Hospital collaboration with a Housing First program to improve health outcomes for people experiencing homelessness

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Abstract

Purpose – *Homelessness is a colossal issue, precipitated by a wide array of social determinants, and mirrored in substantial health disparities and a revolving hospital door. Connecting people to safe and secure housing needs to be part of the health system response. The paper aims to discuss these issues.*
Design/methodology/approach – *This mixed-methods paper presents emerging findings from the collaboration between an inner city hospital, a specialist homeless medicine GP service and Western Australia's inaugural Housing First collective impact project (50 Lives 50 Homes) in Perth. This paper draws on data from hospitals, homelessness community services and general practice.*
Findings – *This collaboration has facilitated hospital identification and referral of vulnerable rough sleepers to the Housing First project, and connected those housed to a GP and after hours nursing support. For a cohort (n = 44) housed now for at least 12 months, significant reductions in hospital use and associated costs were observed.*
Research limitations/implications – *While the observed reductions in hospital use in the year following housing are based on a small cohort, this data and the case studies presented demonstrate the power of care coordinated across hospital and community in this complex cohort.*
Practical implications – *This model of collaboration between a hospital and a Housing First project can not only improve discharge outcomes and re-admission in the shorter term, but can also contribute to ending homelessness which is itself, a social determinant of poor health.*
Originality/value – *Coordinated care between hospitals and programmes to house people who are homeless can significantly reduce hospital use and healthcare costs, and provides hospitals with the opportunity to contribute to more systemic solutions to ending homelessness.*
Keywords *Social determinants of health, Healthcare, Homelessness, Primary care, Emergency department, Hospital discharge*
Paper type *Research paper*

1. Background

1.1 Health and homelessness are intertwined

On nearly any measure of health inequality, people experiencing homelessness are vastly over-represented (Luchenski *et al.*, 2018), and the compounding reciprocity of the relationship between homelessness and health has been observed globally (Wood *et al.*, 2016). UK data reports an average life expectancy of 47 years among people who are homeless, and multiple complex morbidities are common (Perry and Craig, 2015). Health conditions that are more prevalent in homeless populations include psychiatric illness, substance use, chronic disease, musculoskeletal disorders, poor oral health, and infectious diseases such as tuberculosis, hepatitis C and HIV infection (Aldridge *et al.*, 2018; Perry and Craig, 2015).

The homeless population has disproportionately high healthcare use, and are far more likely to access acute health services, experience multiple morbidities and die prematurely (Fitzpatrick-Lewis *et al.*, 2011; Kushel *et al.*, 2002). Constellations of trauma, poverty, substance misuse, educational

disadvantage, unemployment, domestic violence and social disconnection are common (Hwang *et al.*, 2009; Fowler *et al.*, 2009) and this imbalance of social determinants fuels deteriorating health outcomes and persistent use of acute healthcare.

People experiencing homelessness are less likely to seek primary or preventative health services and so present later with a diagnosis of greater severity or with avoidable complications (Moore *et al.*, 2007; Rieke *et al.*, 2015). There are raft of impediments to healthcare access for people who are homeless. At the personal level, just meeting basic day-to-day needs for food and a place to sleep is challenging, and health is often neglected until crisis point is reached (Wise and Phillips, 2013). Poor health itself can be a barrier to accessing healthcare, particularly among people with mental illness, addictions, cognitive impairment or mobility limitations (Davies and Wood, 2018). Experiences of trauma are pervasive among homeless population and this coupled with stigma and past negative experiences of the health system can render people wary of seeking help (Davies and Wood, 2018). There are also practical barriers to health service access, including lack of transport and not being contactable for appointment reminders (Davies and Wood, 2018).

As articulated by Marmot (2015), it is futile to treat homeless patients in hospitals before discharging them back to the abysmal social conditions that made them sick in the first place: to do so perpetuates a revolving door between the hospital and the street or between the hospital and precarious housing.

1.2 Housing as healthcare

Mounting evidence supports the argument that re-housing people experiencing homeless is a powerful healthcare intervention (Stafford and Wood, 2017). The Housing First approach originated in New York (Tsemberis and Eisenberg, 2000) and as the name implies, advocates that long-term housing is the essential first step that then provides stability that enables other complex medical and psychosocial issues to be addressed (Johnson *et al.*, 2010; Mackelprang *et al.*, 2014). The emphasis is on housing people rapidly with no pre-conditions, and providing support services in conjunction with the long-term housing to support people exiting homelessness to sustain tenancies and address other issues (Johnson *et al.*, 2010). There are now many Housing First programmes across the USA and Canada (Woodhall-Melnik and Dunn, 2016), and a growing number across the globe, including Finland (Busch-Geertsema, 2013), Italy (Lancione *et al.*, 2018) and Australia (Conroy *et al.*, 2014; Wood *et al.*, 2017; 500 Lives 500 Homes, 2016). Around the world, no two Housing First programmes are the same, with iterations reflecting variations in programme funding and partners, along with adaptation to cultural, social and political contexts (Lancione *et al.*, 2018). Housing First programmes have demonstrated significant reductions in emergency department (ED) presentations and hospital admissions (DeSilva *et al.*, 2011; Russolillo *et al.*, 2014; Mackelprang *et al.*, 2014; Larimer *et al.*, 2009; Debra *et al.*, 2013). A 2011 review of the Housing First approach emphasised the benefits when housing was secured as a part of hospital discharge for homeless people, particularly those with severe mental illness and/or substance use issues (Fitzpatrick-Lewis *et al.*, 2011).

Whilst reduced hospital use has been demonstrated to be a Housing First outcome, there is scant literature describing the converse: how hospitals can engage in Housing First programmes to connect patients to housing and social support and reduce the likelihood of repeat re-admissions. This paper demonstrates how a collaboration between a Housing First programme, a major city hospital and a Homeless Medicine GP service is improving the health and housing outcomes for vulnerable rough sleepers. The interdisciplinary and inter-service collaboration between these three providers affords a seamless continuity of care through hospital, general practice and the community.

1.3 Integrating health into a Housing First collaboration

The three services involved in this intervention are:

1.   A "Housing First" programme for Perth's most chronic and complex rough sleepers.

Perth's inaugural Housing First Programme, the 50 Lives 50 Homes (50L50H) Project, is a multi-agency collaboration targeting Perth's most vulnerable rough sleepers (Stafford and Wood, 2017). The project is based on overseas and interstate models (adapted to the local context) and

was launched in July 2015, with small seed funding from two government departments before receiving philanthropic support for the next three years of operation. The diverse range of partners ($n = 28$) includes government departments, community housing organisations, specialist aboriginal services, community health and support organisations (Stafford and Wood, 2017). The 50L50H project uses a validated triage tool, the Vulnerability Index – Service Prioritisation Decision Assistance Tool (VI-SPDAT) to assess key mortality risk indicators that are prevalent in people experiencing long-term homeless (Hwang *et al.*, 1998). Since July 2015, 147 people have been housed in 109 homes, with 87 per cent sustaining their tenancy at one year (Vallesi *et al.*, 2018). The type of housing provided is dependent on individual need and circumstance such as access and location to services and transport, disability (i.e., ground floor apartments vs high-level apartments accessible via stairs only), living arrangement (i.e., partners, children) and if additional support is required.

2. A specialist homeless medicine general practice.

Homeless Healthcare (HHC) is a multi-site GP practice that aims to bring primary healthcare services to places where homeless people feel comfortable. There are clinics in drop in centres, transitional accommodation services, a drug and alcohol therapeutic community and a GP surgery in a central metropolitan location. Nurses run street outreach clinics and provide support to those who have been re-housed under 50L50H. Staff work closely with the major homelessness services (NGOs) and prioritise housing as part of care.

3. A hospital Homeless Team.

Australia's first Homeless Medicine GP in-reach programme started in June 2016 at Perth's inner city hospital, Royal Perth Hospital (RPH). It serves a large proportion of Perth's homeless community, especially those who are street present (Gazey *et al.*, 2018) with 1 in 24 RPH ED patients being recorded as of "no fixed address" (NFA) upon presentation. RPH's Homeless Team is based on the UK Pathway model (Hewett *et al.*, 2016), and is a partnership between RPH, Ruah Community Services and HHC. The hospital-based Homeless Team consists of a HHC GP, HHC Nurse, an RPH Consultant Clinician and a community services caseworker. It works with the homeless patients in RPH to assist them with a range of issues such as their inpatient treatment, discharge planning and linking to housing and support services. The Homeless Team members are also active participants in the 50L50H project, the Rough Sleepers Working Group and some members also sit on the 50L50H Steering Group.

2. Methods

2.1 Data sources

This paper draws on the following data sets: the VI-SPDAT database held by Ruah Community Services, the Perth Metropolitan Hospital database (WebPAS), HHC GP's clinical database (Best Practice), administrative hospital and ED data, and observational data from community case workers engaged with 50L50H clients. These data sources were used to inform the six case studies.

VI-SPDAT data. Entry into the 50L50H project requires that a homeless individual or family has been assessed as being "highly vulnerable" using the VI-SPDAT (score $\geqslant$ 10). The Tool is a combination of the Vulnerability Index (VI) and the Service Prioritization Decision Assistance Tool (SPDAT), and is used widely in the USA, Canada (OrgCode, 2015) and Australia (Flatau *et al.*, 2018) to assess vulnerability and the level of assistance from services required to exit homelessness. The tool collects self-report information across a range of domains including history of housing and homelessness, health, healthcare utilisation, police and justice system contacts and wellness (US Department of Housing and Urban Development, 2014). The VI-SPDAT was used during Perth Registry Weeks, the street homelessness snapshot surveys carried out in 2012, 2014 and 2016 (Flatau *et al.*, 2018) and continues to be administered by homelessness community services, HHC staff at their clinics and the RPH Homeless Team. All completed surveys are scored by Ruah Community Services. While the VI-SPDAT is used by 50L50H to prioritise the most vulnerable rough sleepers for rapid housing and support, it does not always describe the full extent of vulnerability. This is most commonly seen with severe mental health issues (e.g. individuals who have active psychosis may be unable to comprehend survey questions).

Case studies. Case studies are used in this paper to provide examples of the four types of collaboration described. Five short case studies have been compiled by triangulating several data sources: hospital service utilisation data extracted by the RPH Homeless Team from the Perth metropolitan hospital patient database (TOPAS); VI-SPDAT data; HHC medical records; and clinical staff observations.

Administrative hospital data. Identifying information (e.g. given names, surnames, date of birth) was provided to the business intelligence unit (BIU) at WA Health for all 50L50H clients, along with a unique study ID for each individual, to enable the administrative data to be provided without names or other identifying information. Administrative hospital data included ED presentations, hospital admissions and outpatient service utilisation for all 50L50H clients for the period 1 January 2013– 30 April 2018. Data were obtained for four hospitals – RPH (which sees the greatest proportion of homeless patients in Perth) and three other metropolitan hospitals within the East Metropolitan Health Service Catchment (Kalamunda, Bentley and Armadale/Kelmscott). The administrative data were provided to a different researcher who did not have access to the identifying variables originally provided to the BIU, to ensure participants would not be re-identified by the research team.

2.2 Analysis

We identified individuals who had at least 12 months follow-up after being housed through 50L50H. We restricted our analyses to this group, so that we could compare the periods of 12 months pre- and post-housing for changes in service use. Hospital admission and ED presentation data were analysed for the pre- and post-housing periods, to produce counts for presentations, admissions and to calculate the number of hospital days admitted, both at a group and individual level. Due to the data being heavily skewed, non-parametric statistical methods were used to test for group differences in ED presentations and hospital admissions between the periods before and after housing. Hospital admissions for chronic kidney disease, dialysis and chemotherapy were excluded from the analyses as these are generally planned single-day admissions for tertiary care of chronic conditions that are often managed in a hospital setting, however, are likely not associated with an individual's housing status, while the focus of this study is largely unplanned admissions for preventable conditions that require acute care. Estimated costs for hospital presentations and admissions have been calculated using the Independent Hospital Pricing Authority (IHPA) Round 20 Cost Report (IHPA, 2018) which gives the Western Australian average cost for an ED presentation and inpatient days.

2.3 Ethics approval

This paper is based on findings from two inter-related research projects. The approval to conduct the first research project was granted by the RPH Human Research Ethics Committee (HREC) on 26 May 2017 (Reference No. RGS0000000075), with reciprocal approval granted by the University of Western Australia HREC on 10 October 2017 (Reference RA/4/20/4045). The approval to conduct the evaluation of the 50L50H project was granted by the University of Western Australian Human Research Ethics Committee on 20 January 2017 (Reference No. RA/4/1/8813).

3. Results

This paper first describes four key domains of collaboration between the hospital, HHC and the 50L50H project:

1. identification of patients in RPH who are homeless and assessment of vulnerability;

2. referral of high acuity homeless patients to the 50L50H Rough Sleepers Working Group;

3. connecting discharged patients to primary care and follow-up support in the community; and

4. communication between the Housing First partners to prevent clients falling through the cracks.

Second, the paper presents preliminary findings relating to changes in patterns of hospital use amongst 50L50H clients housed for 12 months or more.

3.1 Identification of patients who are homeless and assessment of vulnerability

Generally, homeless people are more likely to frequent an inner city hospital as they are close to where homelessness services are concentrated. The Homeless Team at RPH uses multiple methods to find the homeless clients in the hospital e.g. daily listings of NFA patients and attending wards with frequent admission of homeless patients. As part of the assessment of rough sleepers, the VI-SPAT is administered if this has not already occurred.

The evaluation of the Homeless Team's first 18 months of operation found that 64 per cent of clients who had VI-SPDAT screening had a vulnerability score ⩾10 (Gazey *et al.*, 2018). This confirms the important role of the hospital in identifying highly vulnerable rough sleepers who have not previously engaged with community homelessness services but present to hospital when unwell or injured.

For the 50L50H project, the use of the VI-SPDAT at RPH has identified many people with high vulnerability that may otherwise have remained undetected and homeless on the streets. As the VI-SPDAT is automatically uploaded to a database monitored by the 50L50H team, patients who have scored 10 or more in the VI-SPDAT at the hospital are flagged as eligible for the 50L50H project. An example of this can be seen in Case Study 1 below where a male who had been homeless for 26 years completed the VI-SDAT survey at in the ED at RPH and whose score of 14 indicated high vulnerability.

Case study 1 – 26 years on the street

Background: A man in his late fifties had spent 26 years rough sleeping under a suburban bridge with various health issues including schizophrenia, lung and liver disease. In 2015 he started to present frequently to hospital EDs due to increasingly severe back pain which limited walking to several meters and left him wheelchair bound. He asked for assistance with housing and medical issues but was generally discharged rapidly from ED as "not having an acute problem". In one of his hospital discharge summaries, it indicated that he had been given a taxi voucher to return to the bridge.

Intervention: In mid-2016 he was seen by the RPH Homeless Team and completed a VI-SPDAT, scoring 14, indicating high vulnerability and eligibility for the 50L50H project. He required intensive input from his 50L50H caseworker to find suitable accommodation as he required supported care and was bounced between disability and aged care services. In mid-2017, he was successfully housed in an aged care hostel.

3.2 Referral of patients to the 50L50H rough sleepers working group

Some clients only engage with services for the first time when hospitalised with injury or illness. Contacts with the hospital can often be the portal through which the road to housing and recovery begins. The Homeless Team at RPH and HHC GP work directly with some of the most vulnerable rough sleepers in Perth. By combining clinical information with data from the VI-SPDAT, the team is able to identify people with high need for a Housing First intervention and make recommendations concerning the specific types of housing and support for the patients' needs. The effectiveness of this approach is summarised by the 50L50H project manager:

The RPH Homeless Team is very active in the 50 Lives 50 Homes rough sleepers working group and there is enormous mutual benefit for both the hospital and for the homeless sector in Perth. Some of the most vulnerable rough sleepers in Perth have been brought to our attention by the RPH Homeless Team, and we have been able to prioritise them for support and housing (50L50H Project Manager).

In some cases, a VI-SPDAT score below 10 may not adequately reflect the level of vulnerability or acute need of a particular patient. In the case study below, the patient was severely psychotic at the time of VI-SPDAT completion, and the computed score of 3 was a stark mismatch to his level of need. Advocacy by the RPH hospital team and HHC played a critical role in the intensive mental healthcare he received, and in his subsequent housing through 50L50H.

Case study 2 – advocacy sorely needed

Background: A man in his mid-forties with a diagnosis of schizophrenia dating back to the 1990s, and had historically very little contact with psychiatric services. By 2009 he was street homeless and, after two brief psychiatric admissions, was placed in a psychiatric hostel, but soon returned to the streets. For nearly three years, there is no record of any psychiatric care. He presented to ED sporadically in 2014-2015 with complaints such as sore feet but although he was noted to be living on the streets and schizophrenic, he was discharged back to the street each time.

Intervention: He was first detected by HHC Street Health outreach in early December 2015 with a large abscess on his back. Initially reluctant to accept treatment, the abscess worsened and he agreed to be admitted to RPH ED. During this admission he underwent psychiatric review and subsequently received his first depot injection of antipsychotic medication in three years. The psychiatric team discharged him with an arrangement for GP follow up with HHC for voluntary treatment with depot antipsychotic medication. However he refused any further medication, and HHC actively advocated for an admission to enable his schizophrenia to be treated. In late December 2015 he was admitted to a Mental Health Unit where he spent five months (141 days) receiving treatment, including antipsychotic medication. Over these months, his psychosis slowly resolved and was discharged to a supported psychiatric hostel. It emerged that he had a wife and children from who he had become estranged due to his illness. Through 50L50H he secured a place in supported accommodation for people with chronic mental illness, and has now resided there for two years.

3.3 Connecting patients to primary care and follow-up support in the community

The RPH Homeless Team's composition of community caseworker, HHC nurse, HHC GP and RPH ED consultant directly connects hospitalised individuals experiencing homelessness with a range of community health and homelessness services. This includes follow up with HHC's GP clinics for comprehensive primary and preventative healthcare or another GP of their choice (e.g. Aboriginal-specific health services). Clients of the 50L50H project are also eligible for support by an After Hours Support Service (AHSS). This team consists of a HHC nurse and a Ruah Community Services caseworker who work evenings, weekends and public holidays to provide extended hours of support at clients' homes.

The combination of nursing and social care is particularly effective for people with complex issues or who have experienced long-term homelessness (Stafford and Wood, 2017). The early stages of being housed can be immensely challenging, with poor physical and mental health adding to the concomitant stress of adjusting to a very different way of life. The AHSS team's role in maintaining regular contact with re-housed clients is a key intervention for supporting client health and wellbeing. The AHSS coordinates closely with each client's primary caseworker to streamline care and case workers can request changes to AHSS intervention (e.g. increasing the frequency of visits during times of difficulty).

As shown in Case Study 3, the support provided by the AHSS has a holistic focus on improving health, wellbeing and housing outcomes, based around the individual client's social determinants of health.

Case study 3 – After-hours health and psychosocial support once housed

Background: An Aboriginal woman in her mid-forties came into contact with HHC in early 2016 and was assessed as having a high level of vulnerability on the VI-SPDAT (score of 10). Her homelessness was associated with a history of domestic violence and troubled family circumstances, and she had a raft of health issues, including anxiety and depression, a skin cancer that led to a limb amputation, and alcohol and drug use.

Intervention: She was housed through 50L50H relatively quickly. Regular support from the AHSS team in the form of home visits and telephone calls has contributed to significant improvements in the management of the client's physical and mental health issues. In her own words:

They come out here, the outreach. They come here and see if I'm okay, even if it's for a chat sometimes because I'd get very anxious […].

The broad social determinants outlook taken by the AHSS team and 50L50H is evident in the way that the team has encouraged her involvement in art classes and provided transport to a parenting course as a pathway to regaining custody of her youngest child.

The close collaboration and shared staffing across AHSS, HHC and the RPH Homeless Team enhances the continuity of care for 50L50H clients. Not only is it reassuring for clients to see familiar staff in unfamiliar places like RPH, it facilitates seamless pathways of care across the hospital, GP practice and community services (see Case study 4).

Case study 4 – benefits of staff working across hospital and community setting

Background: A man in his mid-forties was housed by 50L50H in March 2017 after nearly four years of intermittent homelessness. He has a traumatic brain injury from a fall and experiences seizures but is fearful of hospitals and medical professionals and is reluctant to take medication.

Intervention. The AHSS team visits this client weekly and has been supporting him with to the consequences of his brain injury and encouraging him to take his seizure medication. The AHSS nurse who visits him weekly also does ward rounds with the Homeless Team at RPH, so is a familiar face when the client recently presented to hospital, and was able to follow up with him at home following discharge.

3.4 Communication between the Housing First partners to prevent clients "falling through the cracks"

One of the challenges in the homelessness sector is the difficulty of finding and maintaining contact with people who are rough sleeping. This can be an issue for hospitals when, for example, people do not attend outpatient appointments or lapse in treatment compliance. It can also be an issue for homelessness services when clients disappear off the radar. A significant benefit of 50L50H's highly collaborative way of working, for which client consent is obtained, has been the ability of the partners involved to share meaningful information about clients (Vallesi *et al.*, 2018). This cooperation enables closer monitoring and understanding of client issues, faster and more effective responses to needs and the ability to rapidly engage multiple agencies in collective solutions to complex client problems.

Case study 5 – communication between hospital and 50L50H collaborators to improve continuity of client care

Background: A male in his late sixties has been homeless for well over 40 years, living most of the time on the streets. He has a long history of substance use disorder and schizophrenia, but had neither sought nor received much treatment for these. In one recent instance, this client had presented to ED with a large head wound but ending up leaving untreated and against medical advice.

Intervention: The RPH Homeless Team was able to liaise with outreach workers linked to the 50L50H project to quickly identify the whereabouts of the client and get him to return to hospital. The Homeless Team were then able to secure an aged-care assessment for the patient, leading to his admission to an aged-care facility. Sadly, this arrangement didn't last and, shortly after returning to the streets, he was diagnosed with late stage cancer. Through the advocacy of the RPH Homeless Team, was able to enter palliative care until he passed away. The alternative would have been that he died, likely alone, on the streets.

3.5 Potential to reduce hospital use among Housing First clients

As part of the larger 50L50H evaluation, the hospital use of participating clients is being tracked over time. The working hypothesis is that rates of ED presentations and unplanned hospital admissions amongst 50L50H clients will decline through the coupling of housing, psychosocial support and access to primary healthcare. This paper looks at the subset of clients who had been housed for 12 months or longer as at 30 April 2017 ($n = 44$), exploring changes in hospital use 12 months prior to and 12 months post the date they were housed by 50L50H (see Table I).

ED presentations. The proportion of clients presenting to ED reduced by a quarter (25.6 per cent) in the 12 months following being housed. The average number of ED presentations per client dropped from 4.6 prior to housing, to 2.0 afterwards, reflecting a significant reduction (−56.8 per cent) in the total number of ED presentations in this subgroup for the 12 months following housing. At the individual level, there was a reduction in ED presentations for two-thirds of the group (66 per cent).

Inpatient admissions. There was also a significant decrease in inpatient admissions among clients who were housed for 12 months or more. Half of this group had inpatient admissions in the 12 months prior to housing, compared with 32 per cent in the 12 months following housing. The total number of days stayed as an inpatient decreased from 217 days in the 12 months prior to housing to 101 in the 12 months after. This equates to a 53 per cent reduction inpatient days and an average reduction in the length of stay of 8.8 inpatient days.

Representations post-discharge. With respect to clients re-presenting to the ED in the period after release from hospital, there were reductions of 62.5 and 71.1 per cent for re-presentations within 7 days and 30 days of release, respectively.

Cost savings to health system. The estimated cost saving to the health system associated with the observed reductions in ED presentations for this subset of 44 clients in the year following

Table I	Changes in ED presentations and inpatient admissions pre- and post-housing (for those housed 12 months or more)		
	Pre-housing (n = 44)	Post-housing (n = 44)	Change observed post-housing
ED presentations			
Number presenting to ED	31 (70%)	23 (52%)	−25.8%
Total ED presentations	204	88	−56.8%
Mean (SD) per person	4.6 (6.8)	2.0 (4.4)	$p < 0.001$*
Range	0–26	0–25	
ED representations after discharged from ED			
Re-presentations to ED within 7 days	24	9	−62.5%
Re-presentations to ED within 30 days	38	11	−71.1%
Inpatient admissions			
Number of people admitted	22 (50%)	14 (32%)	−36.4%
Total inpatient admissions	76	37	−51.3%
Mean (SD) per person	1.7 (2.7)	0.8 (2.4)	$p = 0.002$*
Range	0–13	0–15	
Inpatient days (LOS)			
Total inpatient days	217	101	−53.5%
Mean (SD) days per person	4.9 (11.0)	2.3 (5.0)	$p = 0.029$*
Range in days	0–64	0–22	
Associated health system costs			
ED presentation cost	$156,060	$67,320	−$88,740
Inpatient days cost	$589,806	$274,518	−$315,288
Total health service use cost	$745,866	$341,838	−$404,028
Average cost per client (n = 44)	$16,952	$7,769	−$9,182

Notes: Costs are based on the latest Independent Hospital Pricing Authority (Round 20) figures for the 2015–2016 financial year for WA: ED $765 per ED presentation, $2,718 per day admitted to inpatient ward; *Wilcoxon signed-rank test was used
Source: Hospital data from East Metropolitan Catchment area (RPH, Bentley, Armadale/Kelmscott, Kalamunda) only

housing was $88,740, whilst the substantial reduction in inpatient days equated to a saving of $315,288. The total saving associated with these reductions was $404,028 across the 44 clients (over $9,000 per client in 12 months alone). It should be noted that these figures are based on only four EMHS hospitals. It has been estimated that at least 30 per cent of 50L50H clients are also presenting at other hospital across Perth, so the true cost on the health system is likely to be underestimated.

4. Discussion

Inpatient hospital healthcare treats acute episodes of injury and illness; however, the health of homeless people is characterised by chronic illness, which is best managed in GP or outpatient clinics. Unfortunately, homeless people struggle to access these services; instead waiting until late in the course of their illness and present to hospital when acutely unwell. They are often discharged whilst still too unwell to survive on the streets, resulting in a further deterioration in health and representation to hospital. At the core of the poor health of homeless people is the absence of a safe and secure house in which to live; therefore housing has to be part of the health solution. Although housing has not traditionally been seen as "the hospital's job", and in the current climate of escalating healthcare costs and the need to deliver cost-effective health interventions, we argue that programmes facilitating the linking of homeless individuals with primary care and other services to address the social determinants of health (including housing) are integral to a just and economically rational healthcare system.

In this paper we have described how a major city hospital frequented by people who are homeless can collaborate with a Housing First programme and a community-based GP to simultaneously yield positive health and housing outcomes for society's most vulnerable rough sleepers. The paper is intentionally descriptive, as whilst reduced hospital use has been

documented in a number of Housing First studies (DeSilva *et al.*, 2011; Russolillo *et al.*, 2014; Mackelprang *et al.*, 2014; Larimer *et al.*, 2009; Debra *et al.*, 2013), there is a paucity of papers discussing the integral role that a hospital can play as an active Housing First partner.

The RPH Homeless Team is Australia's first GP in-reach programme for homeless people, modelled on the Pathway model that now exists across 11 hospitals in the UK (Pathway UK, 2018). The experience of the RPH Homeless Team illustrates the potential of this approach locally, by demonstrably improving the health and healthcare costs in one of our most costly, complex and marginalised patient cohorts. We demonstrate that using a Housing First approach of direct access to long-term housing coupled with GP healthcare and support services, including an after-hours support service, maintains clients in housing and reduces hospital re-admissions and health expenditure.

The key interventions for a patient experiencing homelessness are access to affordable, stable accommodation and community support to maintain their tenancy whilst they deal with underlying personal and medical issues, including mental illness and substance use. The type of hospital homeless team described in this paper is an efficient model for facilitating this process: a GP, with deep roots in the community homelessness services sector and partnerships with tertiary hospitals, bringing relevant expertise to patients at the hospital bedside, thereby starting a process that will continue in the community after hospital discharge.

This paper focusses on clients of the 50L50H project, which specifically targets rough sleepers who require the highest levels of intervention. The 50L50H project recognises the extreme need of this cohort and in prioritising service provision to the most vulnerable individuals, avoids the temptation to help the "easiest" clients first, thereby generating more "success stories". The overall results of 50L50H are therefore impressive with 87 per cent of all housed 50L50H clients retaining their tenancy one year after being housed (Vallesi *et al.*, 2018). We suggest that the synergism between hospital, GP practice and community services is responsible for these excellent retention rates.

The examples of collaboration in action described in this paper can be readily adapted to other settings, both within the health sector and more widely. For hospitals without a dedicated homeless team, the social work department or staff working in areas where people who are homeless are over-represented (such as ED) could broker ties with programmes and services that can assist people to obtain stable housing. Outside of the hospital setting, there are other health services where people who are homeless may be more likely to present, including no charge drop-in health clinics in disadvantaged areas and alcohol and drug services. Beyond the health and homeless sectors, 50L50H has shown that there is a wide array of organisations willing to partner in a collective impact intervention to tackle homelessness, with 28 participating government and non-government agencies spanning police, housing, mental health, Indigenous outreach, and social services (Wood *et al.*, 2017).

The changes in hospital use observed among 50L50H clients to date has also helped to add weight to calls to continue and expand this Housing First programme in WA, with the recently released WA 10-year Strategy to End homelessness advocating for the Housing First approach to be rolled out across the State (Reynolds *et al.*, 2018).

The concept of a hospital widening the scope of interventions to include addressing social determinants of health could be applied to a wider variety of hospital patients than those experiencing rough sleeping. Rough sleepers demonstrate the most extreme examples of poor health driven by adverse social circumstances, however there are other groups whose health would benefit from similar interventions, including the range of more marginalised group identified in the recent Lancet paper on inclusion health (Luchenski *et al.*, 2018). As the challenges of managing almost any illness or injury are compounded by the existence of poverty and/or social exclusion, hospitals can circumvent multiple attendances by systematically identifying at-risk patients and referring them to community-based interventions that might start at the hospital bedside.

On a larger scale, governments can address social determinants of health to improve the health and wellbeing of the community at a lower cost. In terms of healthcare, this involves shifting funding out of low value care into higher value, lower cost care in prevention, primary care and community-based programmes. Access to affordable, decent housing is another pillar of cost- effective social change.

4.1 Limitations

Whilst the case studies yield valuable insights they cannot be generalised to the broader population of people experiencing homelessness. The cases presented, however, represent common themes and issues. The hospital data presented are limited to four hospitals only, and given the mobility of many rough sleepers, this is an underestimate rather than overestimate overall hospital usage. As 50L50H is only in its second year, the sample size of clients housed for at least 12 months is small ($n = 44$), but longitudinal comparison of hospital use before and after housing is nonetheless indicative of the potential cost savings to the health system that can arise when people are housed and provided with wrap-around support.

4.2 Implications for future research

There are a number of implications for future research, with just three suggested here:

1. Around the globe, a recurrent catchcry in policy and research discourse on homelessness is that greater collaboration across sectors is vital, but published studies to date tend to focus primarily on outcomes (health or housing) observed, and the "how to" of achieving effective collaboration across sectors as disparate as health, housing, homelessness, justice and welfare is often not elucidated. We have sought to demonstrate in this paper the benefits of mapping the collaboration processes and impacts of interventions that transcend health and homelessness silos, and more research of this kind could accelerate the sharing of learnings between countries and programmes.

2. Notwithstanding the moral and human rights imperative to reduce health disparities and homelessness, economic pragmatism is a powerful driver of policy and funding decisions in fiscally strained health systems (Stafford and Wood, 2017). It is critical therefore that we build the evidence base for hospitals and other health organisation partnerships with interventions such as Housing First that can yield economic savings to health and other government portfolios, whilst still addressing the underlying social determinants of health and prioritising person-centred care.

3. A recent paper in The Lancet (Aldridge *et al.*, 2018) highlighted the critical need to monitor how well health and social policy addresses the needs of societies most marginalised populations. The authors went on to note, that "such initiatives need to be supported by information systems that can provide data for continuing advocacy, guide service development, and monitor the health of marginalised populations over time" (Aldridge *et al.*, 2018, p. 8). We echo this call emphatically. In this paper, we have shared some of our emerging findings from the linking of administrative hospital, homeless sector and case note data, but this has been a challenging and time consuming process. Mainstream health data systems tend not to capture psycho-social or homeless history data, whilst homelessness services tend not to use robust health measures, and there is a need for research and investment to build information systems that enable us to better monitor the effectiveness of interventions in this space. Data pertaining to people who are homeless are also often messy from our experience – people do not have an address to record, they may not know their birth date, and aliases are sometime used when people are wary of disclosing identity. We encourage other researchers to persist despite these challenges however, and to publish and share learnings about how data challenges can be overcome.

5. Conclusions

While homelessness is readily recognised as a social and humanitarian issue, it is also a major financial issue for government services such as health, justice, police, child protection and social welfare. A hospital's job is, clearly, to deliver healthcare. However, the factors determining whether that healthcare was effective (for outcome and for money spent) often lie outside of the hospital's usual remit. Neither reducing barriers to healthcare access (such as free of charge healthcare at point of delivery) nor having "state of the art" healthcare systems can overcome the health inequality of the socially disadvantaged.

Chronic rough sleepers are arguably the most marginalised group in society and seen as too complex to help, leaving them cycling between the street and hospital. This paper shows however

that through a collaboration between a large inner city hospital, a homelessness GP service and a targeted Housing First programme, these "un-help-able" individuals can be durably housed with improved health and lower hospital healthcare costs. This collaborative work also serves as a model for the wider use of programmes addressing social determinants of health in health systems.

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Dr Andrew Davies established Homeless Healthcare in 2008. It is now Australia's largest dedicated general practice for people experiencing homelessness, having over 12 community based clinics and a street outreach team. He has led a number of innovations in homeless healthcare, including the establishment of the first GP in-reach hospital service for homeless people in the Southern Hemisphere.

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