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Avoiding hospital readmissions: the models and the role of primary care

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Introduction

Australia's 2020-25 National Health Reform Agreement (NHRA) commits to improving the health outcomes of Australians through better coordinated care in the community and ensuring Australia's health system remains sustainable (Department of Health, 2020b). Unplanned hospital readmissions indicate suboptimal patient outcomes, care coordination, and quality of care and contribute to significant avoidable healthcare costs (Katteri et al., 2012; Li et al., 2014; Considine et al., 2019; ACSQHC, 2019). The transition between hospital and the community requires good multi-disciplinary cooperation and timely, comprehensive, and accurate communication. However, these are not always achieved. Consequently, the discharge and transition phase of care is considered one of the most risky phases of hospital stays (Waring et al., 2014; Wells et al., 2017).

In addition, the COVID-19 pandemic has catalysed the need for remote delivery of healthcare in Australia as a way to reduce demand on hospital beds, and facilitate remote monitoring to detect and appropriately treat deterioration. The pandemic has forced healthcare providers and patients to quickly overcome barriers and reservations about its use (Taylor et al., 2021; Attwooll, 2021; Gillespie, 2021).

As health systems globally grapple with bed and resource shortages, compounded by the pandemic and leading to delayed or cancelled non-urgent and elective procedures, the need for additional work to sustainably improve system resilience and capacity has become more evident (Wood, 2022). The transmissibility of the Omicron variant has tested Australia's health system preparedness, and has led to many questioning the effectiveness of government-led pandemic response and planning; including the degree of integration and shared care possible across primary and tertiary care sectors (Angus et al., 2020; Schultz et al., 2021; Ferry et al., 2021; NSW Health 2021; Barrett and Sweet, 2022; Faux and Sweet, 2022; MacIntyre and Sweet, 2022; Leeder, 2022).

Prior to the COVID-19 pandemic, telehealth was underutilised and largely excluded from funding models in metropolitan areas or where care was not being provided by specialist medical providers. (Snoswell and Gray, 2019). The pandemic has accelerated the implementation of virtual hospital care for COVID-19 and other patients in Australia.

This paper briefly discusses the different models of care reported in the literature which have been used to prevent unplanned hospital readmissions, including those models that improve transitional care, as well as virtual wards.

Avoiding unplanned readmission is important. A significant proportion of hospital readmissions are avoidable and vulnerable groups, such as older people, are disproportionately affected by unplanned readmissions (Walraven et al., 2011; Finlayson et al., 2018; Sharma et al., 2019). Unplanned readmissions are associated with poorer health outcomes, lower satisfaction with healthcare, and increased health system costs. This brief also discusses the potential role of primary care, namely general practice, in helping to reduce hospital readmissions.

Policy Issue

Key critical priorities of Australia's National Health Reform Agreement are 'improving efficiency and ensuring financial sustainability' and 'delivering safe, high-quality care in the right place at the right time' (Department of Health, 2020a). Globally, 27% of all hospital readmissions were deemed avoidable (Walraven et al., 2011). In Australia, the rates of unplanned hospital readmissions range from as low as 0.3% for cataract surgery to 11% for general medicine admissions (Li et al., 2014; Considine et al., 2019; ACSQHC, 2019). One in seven hospital discharges in metropolitan Victoria results in an unplanned readmission within a month, and 10% of the readmissions occurred within a day of discharge (Considine et al., 2019). Unplanned readmissions are estimated to cost Australia in the order of \$1.5B annually (Sahli, 2015). Australia and its states have frameworks in place to reduce readmissions, but clearly more needs to be done (Katteri et al., 2012; ACSQHC, 2019).

We know the transition process between hospital and home is risky for the patient, however it is also a phase where patients may not necessarily need the intensity of a hospital bed, nor might patients actually want to remain in hospital especially if the same level of patient safety could be assured in the patient's own home. The Australian primary care sector is ideally poised to support innovative model of care to support patients in the transition period (RACGP, 2019).

What does the evidence say?

Brief overview of models

There are a wide variety of published models aiming to reduce hospital readmissions. However, due to heterogeneity in designs, comparison of health outcomes, improvements on quality of life, patient satisfaction with care and practitioner satisfaction with providing care, and the impacts on health system costs between models is difficult. For example, terminology used, which outcomes are measured, and the methods employed to measure those outcomes all differ between models. Meta-analyses on the topic are uncommon and those that have been published have outlined limitations in their ability to reach firm conclusions as a consequence of the heterogeneity in both intervention designs and outcome measures used and, in some cases, inadequate descriptions of interventions (Hesselink et al., 2012; Leppin et al., 2014; Jones et al., 2016). Nevertheless, characterisation of different models can be broadly arranged in a hierarchical manner as shown in Table 1.

Table 1: Examples of models in literature that sought to reduce hospital readmissions (adapted from Hansen et al., 2011).

Predischarge interventions	Interventions bridging the transition	Post discharge interventions
<ul style="list-style-type: none"> ▪ Discharge planning (without any transition or post discharge care provision) ▪ Medication reconciliation ▪ Proactive scheduling of follow-up appointments 	<ul style="list-style-type: none"> ▪ Ensuring healthcare provider continuity, usually with transition care models which include: <ul style="list-style-type: none"> ▪ Interdisciplinary discharge teams ▪ Discharge summaries and patient-centred discharge instructions ▪ Medicine transition coordination (community pharmacists) 	<ul style="list-style-type: none"> ▪ Most virtual ward models ▪ Timely follow-up ▪ Timely post discharge communication with primary healthcare provider ▪ Home visits ▪ Telephone follow-up ▪ Patient hotlines

Which models are effective at reducing hospital readmissions?

A systematic review investigating interventions aimed at preventing rehospitalisations found no evidence that interventions where the sole aim was to reduce 30-day hospital readmissions achieve that goal (Hansen et al., 2011). Another systematic review investigated whether or not improving patient handovers between hospital and primary care demonstrated ‘broader benefits’ beyond just 30-day hospital readmissions (Hesselink et al., 2012). Measures of ‘broader benefits’ included:

- Improved hospital utilisation
- Continuity of care, patient status (e.g., patient self-reported preparedness for discharge)
- Errors
- Near miss or adverse events
- Primary care utilisation (e.g., frequency of primary care follow-up)
- Healthcare provider status (e.g., primary care provider rated quality of discharge summary)
- Care giver status (e.g., reduced carer burden or stress)

It was found that interventions that improved coordination of care and communications between hospitals, primary care providers and/or pharmacists were effective at improving one or more of the outcome measures described (Hesselink et al., 2012).

A meta-analysis investigating the impact of post-discharge interventions on the reduction of hospital readmissions found in general, that post-discharge interventions were effective at reducing 30-day readmissions. Interventions included improving discharge planning, discharge communication, medicine reconciliation, patient self-management and education, clinician continuity, follow-up

scheduling or introducing home visits, telephone follow-up, telemonitoring or rehabilitation services. It was reported that models which aimed to improve patient self-care capacity as a component of the overall intervention were particularly effective at reducing 30-day hospital readmissions (Leppin et al., 2014).

A Cochrane Review of discharge planning interventions, a form of transitional care, demonstrated a small reduction in hospital stay length and risk of readmission for older people (Gonçalves-Bradley et al., 2016). Transitional care also had potential to delay and prevent early readmissions for older people, but findings were mixed for this specific group (Allen et al., 2014). The essential elements of transitional care include communication between care providers, discharge assessment and creation of a care plan, preparing the patient and carer for the transition, reconciliation of medications at the time of transition, putting in place a follow-up plan and education for self-management (Allen et al., 2014). Typically, advanced practice nurses, general practitioners (GPs), or primary care nurses performed the work required for transitional care with some studies having case management oversight by geriatricians (Allen et al., 2014).

A closer look at the Virtual Ward Model

Virtual wards are also seen as another way to reduce risk of hospital readmissions and to improve outcomes during the hospital to home transition period. While no standardised definition exists for what virtual wards are, the following characteristics are common:

- Admission to a virtual ward is determined using predictive tools to identify patients who are most likely to benefit. The LACE score (Length of stay, Acuity of admission, Comorbidity of patient, Emergency department utilisation) is most common, but more sophisticated predictive tools that rely on artificial intelligence exist (Billings et al., 2012; Lewis et al., 2013; Dhalla et al., 2014; Lee et al., 2015; Low et al., 2017; Lewis, 2017).
- Patients are cared for within their private residence which involves telemonitoring and applying appropriate interventions remotely. Virtual wards go beyond telephone/video follow ups (Lewis, 2006; Uminski et al., 2018).
- Patient care is coordinated by an interdisciplinary team of at least two health professionals, but models reported in literature typically consisted of a ward clerk, nurses, physicians and/or GPs, allied health professionals, pharmacists, mental health professionals and community nurses/matrons (Lewis, 2006; Lewis et al., 2013; Uminski et al., 2018). The ward clerk coordinates the team and their communications both internally and externally (Lewis, 2006).
- Virtual wards copy strengths of hospital ward routines such as having a common set of patient charts accessible to the whole care team, and daily 'ward' rounds involving the care team; although not all patients need to be discussed daily depending on their condition (Lewis, 2006; Low et al., 2017).

Other studies have reported virtual wards being staffed at 15 GPs per ward, with each ward having capacity for 100 patients (≈ 7 patients per GP); or in another model, staffed at one nurse per 30 patients with each patient being allocated a three month 'stay' (Lewis, 2006; Lee et al., 2015).

Virtual wards are not to be confused with Hospital in the Home (HITH). HITH is designed to replace hospital care and is usually applied to patients with higher acuity conditions. The role of the virtual wards is to transition patients from hospital care to home care safely and to avoid readmissions. Compared to HITH, virtual wards typically have a higher degree of interdisciplinary care coordination and review, are simpler in design and implementation, and have a broader scope of activities (Uminski et al., 2018). Transitional care is similar to virtual wards, but usually implemented within existing systems. Virtual wards typically require a completely new care pathway and potentially new organisations to manage its implementation. Transitional care does not typically utilise risk prediction as a method of triage.

When applied to non-specific complex diseases, virtual wards in the UK, Canada, Singapore, Denmark and Australia, have shown little benefit to reducing all-cause mortality, hospital readmissions or lowering health service costs (Lewis et al., 2013; Dhalla et al., 2014; Lee et al., 2015; Uminski et al., 2018). However, a systematic review and meta-analysis found that disease specific virtual wards models have shown some promise (Uminski et al., 2018). For example, when the virtual wards have the specific intention to reduce heart failure-related readmissions in patients, there is a significant reduction in both heart failure-related and all-cause mortality, despite the number of readmissions itself not being lower. This was largely attributed to the aims of the intervention which were to prevent worsening heart failure, improve early detection and treatment of life-threatening complications due to both heart failure and non-related complications (Uminski et al., 2018). The first aim of 'prevent worsening heart failure' would lead to a reduction in readmissions, but the second aim of 'early detection', if successful, would see readmissions occur and these readmissions are more likely to lead to more effective service use and reduced patient harms. It was found that post discharge virtual wards for heterogenous high-risk populations was no better than usual community-based care, agreeing with the other studies reviewed (Uminski et al., 2018).

Patient and practitioner satisfaction

Patient satisfaction is a key metric for success of healthcare models and while not all studies of virtual wards or transitional care measure patient and/or practitioner satisfaction, those that do generally find improved patient, practitioner, and care satisfaction. For example, in studies aiming to improve patient handovers, patients reported feeling more prepared for discharge, primary care providers were happier with discharge communications, and carers were less stressed (Hesselink et al., 2012).

Such models are patient-centred by design. Consequently, practitioner-patient communication, patient and carer self-efficacy and education, and ensuring that care fitted within the patient's social context are generally features of the interventions (Lewis, 2006; Dhalla et al., 2014; Lee et al., 2015; Low et al., 2017). It has been demonstrated that compared to usual care (that is, standard hospital discharge procedures) patients in the virtual wards arm were more satisfied with their overall care (Lee et al., 2015). Patients said they received higher levels of care and concern; and received help with complying with their treatment plans. They also understood their medical condition and their treatment plans better, and demonstrated higher levels of self-efficacy, greater confidence in coping with their conditions and reduced stress and anxiety related to their illness (Lee et al., 2015).

Overall, patients felt they had better coordinated care compared to the control (Lee et al., 2015). Another study found that better care coordination led to significant reductions in outpatient attendances in the 6 months post discharge (Lewis et al., 2013). Nevertheless, virtual wards did not appear to reduce readmission risk, including when self-rated quality of life was assessed (Lee et al., 2015). It was speculated that while readmissions were not reduced, the improved patient satisfaction could be associated with improved quality of life between hospital visits (Lee et al., 2015).

Impact on healthcare costs

Findings on the cost-effectiveness of virtual wards were varied. Some studies demonstrated significantly reduced hospital utilisation (Low et al., 2017); whereas others found no net reduction in costs, as any savings realised by reductions in hospital readmissions were offset by the increased costs of operating the virtual wards (Lewis et al., 2013). Meta-analysis on discharge planning interventions, a type of transitional care, concluded that there was little evidence to support the suggestion that interventions reduced overall healthcare costs (Gonçalves-Bradley et al., 2016). While disease-specific virtual wards do not necessarily decrease healthcare costs but rather serve to improve health outcomes and utilisation effectiveness (Uminski et al., 2018).

The variability in cost effectiveness data serves to highlight the vast number of different health systems which exist and the many assumptions that need to be made to calculate cost effectiveness of an intervention (Lee et al., 2015; Gonçalves-Bradley et al., 2016). Activity-based costing would have greater usefulness to understanding cost-effectiveness of future hospital readmission avoidance interventions (Kaplan and Porter, 2011; Lee et al., 2015). Australia's Independent Hospital Pricing Authority (IHPA) has developed a method to calculate activity-based costing. Consequently, Australia is well-primed to lead research on effectiveness of such interventions (IHPA, 2016).

COVID-19 and virtual wards

The SARS-CoV2 pandemic has highlighted the need to reduce strain on hospital settings without reducing patient safety. One such way to achieve this would be to use telemonitoring within a HITH or virtual wards framework.

A rapid systematic review of literature between July 2020 and February 2021 found that several countries including the United States, United Kingdom, Canada, Netherlands, China, Ireland, Brazil and Australia had trialled remote home monitoring models of care for COVID-19 (Vindrola-Padros et al., 2021). Studies that investigated remote monitoring of hospital in-patients, and those that did not have a remote home monitoring component (e.g., telephone-only triage or follow-up), were excluded. The review found that the home monitoring trials for COVID-19 care generally had five distinct stages:

1. Referral and determination of eligibility through triaging
2. A patient onboarding process including provision of information to patient and/or carer on the self-care methods, the home monitoring process and how to escalate care
3. Home monitoring, including the recording and communication of observations and assessment of this information by the medical team
4. Mechanisms to detect and escalate care
5. Discharge

The primary aims of the models were generally to:

- Enable early identification of deterioration for patients self-managing COVID-19 symptoms at home with secondary aims of reducing the rate of hospital-acquired infections
- Identify and divert reasonably low-risk patients away from acute care beds (pre-admissions approach)
- Facilitate earlier discharge from hospital care to remote care thus freeing an acute care bed sooner ('step-down' approach)

Some aspects of the models included in the review aligned more closely to the HITH model (e.g., diverting low-risk patients from acute care beds), whereas other aspects are more aligned with virtual wards models (e.g., 'step-down' approach to facilitate earlier discharge).

Of the 27 COVID-19 remote home monitoring care interventions reviewed, most were led by secondary care teams, or both primary and secondary care teams, with very few of the trials led only by a primary care team. It was reported that the studies associated with primary care-led home monitoring models are easier to replicate, especially in scenarios where secondary care resources are already limited (Vindrola-Padros et al., 2021). It was also suggested that effective coordination between primary and secondary care teams was important since the involvement of primary care

means the model was able to better accommodate for a wider range of medical symptoms and comorbidities prevalent in COVID-19 patients, as well as integrating aspects of mental health and social care. Broadness in practice scope is a speciality of primary care (Medina et al., 2020; Agarwal et al., 2021).

Challenges with COVID-19 remote home monitoring interventions were shown to be predominately associated with patient training and their skill at taking vital signs accurately, the need for standardised equipment across all patients to reduce measurement variability, and suitability of patients for home monitoring (e.g., patients with poor peripheral perfusion or underlying health conditions are unsuitable for home monitoring) (Vindrola-Padros et al., 2021). This should be considered when implementing home monitoring of conditions other than COVID-19 that require a degree of operator skill for clinical measurements to be accurate.

Reporting of patient safety or the ability of the trials to detect deterioration of cases was not consistently reported in the literature analysis, nor were standardised measurement outcomes taken. However, mortality across the studies was shown to be low (0% – 3.1%), while readmission rates ranged between 0% – 29%, and emergency department attendance/reattendance between 4% – 36%. The average length of ‘stay’ with the virtual COVID-19 ward ranged from 3.5 to 13 days (Vindrola-Padros et al., 2021).

Patient satisfaction with remote monitoring was suggested to be high (Vindrola-Padros et al., 2021). While remote monitoring appeared to increase the efficiency in the use of resources by reducing length of hospital stay and increasing bed availability without compromising patient safety (Vindrola-Padros et al., 2021). Nevertheless, evidence was generally inconclusive and additional studies are required for more conclusive outcomes.

What does this mean for policymakers?

The transition process between hospital and the home is considered fraught with risk (Waring et al., 2014; Wells et al., 2017). Deficits in care provision, unmet patient needs and unplanned hospital readmissions, which are particularly high in vulnerable populations, are expensive to the health system (Marmot et al., 2008; Marmot, 2018). These issues potentially reduce quality of life and satisfaction with health care (Lee et al., 2015).

All Australian state governments and the federal government are signatories to the National Health Reform Agreement – Addendum 2020-2025. It clearly outlines the need to reduce potentially avoidable hospital admissions, which includes ensuring appropriate discharge, and implementing reforms in primary care to improve patient outcomes and avoid hospital admissions (Department of Health 2020a). Avoidable hospital admissions include hospital readmissions (ACSQHC, 2019).

Three broad intervention areas where specific models could be developed were identified in the literature (see Table 1 for more detail):

1. Predischarge interventions (e.g., discharge planning)
2. Interventions bridging the transition (e.g., continuity of care or interdisciplinary discharge teams)
3. Post-discharge interventions (e.g., virtual wards or improving communication between the hospital and the patient's primary healthcare professional)

The evidence highlighted the following key points:

- Models that sought to reduce unplanned readmissions as the core goal were generally not successful in achieving it. Rather, models where the goal was to improve multiple aspects of the transition care process, such as attempting to improve continuity of care, patient status, reduce errors and near miss events, and improve utilisation of primary care, resulted in overall reductions in unplanned readmissions. This suggests a multi-disciplinary, multi-faceted and contextually appropriate approach is required.
- Overall, models focused on improving the 'bridging' phase of transitioning from hospital to home produced small reductions in unplanned readmissions. The essential elements of transitional care include communication between care providers, discharge assessment and creation of a care plan, preparing the patient and carer for the transition, reconciliation of medications at the time of transition, putting in place a follow-up plan and education for self-management. The most successful models within the 'bridging' phase at reducing unplanned readmissions were ones with a component of improving patient self-care.
- Models focused on improving the post-discharge phase were generally effective at reducing unplanned readmissions. These included improved post-discharge planning, communication with primary care, medicine reconciliation, patient education, clinician continuity, follow-up scheduling, rehabilitation services or home visits, telephone follow up or telemonitoring.
- Virtual wards, when applied to populations with non-specific complex disease, showed no overall reduction in all-cause mortality, hospital readmissions or lowering health service costs. Disease-specific virtual wards are effective at reducing that specific diseases' complications and all-cause mortality; however, readmissions may not lower as they could further occur due to better early detection of complications.
- Overall, the models reviewed demonstrated improvements in patient satisfaction with care, self-efficacy, confidence with coping with their condition, and reduced patient and carer anxiety despite not seeing reductions in hospital readmissions. Naturally, models that sought to improve communication between hospital and primary care resulted in improved GP satisfaction with the transition process.

- Care coordination models were shown to reduce outpatient department utilisation but did not reduce readmissions risk overall.
- No clear conclusion on cost effectiveness can be drawn from the literature. Some studies showed no net reductions in cost, due to the cost to operate the models; whereas others demonstrated cost reductions in the hospital sector but did not consider overall health systems costs. Activity-based cost analysis will be required for future studies.
- Remote home monitoring interventions for COVID-19 were generally best led by a multidisciplinary care team made of primary and secondary care clinicians. This was shown to allow for more effective coordination of care and could accommodate for the widest range of medical symptoms and comorbidities, compared to models led by either just primary or secondary clinicians. Patient training and their skill at using home monitoring equipment was vital to gain accurate readings. This is an important consideration for other models which may require remote monitoring. There was no consistent reporting on safety or outcomes, but generally patient satisfaction with home care was high, mortality low and readmission rates ranging between 0% and 29% of cases.

Australian primary care, particularly general practice, has a key role to play in helping reduce hospital readmissions (RACGP, 2019; Department of Health, 2020; Moorin et al., 2020). Some of the interventions reviewed changed hospital processes (Lee et al., 2015; Low et al., 2017), but even these would need general practice input. For example, medicine reconciliation processes, discharge summaries and improving follow-up processes all need general practice contribution. Other interventions such as virtual wards and other 'bridging' models require multi-disciplinary care teams and general practice is well placed to bring a broader set of clinical skills and care coordination to better manage patients with multimorbidity, in a more patient-centred way and closer to their homes.

Case studies: The role of Inala Primary care in reducing hospital admissions

[Inala Primary Care](#) is a not-for-profit general practice located in Inala serving approximately 7000 patients; 4400 of whom attend clinic regularly. Inala is a suburb of Brisbane, Queensland and has a population of great cultural and linguistic diversity, with just under 40% of residents speaking English at home (ABS, 2016). It is also one of Queensland's most socioeconomically marginalised urban areas (PHIDU, 2018).

Many in the community are vulnerable to increased lifestyle risk factors, increased rates of chronic disease and cancer, poorer health outcomes and lower quality of life (PHIDU 2018). Two examples have been provided to highlight how Inala Primary Care has endeavoured to implement additional services aimed at reducing hospital readmissions. These services were self-funded through partnerships, research funding and/or philanthropy. Concerted government commitment to properly fund research and services that will directly address readmissions risks is desperately

needed. This will also require effectively supporting primary care's current and future role in preventing readmissions.

MCHooSe – Mater Culturally & Linguistically Diverse Healthcare Coordinator Service

Inala Primary Care has historically worked closely with the [Mater Integrated Refugee Health Service \(MIRHS\)](#). Since the 1950s, Inala has been a key settlement area for both diverse overseas migrants and migrants from refugee backgrounds (Greenop, 2008). Patients from such backgrounds often have greater unmet healthcare coordination needs than the general population. The consequences of poor health coordination include inefficient healthcare utilisation, frequent presentations to inappropriate services, defaulting attendance to appointments and frequent unplanned readmissions (Dixon-Woods *et al.* 2006; Henderson and Kendall 2011; Mengesha *et al.*, 2017; Wamwayi *et al.*, 2019). The delivery of care in a culturally and linguistically sensitive manner across all levels of our healthcare system is deficient (Phillips and Travaglia, 2011; Farley *et al.*, 2014; Hilder *et al.*, 2017; White *et al.*, 2019). In an effort to improve healthcare access and equity, Inala Primary Care and MIRHS co-developed the *Mater Culturally & Linguistically Diverse Healthcare Coordinator Service* (MCHooSe).

MCHooSe began in March 2020 at five sites across Brisbane, Queensland. The MCHooSe service was embedded within the general practice clinic and staffed by MHIRS multicultural support nurses. Building on the refugee health co-location in primary care model, the role included a strong brokering and advocacy function for patients with complex biopsychosocial needs (Dixon-Woods *et al.*, 2006; Sackey *et al.*, 2020).

The nurses' roles enabled them to operate to the full scope of their practice and training, enabling a patient-led approach to care. Nurses acted as the interface between primary and secondary/tertiary care, patients, and their GPs; where they worked to address access and equity barriers, including, among other work:

- Tracking referrals
- Ensuring hospital correspondence with the patient's GP was timely
- Organising transport to medical appointments
- Improving health and health systems literacy and ensuring adequate use of bicultural and/or interpreting services

MCHooSe was funded from Queensland Government and philanthropic sources and the model of operation resembled something similar to block funding, rather than fee-for-service.

Commonly delivered services included following up with external health services, chart reviews and helping patients coordinate external health care appointments. Surveys of primary care clinicians (GPs and practice nurses) revealed that MCHooSe improved patient access to external health

services and improved patient understanding of their treatments (Chua et al., 2021). The data also revealed that the primary care clinicians felt the patients' wellbeing improved after their patients had access to the service and that patients were more likely to be compliant with attendance and treatments. Most importantly, primary care clinicians said they received communications from the hospital quicker if MCHooSe was involved. In combination, these factors are known to reduce the risk of hospital readmissions.

MCHooSe highlights the potential to improve hospital outcomes through better healthcare coordination and improved healthcare equity for multicultural patients. The clinical effectiveness and cost-effectiveness of embedding MCHooSe into usual care has yet to be investigated.

Non-dispensing pharmacists in general practice

Integration of non-dispensing pharmacists in the general practice clinic was demonstrated to significantly reduce emergency department presentations and hospital readmissions amongst patients with long-term polypharmacy (five or more long-term medications on discharge) and were suffering from congestive heart failure or chronic obstructive pulmonary disease (Freeman et al., 2021). It was demonstrated that pharmacists in general practice had a cost benefit of \$5072 per intervention patient with a benefit-cost ratio of 31:1 (Freeman et al., 2021).

Inala Primary Care is currently participating in a follow-up pilot of integrated non-dispensing pharmacists in local general practice clinics being run by Brisbane South Primary Health Network (PHN) (Shaw, 2020). At the time of writing, there are no published results of the pilot as it is ongoing (Shaw, 2020). While initial model design costs were covered by Brisbane South PHN, Inala Primary Care is responsible for ongoing employment costs of the pharmacists, who proactively target patients who have been recently discharged from hospital for review.

Inala Primary Care integrated pharmacists review patient's charts and ensure discharge medication lists have been received by their GP. Pharmacists also work closely with the GPs and nurses to identify patients who would benefit most from home medicines reviews on a risk stratification basis; and have successfully identified and intervened where medication lists from hospitals were missing, not current, or incomplete. They have also intervened on cases where medication lists contain potentially incompatible medicines and instances where multidose administration aids (e.g., Webster-Pak®) are altered after discharge but changes were not clearly communicated to the primary care team.

As part of the pilot, pharmacists are working towards averting hospital readmissions, new hospital presentations and adverse health outcomes. Formal evaluation of the pilot is currently being completed by Brisbane South PHN and Griffith University.

Closing remarks

Models of care to avoid hospital readmissions may not necessarily decrease health system costs on a whole, instead it could shift costs to other sectors of the health system. Models designed for specific diseases appear to be more effective at reducing hospital readmissions and all-cause mortality than models accepting patients with heterogenous conditions. Additionally, models where the goal was to improve multiple facets of the transition care process, rather than a single facet, were more successful in reducing unplanned readmissions. The recent rapid integration and development of telehealth into our health system could be an excellent tool for improving transitional care, general practice integration in the discharge process and multi-disciplinary virtual care. However, a multi-disciplinary, multi-faceted and contextually appropriate approach which deeply involves primary care is required to reduce unplanned hospital readmissions.

Key readings

1. Lewis G, Georghiou T, Steventon A and Vaithianathan R. (2013). Impact of 'Virtual Wards' on hospital use: a research study using propensity matched controls and a cost analysis. National Institute for Health Research, London, United Kingdom. Viewed 13 May 2022: <https://fundingawards.nihr.ac.uk/award/09/1816/1021>

This official National Health Service (NHS), National Institute for Health Research, United Kingdom, publication reports the impacts of the NHS Virtual Wards program on hospital usage. The authors of this report utilised a rigorous method of comparison and analysis across two boroughs of London; Croydon and Wadsworth, and the county of Devon. The report contains a thorough analysis of hospital readmissions and health service utilisation rates and the economic benefits of virtual wards. This report also discusses the pitfalls experienced with implementing such a public program and highlights policy issues which they encountered.

2. Uminski K, Komenda P, Whitlock R, Ferguson T, Nadurak S, Hochheim L, ... Rigatto C. (2018). Effect of post-discharge virtual wards on improving outcomes in heart failure and non-heart failure populations: A systematic review and meta-analysis. *PLOS ONE*. 13: e0196114. <https://doi.org/10.1371/journal.pone.0196114>

A systematic review and meta-analysis of 10 studies covering 4820 patients across European, North American and Australian locations outlining the possible benefits of disease-specific virtual wards on hospital service utilisation. This supports the view that a one-size-fits-all approach to reducing hospital readmissions as discussed by Considine et al. (2019) is inadequate; this article was written in the Australian context.

3. Gonçalves-Bradley DC, Lannin NA, Clemson LM, Cameron ID and Shepperd S. (2016). Discharge planning from hospital. *Cochrane Database of Systematic Reviews*. 2016(1): CD000313. <https://doi.org/10.1002/14651858.CD000313.pub5>

Australian GPs and the evidence about avoidable hospital readmissions in Australia demonstrates that improvements to discharge pathways can still be realised (Mahfouz et al., 2017; Considine et al., 2019). This Cochrane Systematic Review highlights that benefits to patient outcomes could be realised by improving coordination of services following discharge from hospital.

4. RACGP: Royal Australian College of General Practitioners. (2019). Vision for general practice and a sustainable healthcare system. RACGP, Melbourne, Australia. Viewed 28 April 2022: <https://www.racgp.org.au/getattachment/e8ad4284-34d3-48ca-825e-45d58b2d49da/The-Vision-for-general-practice.aspx#:~:text=The%20Vision%20for%20general%20practice,facing%20the%20Australian%20healthcare%20system>

The Royal Australian College of General Practitioners (RACGP) have advocated for better involvement of the patient's GP in care, especially when it comes to continuity of care. Fragmentation of care, delays, and barriers in medical records access are known to lead to adverse outcomes. The RACGP outlines that GPs need better funding models to support voluntary patient enrolment of Australians at higher risk of hospitalisation, incentivise health service coordination beyond the limitations of the current Team Care Arrangement platform. These must fund more comprehensive, patient-centred, and team-based care within their practices as the Practice Nurse and Workforce Incentive Programs/Payments are currently inadequate to support high quality team-based care which could prevent hospital readmissions or utilisation in the first instance.

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