Readmissions to hospital in a frail older cohort receiving a community-based transitional care service

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ABSTRACT

AIMS: To investigate frequency of and reasons for hospital readmission in a frail older cohort receiving a community-based, multidisciplinary, transitional care service.

METHODS: A prospective cohort study with descriptive analysis of reasons for readmission in a cohort of frail older people discharged from hospital with the service. Measures of frailty, comorbidity, cognition, quality of life and function were recorded at discharge. Readmissions were recorded within three months after index discharge. Discharge summaries were reviewed and reasons for readmission categorised. Outcomes following readmission were recorded.

RESULTS: Readmission rates were high (42%) in our cohort, despite the intervention. People readmitted had worse functional ability and a greater burden of comorbidities. Half of the readmissions were classified as being new, acute medical problems requiring inpatient treatment, and a quarter as exacerbations of chronic medical problems. Eighty-six percent of those readmitted were able to return home following their readmission.

CONCLUSIONS: Our study showed high readmission rates despite the community supports. This high readmission rate does not imply failure of the intervention as the majority of these were with new or acute medical problems requiring inpatient treatment which were not preventable. Most were able to recover and return to their own homes.

The transition between hospital and home for frail older people can be a difficult and challenging time. Studies have shown that up to 40% of this group are readmitted within three months.1-3 Readmissions to hospital are associated with poorer outcomes such as functional decline, longer length of stay and discharge to Aged Residential Care (ARC) facilities. Studies have shown that many readmissions are with the same condition as the index admission.1 Readmissions are often seen as unnecessary, a “failed discharge” or attributed to a lack of support services in the community and therefore something that should be reduced.2 Schwarz3 describes the relationships between carer support, burden, depressive symptomatology and readmissions. In their review Garcia-Perez et al4 find that functional abilities are significant. Several studies have included physical comorbidities, including cardiovascular disease, heart failure, respiratory conditions, diabetes and renal disease;4-8 and geriatric conditions such as dementia, functional decline and falls;4,10 as associations with readmissions, but also broader community and health service issues such as underlying admission rates and length of stay;11 or problems with physician follow-up.1

In a New Zealand study Minnee and Wilkinson12 assessed return visits to the emergency department (ED) by older people. They found high levels of comorbidities and polypharmacy, and conclude that most return visits were with acute medical problems, such as cardiac problems, and not “failure to cope”. They also found the oldest and most frail people were actually least likely to re-present, and they suggest this...
may be due to better assessment and longer length of stay for their index admission. Similarly in the UK, Kee and Rippingale assessed patients presenting with “acopia” in the ED. They found that the majority had an acute medical problem and multiple underlying comorbidities.

Transitional care (TC) is a concept which is growing in popularity and being developed across the world in recent years. TC programmes have varied widely in their target population (with many focusing on specific syndromes such as heart failure), structure, length of intervention and content, but key components seem to include self-management, discharge planning, continuity of care, multidisciplinary team input, structured follow-up, and co-ordination of community services. TC interventions have demonstrated conflicting results on hospital readmissions. Some have found reduced readmission rates, while others found no difference. A recent systematic review has shown clear benefits in readmission rates, while another showed no clear benefit in Comprehensive Geriatric Assessment (CGA) interventions in older people being discharged after short admissions. A recent New Zealand study evaluated total time spent in hospital (rather than number of readmissions) and found a significant decrease with a supported discharge intervention for those being discharged from acute care.

The Community Rehabilitation, Enablement and Support Team (CREST) was introduced in our region of New Zealand in 2011. It is an intensive, short-term or transitional community-based service which aims to support frail older people living in their own homes and maximise independence. A major part of the service is a TC service for people being discharged from hospital for whom it is considered that a further period of support and rehabilitation would be of benefit. Since introduction it had never been formally evaluated, and this is the reason for this study (overall evaluation in preparation). The specific aims of this sub-study were to record readmission rates in older people receiving the service, and to describe reasons for readmissions; particularly whether they represent problems with the service design or provision, or reflect acute or unstable medical conditions.

Methods

Participants in this study were referred by their inpatient team, then assessed by the CREST liaison team prior to discharge. CREST eligibility criteria are shown in Table 1. Once discharged they were seen by a specialised case-manager within 24 hours, and an individualised goal-directed plan agreed. Participants then received up to four visits per day for an average of six weeks. These included support with basic and extended Activities of Daily Living (ADLs) and an exercise and mobility programme. Key Support Workers (KSW) receive specific training to deliver the service and are asked to “do with” rather than “do for”.

Table 1: Eligibility criteria for CREST (CDHB).

| 1. | The client is over 65 years or close in age and interest (55y for Māori and Pacific Islanders). |
| 2. | The client does not require acute inpatient treatment. |
| 3. | The client consents to being treated at home by the team. |
| 4. | The client is considered to have potential for partial or complete recovery with suitable home rehabilitation for six weeks. |
| 5. | The client is able to stand and transfer with one person. |
| 6. | The client’s home is judged to be safe for the client and visiting staff. |
| 7. | The client has had a recent acute illness or injury and is at borderline level of function with an associated reduction in personal (PADL) and/or extended (EADL) activities of daily living and who without input from the team is: |
| a. | Likely to fail to recuperate full potential of functional recovery |
| b. | Likely to fail to manage satisfactorily at home despite conventional community support, and therefore would be at risk of hospital re-admission or institutionalisation. |
This study was a prospective cohort study. Older people due to be discharged from hospital within the next 48 hours with the CREST service were referred by the clinical liaison team. The lead researcher then visited the person in hospital. The study was explained and written consent obtained. The Reported Edmonton Frail Scale (REFS)\textsuperscript{26} and Montreal Cognitive Assessment (MoCA)\textsuperscript{27} were then completed. The Charlson Index of comorbidities (CI)\textsuperscript{28} was completed from their medical records. The EuroQOL, EuroQOL self-rated health visual analogue scale (VAS)\textsuperscript{29} and Nottingham Extended Activities of Daily Living (NEADLs)\textsuperscript{30} scores were completed by the case manager as part of the initial assessment after discharge. These were provided to the research team.

The outcome of readmission to hospital over the next three months was recorded from the hospital computerised patient management system. All admissions to hospital in the region are recorded on this system. Discharge summaries were assessed independently by two clinically trained researchers. The diagnosis leading to readmission to hospital was recorded. This was then further classified into five groups: 1) new acute medical or surgical problem (for example pneumonia); 2) acute exacerbation of existing chronic medical condition (for example congestive cardiac failure); 3) same condition as was treated during the index admission; 4) geriatric syndromes (for example falls or functional decline) not caused by an acute illness and 5) elective. This was a subjective definition and some decisions had to be made. Where there was disagreement between the two coders (AC, HCH), these cases were debated until mutual consensus reached. The mode (or symptoms) of presentation were also recorded, which included geriatric “syndromes” falls, decreased mobility, not managing at home, non-specifically unwell, collapse and delirium. It also included medical and surgical symptoms such as pain and shortness of breath. For example, pneumonia may have presented as falls, decreased mobility or as shortness of breath.

Admissions were then further classified as “avoidable” or “unavoidable” admissions. “Unavoidable” was defined as requiring inpatient monitoring, investigation, medical or surgical treatment, or rehabilitation. Finally, the discharge destination from hospital for that person was recorded.

Descriptive statistics were used to describe the demographics and outcomes for the cohort. The relationship between readmission and the scales recorded at initial discharge were examined using univariate analysis. Variables within a p-value of <0.10 were then entered into a forward stepwise multiple logistic regression analysis. Significance of the variables and Odds Ratio (OR) were calculated.

Results

Two hundred and thirty-two people were recruited into the study. Of these, eight subsequently declined CREST services, leaving a cohort of 224. The mean (SD) age was 82.3 (6.5) years, 56% were female. They were moderately frail, mean (SD) REFS was 7.9 (2.8); the majority had some degree of cognitive impairment, mean MoCA 21.9 (4.6); they had a mean of 2.4 comorbidities (1.5); mean EuroQOL 11.8 (1.4); mean VAS score 54.8 (13.8); and mean NEADLs 29.1 (10.6). Mean length of stay for their index admission was 8.2 days and for those discharged from specialist inpatient geriatric care, 24.1 days.

Within the three months of discharge, 93 people (42%) had been readmitted. Mean time from index discharge to readmission was 23.5 days. There was a particularly rapid increase in the numbers readmitted early, over the first six weeks. Readmissions over time are shown in Figure 1. Mean length of stay for readmissions was 11.2 days.

Of the 93 readmissions, 57 (62%) were classified as a new acute problem; 12 (13%) as an acute exacerbation of an existing medical problem; and 15 (16%) as the same as the index discharge, four (4%) as a geriatric syndrome without other diagnosis, and four patients (4%) had an elective admission (e.g., planned eye surgery). One person died during their admission and a discharge summary was not completed, so could not be classified. These results are illustrated in Figure 2. From the 88 unplanned or emergent readmissions, 83 (95%) were considered unavoidable.
The mode of presentation is illustrated in Table 2. There were approximately equal numbers of falls, pain (including chest pain), shortness of breath and other medical conditions. There were smaller numbers of other geriatric syndromes: generally unwell, collapse and decreased mobility. While a third presented as a “geriatric syndrome” most of these were due to underlying medical problems, and hence the reason for admission was coded as such. No one was classified on their mode of presentation on discharge summaries as having delirium, although for a number this was diagnosed later. Also no one presented with the only presenting issue being failure to manage at home.

Figure 1: Numbers of readmissions over three months.

![Graph showing numbers of readmissions over three months.](image)

Time from discharge to first readmission (days)

Number of patients readmitted

- 0
- 10
- 20
- 30
- 40
- 50
- 60
- 70
- 80
- 90
- 100

Figure 2: Readmission category.

![Bar chart showing readmission category.](image)

Readmission category

- Acute: 57
- Exacerbation of chronic: 12
- Same as index: 15
- Geriatric: 4
- Elective: 4

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From the 88 unplanned readmissions, the majority, 75 (85%), were able to return home after their readmission. Twenty-seven (31%) did so with existing supports (formal or informal); 26 (30%) with further CREST input; seven (8%) were discharged with new long-term supports; and 15 (17%) after a period of inpatient rehabilitation. Of the remainder, 10 (12%) entered ARC; (6 (7%) directly from acute care, four (5%) from inpatient rehabilitation) and five (6%) died during the hospital admission.

Univariate analysis identified a number of variables as significant in those readmitted in the first three months. These were longer index length of stay (p=0.015), greater comorbidities (p=0.005), increased frailty (p=0.002), poorer QOL (p=0.010) and greater EADL dependence (p=0.010). These variables were then entered into the multivariate analysis. Two factors remained significant as predictors of readmission—lower functional abilities (NEADLs): OR= 0.97 (0.93-0.99) per point, p=0.017; and increased comorbidities (CI): OR=1.30 (1.07–1.59) per point, p=0.009.

Discussion

This study explores the issue of hospital readmissions in a frail, older cohort, discharged from hospital with the support of a community-based rehabilitation and support service. There are a number of key findings.

1. The readmission rate was high despite the CREST intervention bridging the transition to home.
2. The majority of readmissions were new acute medical or surgical problems or exacerbations of existing chronic medical conditions, not “failure to manage” or “failure” of CREST supports.
3. The majority of those readmitted were able to return home after treatment.
4. Predictors of readmission were increased comorbidities and lower functional status.

A key feature of this intervention is the targeting of a particularly frail group. Our group were older than the START study, which used a similar intervention, and most had frailty and cognitive impairment. This group have complex and unstable health and disability needs. This may have contributed to the high early readmission rates despite the intervention. This is in keeping with other studies of readmission rates in frail populations. In previous New Zealand studies with a similar frail group we found 40.7% three month readmission rate, and others 28-day readmission rates of 26.5%. In this observational study, the CREST intervention does not seem to have reduced readmission rates compared with these previous studies but neither have readmission rates increased. Without a

Table 2: Mode of presentation for emergent readmissions (n=88).

<table>
<thead>
<tr>
<th>Category</th>
<th>Mode</th>
<th>Number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geriatric syndromes</td>
<td>Falls</td>
<td>17</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td>Decreased mobility</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Collapse</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Generally unwell</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Not managing at home</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Delirium</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Palliative care</td>
<td>Palliative care</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Medical/surgical</td>
<td>Short of breath</td>
<td>17</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td>Pain (including chest pain)</td>
<td>16</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>Other medical</td>
<td>14</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>Other surgical</td>
<td>8</td>
<td>9</td>
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control group, we do not know whether the rates without intervention would have been different.

From our findings we have demonstrated that about three-quarters of the readmissions in our group could be classified with acute new conditions or acute exacerbations of existing chronic conditions. Only about a quarter were for the same condition as the index discharge. While about one-third presented with geriatric syndromes, particularly falls, we found that there were usually underlying medical conditions. These findings reflect the medical instability of this population, and many of their admissions to hospital are with significant medical conditions, rather than a “failure” of support services, or “failed discharge.” This finding is supported by the New Zealand study of Minnee and Wilkinson, who assessed reasons for representation to the ED, and found most were acute medical problems. Similarly others have found readmissions to be due to acute or chronic medical conditions even when initially triaged as “acopia”. We considered over 95% of readmissions to be unavoidable; that is they required inpatient monitoring, investigation, management or rehabilitation.

Another key finding was that the majority of those readmitted (85%) were able to return back to their own homes, with or without further CREST input. This again supports the finding that people were readmitted with acute, treatable problems from which people could recover with appropriate care. It also argues against the use of pejorative labels such as “failure to cope” or “acopia” or blaming the support structures. It is recognised that most older patients given these labels have acute, serious medical problems that need addressing.

In our multivariate regression analysis we performed analysis of a number of scales recorded at the time of initial discharge. Significant predictive factors in people who were readmitted at three months were comorbidities (the CI) and function (NEADLs). The significance of the CI supports the idea that this population are medically unstable, and therefore at risk of readmission, and is in keeping with other studies which have shown medical comorbidities to be significant. However the finding that functional abilities are also significant is important. It is widely recognised that this frail population is very precariously balanced between independence and dependence, and that even an apparently minor insult or illness can tip that balance. The relevance of this, is that even small gains in function are worthwhile and can make the difference between remaining at home or not.

When we examine our patients’ mode of presentation, about one-third of them presented with “geriatric syndromes” secondary to acute medical problems, which supports the suggestion of frailty and decompensation of function being important. In their review Garcia-Perez also found functional ability to be important.

Unfortunately we do not have any data on whether our cohort had any primary care follow-up prior to readmission. Others studies found half of their study population had not had a physician visit between index discharge and readmission. We do not know whether, with earlier primary care follow-up or other intervention, medical conditions may have been detected sooner, and be treated in the community setting. In a recent study Legrain found that discharge planning, self-management coaching and medication review by geriatricians with detailed transition-of-care communication to primary care reduced readmissions and ED attendances. The CREST service may need to incorporate increased specialist and generalist medical input to address these needs, and/or review how we communicate with primary care. It supports the need for rapid access for older people to acute assessment, diagnostic and management services. Scheduling an early primary care review at the time of discharge is another option.

There are a number of limitations to this study. First it was not a controlled trial, so we do not know the underlying readmission rates in people of equivalent frailty who did not receive the CREST service. Second, it was descriptive, and judgement calls had to be made about which diagnostic group to place people in when there were co-existing problems. There was also potential for bias, for investigators to classify admissions to “improve” outcomes of the study.
We addressed this by having two clinicians separately coding the reasons for readmission, then comparing these codes. When they did not agree, cases were discussed and consensus reached.

Our study has found that in a population of frail older people discharged from hospital with a community rehabilitation and support service readmission rates were high. Readmissions in this group are commonly seen as preventable or unnecessary, and that they represent a failure of services or an inability of the older person to manage at home. However, the majority of our cohort were readmitted with acute problems, from which they were able to recover and return home after treatment. These findings suggest that this model of service should not have prevention of readmissions as its primary outcome goal, rather improvement of function and maintenance of independence. We will report on these outcomes in a separate paper.

The question remains whether readmissions in this group can be prevented. Further research is needed on whether specialist follow-up, early primary care input or better communication with primary care services would enable medical issues to be identified and managed earlier in a community setting.

Competing interests:
Nil.

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