



Emergency department interventions for homelessness: a systematic review

Evan A. Formosa¹ · Vanessa Kishimoto² · Ani Orchanian-Cheff³ · Kaitlin Hayman^{4,5}

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Abstract

Background The social determinants of health are economic and social conditions that contribute to health. Access to housing is a major social determinant of health and homeless patients often rely on emergency departments (EDs) for their healthcare. These patients are frequently discharged back to the street which further perpetuates the cycle of homelessness and negatively affects their health. Previous work has described the financial and systems implications of ED-housed interventions for homeless patients; this review summarizes ED-based interventions that seek to improve the social determinants of health of homeless patients.

Methods We conducted a search of multiple databases and gray literature for studies investigating interventions for homelessness that were initiated in the ED. Studies had to use a control group or use a pre/post-intervention design and measure outcomes that demonstrate an effect on health or the social determinants of health.

Results Thirteen studies were identified that met the inclusion criteria. Two studies were housing first interventions and were effective in providing housing and improving health. Seven studies used variations of case management and were able to address many of the social needs of people who are homeless.

Conclusion This review demonstrated that ED interventions can be effective in improving the social determinants of health of homeless individuals and can be the place to initiate housing interventions. ED providers must advocate for the resources necessary to properly address the social needs of this marginalized population. Equipped with the proper resources, EDs can be one place where the cycle of homelessness is broken.

Keywords Social determinants of health · Homelessness · Public health · Emergency department

Résumé

Contexte Les déterminants sociaux de la santé font référence aux conditions sociales et économiques qui ont une incidence sur l'état de santé. Ainsi, l'accès au logement représente un important et les patients sans abri comptent souvent sur les

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✉ Kaitlin Hayman
khayman2010@gmail.com

¹ School of Medicine, New York Medical College, Valhalla, NY, USA

² University of Toronto, Toronto, ON, Canada

³ University Health Network, Library and Information Services, Toronto, ON, Canada

⁴ Department of Medicine, University of Toronto, 1901 Elizabeth Street, R Fraser Elliot Building, 3-805, Toronto, ON M5G 2C4, Canada

⁵ University Health Network, Toronto, ON, Canada

services des urgences (SU) pour obtenir des soins de santé. Qui plus est, après avoir obtenu leur congé de l'hôpital, ces patients retournent la plupart du temps à la rue, ce qui a pour effet d'entretenir le cercle vicieux de l'itinérance et d'avoir une influence défavorable sur leur santé. La portée financière des interventions amorcées au SU pour les patients sans abri et leurs retombées sur les systèmes de soins de santé ont déjà fait l'objet d'études. La revue systématique avait donc pour but de présenter un résumé des interventions visant à améliorer les des patients sans abri, mises en œuvre au SU.

Méthode La revue consistait en une recherche d'études dans de nombreuses bases de données et dans la documentation parallèle portant sur des interventions amorcées au SU pour les sans-abris. Les études sélectionnées devaient s'appuyer sur un groupe témoin ou sur une démarche de type avant-après ainsi que sur des mesures de résultats démontrant une influence des interventions sur l'état de santé ou sur les.

Résultats Treize études satisfaisaient aux critères de sélection. Deux d'entre elles portaient sur des interventions accordant la priorité au logement et ces dernières se sont révélées efficaces dans l'accès au logement et dans l'amélioration de l'état de santé. Dans sept autres études, on avait appliqué diverses variantes de la prise en charge de cas, qui se sont montrées efficaces dans la satisfaction de nombreux besoins sociaux des sans-abris.

Interprétation Les résultats de cette revue systématique ont démontré que les interventions amorcées au SU peuvent améliorer efficacement les des sans-abris et que les SU peuvent certes être le lieu de mise en œuvre d'interventions accordant la priorité au logement. Aussi les fournisseurs de soins au SU doivent-ils réclamer les ressources nécessaires pour répondre adéquatement aux besoins sociaux de cette population marginalisée. Ainsi dotés des ressources appropriées, les SU peuvent devenir l'un des points de rupture du cercle vicieux de l'itinérance.

Clinician's capsule

What is known about the topic?

Many people live without stable housing and often the emergency department (ED) is their only point of access to healthcare.

What did this study ask?

What, if any, ED interventions have addressed the social needs of those without housing?

What did this study find?

This systematic review identified 13 studies that addressed social needs and demonstrated that ED initiated housing first initiatives are effective.

Why does this study matter to clinicians?

ED interventions can help break the cycle of homelessness and improve the health of people without stable housing.

care and to address social issues such as shelter, food, and safety [1, 5]. Often these patients are discharged back into homelessness which perpetuates the cycle of common and constant ED visits and fails to address their lack of housing, the major social determinant of health that is likely contributing to their poor health [6]. Furthermore, discharging unwell patients back to congregate living settings poses further risks to their community, particularly in the context of infectious diseases [1]. Interventions to improve the social determinants of health of homeless patients may improve their overall health, decrease their reliance on the ED, and are called for in treatment guidelines [7]. Many researchers have investigated interventions focused on reducing return visits and hospital costs, but few have evaluated patient-centered outcomes. ED use may be a surrogate marker for improved health of homeless patients, but this correlation is not clear. Given that the ED is a main point of contact with the health system for many individuals experiencing homelessness, it is important that ED-specific strategies are developed to meet the needs of these patients.

In a recent systematic review, Salhi et al. [8] investigated ED management guidelines for homeless patients, described their demographic characteristics, and described their health status. While informative, this review did not provide guidance about successful interventions that improved the social determinants of health of homeless patients. Therefore, a need to aggregate information about successful interventions remains. This study aims to aggregate and review the literature on ED interventions that improve social determinants of health outcomes for homeless patients that are treated in the ED.

Introduction

Access to stable housing is a major social determinant of health that, if not attained, contributes to an individual's morbidity and mortality [1]. It is estimated that 235,000 Canadians experience homelessness each year [2]. Those that are homeless or unstably housed often experience significant chronic illness and lack primary care, hence the emergency department (ED) is often their main source of healthcare [3]. EDs are seeing an increase in homeless patients [2, 4] who use the ED for both accessing medical

Materials and methods

The full protocol was published in the PROSPERO International prospective register of systematic reviews (CRD42018104371). We applied the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) quality and publication standards [9]. No ethics approval was required.

Search method

A comprehensive search strategy was initially developed by an experienced Information Specialist (AO) for Ovid Medline using a combination of database-specific subject headings and text words for the main concepts of emergency department and homeless patients. Additional keywords were generated through input from subject specialists on the team and the revised search strategy was customized for each of the following databases: Ovid Medline, Ovid MEDLINE Epub Ahead of Print and In-Process and Other Non-indexed Citations, Ovid Embase, Cochrane Database of Systematic Reviews, Cochrane Central Register of Controlled Trials, PsycINFO, Ovid Emcare, and ProQuest Dissertations and Theses Global. All database searches were executed on September 13, 2018 and no date limits were applied. Results were limited to English or French (Supplemental Appendix 1).

In addition, we searched Google Scholar, cited references of eligible studies through Web of Science, and references of eligible studies. Conference proceedings from 2014 to 2018 from the Canadian Association of Emergency Physicians, Society of Academic Emergency Medicine and the American College of Emergency Physicians were searched.

Study selection

Inclusion and exclusion criteria

Our eligibility criteria were informed by the PICO criteria [10]. Included studies were required to indicate that their study population was homeless, or the provided definition had to be in line with the definition set by the Canadian Observatory on Homelessness [11]. We included studies in which $\geq 50\%$ of the patient population was homeless (to ensure interventions were applicable to the population of interest), interventions were initiated in the ED, and aimed to improve the social determinants of health (e.g., housing, improved finances, addiction resources). Studies required a comparison group, either a control population or a pre/post-design. Included studies measured outcomes that evaluated the social determinants of health.

We excluded studies if the only metric measured was a reduction in return ED visits and/or hospital costs, because these outcomes do not necessarily indicate an improvement in the health of the patients. While these are important metrics for health systems, they have been described elsewhere [12].

Evaluation of studies

Two investigators (VK and EF) independently reviewed titles, abstracts, and full text to determine studies for inclusion. Disagreement was resolved by a third independent reviewer (KH). Conference proceedings were hand-searched by one investigator (EF). One study author was contacted to provide additional data as it was initially unclear if the study met inclusion criteria [13]. One reviewer evaluated each included article for the risk of bias (EF), consulting with a second reviewer (KH) when clarification was required. Risk of bias assessment was conducted using the Cochrane Risk of Bias Tool for randomized studies [14] and the Robins-I tool for non-randomized studies [15].

One author (EF) abstracted data into a standardized, pilot-tested form of study characteristics, patient demographics, interventions, comparators, and outcome measures. This is summarized into a narrative review. A priori, the study team decided not to perform a meta-analysis as we anticipated considerable methodologic and clinical heterogeneity would exist between studies.

Outcome measures

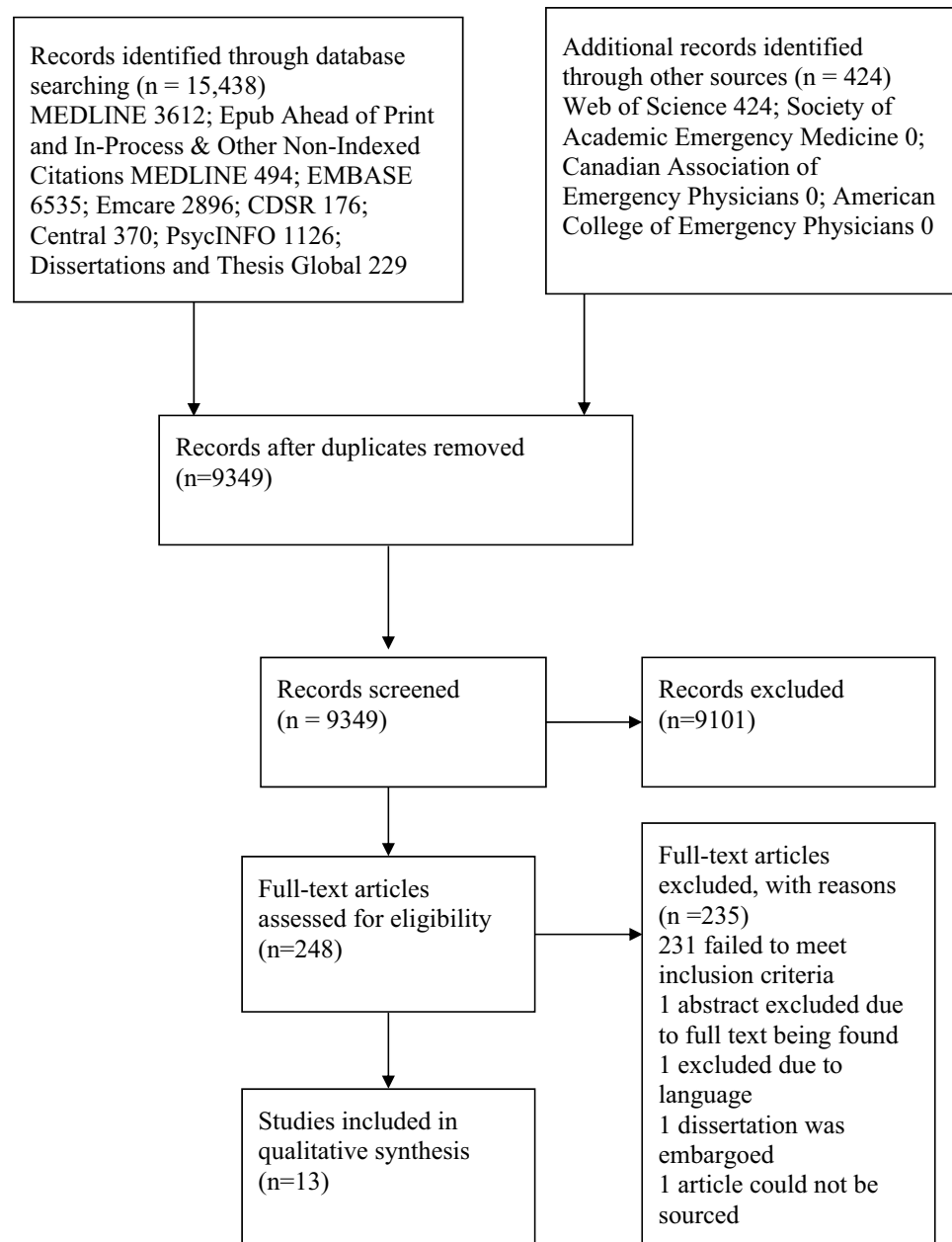
The outcomes collected for this systematic review were any measure that evaluated a change in the social determinants of health. These outcome measures included changes in housing status, variables related to substance use disorder, and access to primary care. While heterogeneous, these outcome measures will help ED physicians evaluate interventions that may be useful for addressing the specific social needs of patients who are homeless. Absolute values of data are presented wherever possible.

Results

Study selection

In total, 9122 unique studies were identified by our initial search. Backwards citation screening revealed another 227 unique records. In total, 9349 studies were screened, 248 were appropriate for full text review, and 13 studies met our inclusion criteria as reflected in the PRISMA diagram (Fig. 1).

Fig. 1 PRISMA flow diagram [9]



Included studies

Of the 13 included studies, six were randomized control trials, four pre/post-intervention trials and three non-randomized control trials. Of these, nine were full articles and four were abstracts. Included studies were published between 1995 and 2018; all studies took place in North American cities (Table 1).

Patient/populations studied

Seven studies [13, 16–21] enrolled only homeless patients and six studies [22–27] included $\geq 50\%$ homeless patients. Included studies focused on homeless patients with risk of overdose [22], alcohol use disorders [17–19], DSM diagnoses [20], unmet social needs [23], and frequent ED use [13, 16, 24–27].

Table 1 Description and characteristics of included studies

Authors	Abstract	Methods	Intervention	Measure	Outcome
Banta-Green [22]	No	RCT Intervention <i>n</i> = 115 Control <i>n</i> = 126 126/241 (53%) homeless	Overdose education: 8 min. video and review of informational flier Brief behavioral change counseling using motivational interviewing helps identify overdose risk and steps to reduce risk Naloxone kit and training on its use United Way Project25: Housing first Social services case management, including housing resources	Time to first opioid overdose measured from date randomized to first ED use with opioid OD Inpatient admissions from health-care utilization data	No significant difference in time to first opioid OD between groups Mean annual rate of inpatient admissions was 1.17 (95% CI 0.95–1.44) (<i>p</i> > 0.05)
Chan [13] Input from author and additional report included [43]	Yes	Pre/post-test design <i>n</i> = 36 100% homeless		Housing status Health insurance status Monthly income Inpatient admissions	100% housed 100% gained health insurance Increase (32%) in those receiving a monthly income Significant decrease (25%) in inpatient admissions
Diamant [16]	Yes	Pre/post-test design <i>n</i> = 77 100% homeless Homeless defined as living on the street or in a shelter	Access to housing for health project provides housing to create changes in use of: Provide stability in housing Medical services Increase enrolment into benefits and community services Improve individual health status	Housing Usual source of care Self-rating of general health Inpatient admissions	All patients received housing Increase (16%) in a usual source of care over 12 months of housing (<i>p</i> < 0.05) 91% had a usual source of care at end point Baseline health was rated as fair/poor vs excellent/very good/good in 62% of participant After 12 months the rate of fair/poor health ratings dropped to 14% (<i>p</i> < 0.0001) Decrease (32%) in inpatient admissions (<i>p</i> < 0.01)
Losonczy [23]	No	RCT Intervention <i>n</i> = 146 Control <i>n</i> = 295 Intervention 53% homeless Control 35% homeless Having housing concerns defined as unsafe housing conditions, lack of housing or another housing need 2013–2014	Cross disciplinary resource desk that screened for and addressed social issues Followed a resource referral protocol based on that patients' needs, to match patients with existing community resources Social workers and medicolegal team provided extra support for complex issues Follow-up was made biweekly to continue providing support for their needs. Enrolled Thursday and Friday	Ability to link patient to community resource that fulfilled social, economic, environmental, and legal needs Ability to find regular medical care Did the patient feel helped	At 1 month: Intervention group was more likely to be aware of a service that could address their primary need (Odds ratio 2.37; 95% CI 1.26–4.46) Intervention patients were more likely to have made contact with the agency addressing primary need (Odds ratio 2.45; 95% CI 1.15–5.20) Intervention patients were more likely to have identified a place for regular medical care (Odds ratio 3.62; 95% CI 1.13–11.52) No difference in odds of patients who had a primary care physician (odds ratio 1.86)

Table 1 (continued)

Authors	Abstract	Methods	Intervention	Measure	Outcome
McCormack [17]	Yes	Pre/post-test design Intervention $n = 56$ Control $n = 36$ 100% homeless Defined as department of homeless services definition of chronic homelessness	Individualized multidisciplinary action plans Case management Coordination with a housing outreach team upon discharge	Housing Mean per-person monthly inpatient admissions	18/20 patients in intervention group received housing Mean per-person monthly inpatient use declined from 0.68 to 0.41 (40%) after housing Inpatient use did not change in the control group
McCormack [18]	Yes	RCT Intervention $n = 7$ Control $n = 7$ 100% homeless	Care management Initiation of extended-release naltrexone	Feasibility of intervention Completion of post-injection visits Patient interest	All subjects in the intervention arm completed post-injection visits Five intervention participants received second injections, the other two were not due Patients expressed interest in participation and treatment
McCormack [19]	No	NRCT Intervention $n = 20$ Prospective control $n = 20$ Retrospective control $n = 20$ 100% homeless	Used developed care plans to offer shelter on discharge Case workers reassigned patients into increasingly supportive settings, coordinated multidisciplinary care Plans were updated biweekly on the basis of the patients' needs	Homeless status Hospital days Mortality 6 months after enrolment	18/20 in intervention group accepted shelter. No controls were housed Decreased hospital days between intervention arm and retrospective controls ($p < 0.05$) No deaths in intervention group. Two prospective controls and 7 retrospective controls died Four months post study, 3 intervention participants died, and 2 prospective controls died

Table 1 (continued)

Authors	Abstract	Methods	Intervention	Measure	Outcome
Morse [20]	No	RCT n=165 100% homeless Homeless defined as living on the street or staying in an emergency shelter immediately before screening	ACT: Intensive individualized treatment with responsibility for providing/ coordinating all services needed by patient, follow-up. Had no time limit. Staff were trained in homeless outreach and engagement methods. Assisted with basic needs and developed plans based on patients' priorities ACT with community workers: Same as above with community workers who assisted with tasks of daily living and leisure activities Broker case management: Case managers developed individualized service plans, arranged for mental health and psychosocial services. Office based with a 1 to 85 staff to client ratio	Stable housing Service contacts Client satisfaction with treatment Psychiatric symptoms and self-esteem Substance abuse Income	ACT subjects had more days in stable housing than the ACT with community workers or broker case management subjects ($p < 0.05$) ACT and ACT with community workers had significantly more service contacts than broker case management ($p < 0.001$) ACT and ACT with community workers provided more housing services ($p < 0.05$), financial assistance services ($p < 0.01$), and supportive services ($p < 0.001$) than broker case management ACT provided more health services ($p < 0.05$) than ACT with community workers and broker case management Subjects in the ACT or ACT with community workers were more satisfied with their care than broker case management ($p < 0.001$) No differences in income No significant differences in substance abuse ACT and ACT with community workers had fewer psychiatric symptoms than broker case management ($p < 0.05$) Trend of increased outpatient use in intervention group
Nossel [24]	No	NRCT Intervention n=47 Control n=50 30/47 (63%) of intervention group homeless	Critical time intervention at the time of ED discharge Peer specialists met with subjects in the community to develop relationships, identify reasons for ED use, and obtain ongoing alcohol and substance abuse treatment, insurance, housing, etc. Available for 6 months	Outpatient service use	

Table 1 (continued)

Authors	Abstract	Methods	Intervention	Measure	Outcome
Oklin [25]	No	Pre/post-test design <i>n</i> = 53 35/53 (67%) homeless Homeless defined as living on the streets, in shelters, in abandoned buildings, or living in non-permanent transient hotels for the majority of time, within the last month	Master's level psychiatric social worker used intensive case management to provide and coordinate all needed services including but not limited to: Therapy Stable housing Financial support Primary care Harm reduction and substance abuse Alcohol treatment, etc.	Psychosocial data including: Housing status Alcohol Substance use	20/35 (57%) were housed (<i>p</i> < 0.01) 8/37 (22%) and 7/27 (26%) no longer had needs related to problem alcohol use and problem drug respectively (<i>p</i> > 0.05) 14/26 (54%) were no longer uninsured (<i>p</i> < 0.01) 29/39 (74%) no longer needed to be connected with a primary care provider (<i>p</i> < 0.01) 15/50 (30%) no longer required social services (<i>p</i> < 0.01) 71% of intervention group rated overall care as "excellent" or "very good" compared to 36% of controls (<i>p</i> < 0.005) 83% of intervention group said they would definitely return for care if needed compared to 62% of control (<i>p</i> < 0.05)
Redelmeier [21]	No	RCT Intervention <i>n</i> = 65 Control <i>n</i> = 68 with 100% homeless Homeless defined as spending the preceding night in a shelter, at a welfare hotel, or on the street	Long-term clinical case management Master's level psychiatric social workers with support of nurse practitioner, primary care physician, and psychiatrist Involves therapy, assistance in housing, income entitlements, primary care linkages, referral to substance abuse treatment, and ongoing outreach	Psychosocial problems: Homelessness Problem alcohol use No health insurance No social security income Unmet basic financial needs Psychiatric symptoms	No difference in psychiatric symptoms Intervention over 24 months had a decreased number of participants reporting: Homelessness (<i>p</i> < 0.01) Problem alcohol use (<i>p</i> < 0.05) Lack of health insurance (<i>p</i> < 0.05) Lack of social security income (<i>p</i> < 0.01) Unmet financial needs (<i>p</i> < 0.05) 9 Entered transitional or permanent housing 7 Accepted substance abuse treatment
Shumway [26]	No	RCT Intervention <i>n</i> = 167 Control <i>n</i> = 85 81% homeless Homeless defined as living on the streets or in a car or other location not designed for human habitation or has been living for less than 1 month in a shelter, a single room occupancy hotel or with friends/ relatives	Intensive community-based case management: Engage in an ongoing treatment relationship Improve and stabilize psychosocial function Decrease use of emergency services	Housing Substance abuse treatment	
Witbeck [27]	No	NRCT Intervention <i>n</i> = 10 Control <i>n</i> = 8 89% homeless			

RCT randomized control trial, NRCT non-randomized control trial, CI confidence Interval, ACT assertive community treatment

Interventions

The most common strategy used to address the social determinants of health were variations of case management. Case management is defined as a collaborative patient-centered process that aims to provide high-quality health and social services by effectively using available resources [28]. The studies by McCormack et al. [17–19], Morse et al. [20], Okin et al. [25], Shumway et al. [26], and Witbeck et al. [27], evaluated interventions that were variations of case management. Specifics of the case management interventions are available in Table 1. The study by Nossel et al. [24] used a critical time intervention which is similar to case management but is time limited and starts immediately on discharge from the ED.

The study by Losonczy et al. [23] connected patients to services by means of a cross-disciplinary resource desk, and Redelmeier et al. [21] studied a “compassionate care” intervention where volunteers spent time with homeless patients in the ED. Chan et al. [13] used a housing first initiative, where patients were provided with stable housing, combined with case management. The study by Diamant et al. [16] used a housing first intervention as well.

The study by Banta-Green et al. [22] targeted opioid users and provided overdose counselling, behaviour change counselling, and naloxone kits. McCormack and DeMuth included naltrexone as an intervention for severe alcohol use disorder [18].

Outcomes

Access to housing

Eight studies directly intervened in the housing of patients who were homeless, using housing first models, assertive community treatment plus housing, and intensive case management [13, 16, 17, 19, 20, 25–27].

In the ED-initiated housing first interventions studied by Chan et al. [13] and Diamant et al. [16] all participants received housing. In the study by Chan et al. 33/36 (92%) of participants were housed 3 years later [13]. The others had died from “natural causes.” The study by Morse et al. [20] used assertive community treatment interventions that provided housing services to homeless patients, finding that patients receiving assertive community treatment without community workers spent more days in stable housing than those in comparison groups.

In the 2012 [17] and 2013 [19] case management studies by McCormack et al., 18/20 participants (90%) obtained housing through case workers. In the 2013 study by McCormack et al. shelter was offered on discharge [19]. In the study by Okin et al. [25], using intensive case management, 20/35 (57%; $p < 0.01$) homeless patients no longer required

housing. Similarly, the study by Shumway et al. [26] using long-term clinical case management, demonstrated a significant reduction in those without housing among the intervention group, although housing was not provided immediately upon discharge. Finally, the study by Witbeck et al. [27], using intensive community-based case management, resulted in 9/10 patients (90%) in the intervention group being housed.

Unless indicated otherwise, it was not clear whether studies provided housing immediately upon ED discharge or whether there was a delay in obtaining housing.

Substance use reduction

Six studies evaluated substance use interventions, of which two had a primary goal of intervening in problem alcohol/substance use. The 2016 study by McCormack and DeMuth [18] evaluated the implementation of extended-release naltrexone for alcohol use disorder in homeless patients and found that all the subjects were able to complete the first injection and 5/7 were able to complete the second injection. The study by Banta-Green et al. [22] was an opioid risk reduction intervention that found no difference in the time to first opioid overdose between the groups.

Four studies evaluated substance use as an outcome of case management. The study by Okin et al. [25] found 8/37 (22%) and 7/27 (26%) no longer had needs related to alcohol/drug use, respectively, with intensive case management. The study by Shumway et al. [26] found a significant decrease in alcohol use with long-term case management and the study by Witbeck et al. [27] was able to enroll 7/10 (70%) patients into substance abuse treatment. The study by Morse et al. [20] evaluated changes in substance use but found no difference whether the patients were enrolled in assertive community treatment or broker case management.

Access to primary care

Five studies addressed access to primary care. Both housing first and case management interventions connected patients with primary care. The housing first study by Diamant et al. [16] had a significant increase in patients having a usual source of care and a 13% decrease in patients who had not received needed medical care. The study by Okin et al. [25], an intensive case management intervention, found 29/39 (74%; $p < 0.01$) participants no longer needed connection to a primary care provider. In the study by Morse et al. [20], assertive community treatment provided significantly more health-related services than other methods of case management. In the study by Losonczy et al. [23], use of a cross-disciplinary resource desk found that participants in the intervention group were more likely to have identified a source of primary medical care. The peer specialist-based,

critical time intervention in the study by Nossel et al. [24], found that patients in the intervention group trended towards more outpatient use.

Risk of bias

Risk of bias for non-randomized trials was conducted using the Robins-I tool [15]. Three studies were at low risk of bias, three were at a serious risk of bias and one study had a critical risk of bias. Randomized trials were evaluated with the Cochrane Risk of Bias Tool [14]. Two studies were at a low risk of bias, one was at a high risk of bias, and the remaining three had an unclear risk of bias. Given the marginalized population studied and difficulty in measuring social outcomes, there is expected to be a greater risk of bias in these types of studies (Supplemental Appendix 2).

Risk of bias was evaluated as per the PRISMA reporting guidelines. Despite our gray literature search, it is possible that many ED-attempted interventions were not published due to small size, lack of funding, or lost follow-up. Homelessness is not included as a key demographic variable in many ED studies, including those of frequent users; this finding also limited our ability to draw conclusions from available data.

Discussion

Variations of case management were the most frequently used interventions in this review. This highlights the need for a multifaceted and cross-disciplinary approach when intervening in homelessness. Studies of case management interventions for mainly housed patients in the ED [29, 30], have had discordant results. A 2013 review by Kumar and Klein [29] determined that case management helped reduce ED visits among frequent ED users. The Coordinated Access to Care from Hospital EDs (CATCH-ED) study evaluated a brief intensive case management intervention for frequent ED users [30], finding no difference between groups for their primary outcomes. Case management may have different effects between housed and homeless cohorts. In our review, case management was more effective when it was multifaceted and intense, similar to what was found in the review by Kumar and Klein [29]. The study by Morse et al. [20] highlighted this by demonstrating that intensive case management, that coordinated all services, had no time limit, and had follow-up with their patients, was more successful.

People who are homeless often have no choice but to use the ED for their healthcare [4, 31]. Frequently, they are discharged back into homelessness, but the ED can be an appropriate point of access to establish housing. The two housing first initiatives in this review successfully housed patients and addressed many of their social determinants of health.

Housing first initiatives provide and help people maintain housing, as well as reduce ED visits and hospitalizations [32]. Housing first interventions may be difficult to scale and likely depend on specific community and governmental factors, although certain studies have suggested the costs are offset by savings in medical and social services [33]. Furthermore, ED-initiated case management is an effective means to connect patients to housing initiatives [17, 19, 20, 25–27].

A significant number of people who are homeless have comorbid substance use disorders [34, 35]. Substance use disorder is an independent indicator of health, contributes to housing loss, leads to difficulty in achieving stable housing, and compounds other morbidity associated with homelessness [36]. Two of the studies in this review targeted substance use disorder directly. In 2016, the study by McCormack and DeMuth [18] showed promising results initiating naltrexone, while the study by Banta-Green et al. [22] was ineffective. The difference in success may lie in the type of intervention. The study by McCormack and DeMuth [18] used concurrent case management, while the study by Banta-Green et al. [22] provided a primarily educational intervention. Our review did not include any studies of buprenorphine/naloxone initiation, which is increasingly used as an ED-initiated treatment for substance use disorder. Many other studies of substance use disorder have small proportions of homeless patients or fail to identify whether patients are homeless [37–41], which makes it a challenge to determine if interventions are effective in this population.

This review has several limitations. Follow-up length in most studies was relatively short, ranging from 1 to 24 months [18, 26]. While there were no geographical criteria for inclusion, all included articles were from North American institutions. Finally, many of the studies included in this review were of low quality, had small sample sizes, and had variability in method of analysis (few used intention to treat analysis) [19, 21, 26]. There is inherent methodological difficulty in conducting research in evaluating the social determinants of health, and this may be reflected in the quality of included studies [42]. For example, the nature of the intervention may preclude blinding, and there are ethical implications of randomizing patients to receive housing or primary care. Despite the inherent methodologic challenges, synthesis of these studies is nonetheless important as they represent the best available evidence at present. These findings highlight the need for significant funding, resources, and collaboration to increase study size and to develop rigorous standards for evaluation of ED-initiated interventions to support people experiencing homelessness.

The heterogeneity of this review reflects the multifaceted and cross-disciplinary approach required to address the complexities of homelessness. The social determinants of health are major contributors to the overall health of a

person. Given that the underlying social determinants of health often cause or contribute to the medical morbidity of homeless patients, it is prudent that ED physicians attempt to address social needs, such as housing, in the ED. Numerous studies in this review demonstrate that ED interventions can help interrupt the cycle of homelessness and address social needs. While there remain significant challenges in scaling these interventions, the review gives credence to the ability to intervene in the ED and continue interventions in the community. With this study, ED physicians can better advocate for the resources necessary in their communities and for more high-quality research addressing our limited knowledge of ED interventions for homelessness. Future studies aimed at reducing costs and ED use remain important but must also include patient-centered outcomes. Of course, these future studies must occur alongside concerted municipal, provincial, and federal efforts to reduce poverty and improve access to affordable housing in communities.

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Compliance with ethical standards

Conflict of interest None.

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