practice, patient-centred transitional care. Despite the strengths of this study, such as the completeness of follow-up and a pragmatic design that included a comparison group, this evaluation failed to demonstrate any impact on readmission rates, emergency department presentation rates or quality of life outcomes at 3 and 6 months post-discharge. Interventions such as these could be assessed within a cluster randomised multicentre design. However, this design may not allow for local contextual factors that can contribute to success or failure of the service to be identified, unless qualitative research is included. Funding opportunities for large scale studies are limited, and the scope of this project was defined by available resources.

Reasons for failure to show an effect on readmission rates

It is difficult to demonstrate the impact of multicomponent transitional care interventions on readmission rates (Gow et al. 1999; Rosswurm & Lanham 1998; Parkes & Shepperd 2000). The reasons for this are varied and complex, relating to system, patient and disease factors. It may also be that readmission rates, which do provide a proxy measure of the cost of care, are not an appropriate outcome measure for this type of multifactorial intervention. While readmissions are commonly used as a high level indicator of intervention success, their utility for measurement of system performance and quality has been questioned (Gray 2001; Milne & Clarke 1990). Health care utilisation outcomes of this high risk patient population may be independent of process and largely determined by clinical disease factors. It may be that older, increasingly frail persons with deteriorating chronic conditions appropriately experience increasing acute care admis-

sions. Reducing readmissions for this group may require higher levels of community support for acute disease exacerbations than is currently provided. It is also likely that transitional care programs that do not integrate with effective strategies such as cardiac failure rehabilitation programs will have less impact on readmission rates. At the time of this service implementation, cardiac failure rehabilitation and chronic disease self-management programs were not readily accessible.

Differences between the two groups at baseline

Two independent researchers recruited patients into the study. One researcher recruited control patients and one researcher (who was also the CDNC) recruited intervention patients. Despite explicit selection criteria and an inter-rater reliability of ascertainment kappa score of 0.79, a selection bias was evident, with the two groups differing at baseline with respect to variables such as ethnicity, severity of illness, nutritional status and depression. An independent researcher may have reduced selection bias, but in doing so would have been less able to match and prioritise existing CDNC resources with identified patient service needs.

After commencement of the service, a system change occurred marked by reduced availability of discharge planning consultants in the medical wards. As a result of this the CDNC noted a change in focus from patient disease management and education to discharge planning activities. Another issue related to availability of interpreters. The CDNC had greater flexibility and higher priority with respect to interpreters' availability to obtain informed written consent and assess patients. This was reflected in the intervention group having a larger proportion of patients from non-English speaking backgrounds than the control group.

Inadequate statistical power

Despite conducting a sample size estimate, this study was underpowered to detect potentially important effects of this intervention, as demonstrated by the wide confidence intervals around the estimate of the effect of the intervention in the negative binomial models. The results are consistent with the intervention either reducing by 40% or increasing by 40% the number of inpatient admissions following the index admission. Similarly, the emergency department presentations may have been reduced by 52% or increased by 70% by the intervention. As such, the potential impact of such an intervention still requires further investigation.

Similarly, quality of life measures usually require large sample sizes and effects to demonstrate a significant change. Quality of life in this study was a secondary outcome measure and the study was not adequately powered to detect changes in this variable.

Local system issues

The findings of the qualitative process evaluation identified local system issues that impacted on the effectiveness and sustainability of the transitional care service model. The lack of integration of the transitional care service with existing services was highlighted as a barrier to the effectiveness and sustainability of the service. Sustainable change has been shown to be dependent upon a variety of factors (Ovretveit & Gustafson 2002). Effective implementation strategies are essential and, in retrospect, this service change may have been more successful if longer-term implementation strategies had been used, in order to reinforce system change and support staff engagement and skill development.

Inadequate risk stratification

The selection criteria were aimed at targeting elderly patients with multiple medical problems at high risk of readmission. The declining health status of this patient group makes it difficult to demonstrate reductions in readmission rates or improvements in quality of life. Better risk stratification tools are needed in order to be able to appropriately risk-stratify patients. While a statistically significant impact on population readmission rates was not demonstrated, individual patient anecdotes indicated that the service clearly had a positive effect on reducing or delaying readmissions in particular cases.

Implications for future evaluation of health service implementation

The outcomes of this study reflect the tension that exists between implementing pragmatic multifaceted integrated health service programs and attempting to evaluate them using robust research methodologies. This multifaceted transitional care service intervention was interdependent and interlinked with other hospital health service initiatives, as is usually the case. It is difficult to test the impact of one intervention in isolation from others, given that changes in one initiative can impact adversely on the outcomes of others. There is limited control over such changes when funding is fragmented into separate demand management projects that are individually evaluated. In addition, the evaluation component of service funding is often inadequate to provide resources required for methodological rigour.

Developing an effective integrated disease management service is an iterative process. A transitional care service alone may not influence health care utilisation outcomes, but it is an essential component for providing effective continuity of care. Although this transitional service failed to change population readmission rates, qualitative data collection identified individual anecdotal successes that helped inform changes in the service at the end of the evaluation period. This report also emphasises the additional benefit of a qualitative external review of service implementation. In this instance, local contextual issues severely impaired effective service implementation and sustainability. In response to identified issues, the service has been redesigned with ownership more clearly defined within the division of general medicine and additional resources have been gained to extend an existing cardiac failure rehabilitation program to general medical patients and to increase access to chronic disease self-management programs. Integration of management of all HARP funded programs has also occurred and will ensure the provision of support for ongoing staff education and the upskilling of hospital and community staff in chronic disease management, as well as backfill for staff absences.

Competing intersests

None identified.

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