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Interventions to increase testing, linkage to care and treatment of hepatitis C virus (HCV) infection among people in prisons: A systematic review

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ABSTRACT

Background: While the burden of chronic hepatitis C virus (HCV) infection is significantly higher among people in prisons compared to the general population, testing and treatment uptake remain suboptimal. The aim of this systematic review was to synthesize evidence on the effectiveness of interventions to increase HCV testing, linkage to care and treatment uptake among people in prisons.

Methods: We searched Medline (Ovid 1996–present), Embase (Ovid 1996–present), and the Cochrane Central Register of Controlled Trials for English language articles published between January 2007 and November 2017. Studies evaluating interventions to enhance HCV testing, linkage to care and treatment uptake for people in prison were included. Two independent reviewers evaluated articles selected for full-text review. Disagreements were resolved by consensus.

Results: A total of 475 unique articles were identified, 29 were eligible for full text review, and six studies were included. All but one study was conducted in the pre-direct-acting antiviral (DAA) era; no studies were conducted in low- or middle-income countries. Of the six studies, all but one focused on testing. Only two were randomised controlled trials; the remaining were single arm studies. Interventions to enhance HCV testing in prison settings included combination risk-based and birth-cohort screening strategies, on-site nurse-led opt-in screening clinics with pre-test counselling and education, and systematic dried blood spot testing. All interventions increased HCV testing, but risk of study bias was high in all studies. Interventions to enhance linkage to care included facilitated referral for HCV assessment and scheduling of specialist appointments; however, risk of study bias was critical.

Conclusions: There is a lack of recent data on interventions to improve the HCV care cascade in people in prisons. With the introduction of short-course, well-tolerated DAAs, rigorous controlled studies evaluating interventions to improve testing, linkage and treatment uptake for people in prison are necessary.

Introduction

More than 11 million people are imprisoned worldwide at any given time (Walmsley, 2016). It is estimated that 3%–38% of people in prison have been previously exposed to hepatitis C virus (HCV), with differences in estimates related primarily to geography and prevalence of injection drug use (Zampino, Coppola, Sagnelli, Di Caprio, & Sagnelli, 2015). Modelling studies have confirmed the negative impact of incarceration on perpetuating the HCV epidemic (Altice et al., 2016) and estimates of HCV incidence among people in prison with a history of injection drug use are as high as 16.4 per 100 person-years (Larney et al., 2013). Despite this, routine HCV testing in correctional facilities remains largely limited (Kronfli & Cox, 2018; Beckwith et al., 2015).

Addressing the HCV epidemic among people in prison is an essential component of the global response (Kouyoumdjian & McIsaac, 2015). Experts are encouraging the "*micro-elimination*" of HCV – a pragmatic approach to pursue elimination goals for individual sub-populations, for which treatment interventions can be delivered more quickly and

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efficiently using targeted methods (Lazarus, Wiktor, Colombo, & Thursz, 2017). With the advent of all oral short-course and highly effective direct-acting antiviral (DAA) therapy, the goal of reducing global HCV infections by 90% as of 2030 among people in prison may be feasible (WHO, 2017), particularly if combined with prison-based opioid substitution therapy (Stone et al., 2017).

The HCV cascade of care describes successive health care steps specific to chronic HCV infection that result in optimal health outcomes (Linas et al., 2014). Screening, the first step of the HCV care continuum, lays the foundation for subsequent linkage to care, initiation of treatment, and achievement of HCV cure. Despite recommendations from the World Health Organization (WHO) that "all prisoners be tested for hepatitis C" (WHO, 2014) and from the United Nations Basic Principles for the Treatment of Prisoners that people in prison "have access to the health services available in the country without discrimination of the grounds of their legal situation" (United Nations, 1990), practice is inconsistent worldwide. Access to DAA treatment has not been prioritized in most prison settings for various reasons including high turnover rates due to short incarcerations, frequent prison transfers, and the high cost of DAA therapy (Kronfli & Cox, 2018). However, modeling studies have shown that in some settings, scaling-up prison-based HCV treatment to 80% of chronically-infected people who inject drugs (PWID) with sentences greater than 16 weeks could reduce HCV incidence and prevalence among all PWID by at least 45%, suggesting both an individual and population-level impact (Stone et al., 2017). Prior to the expansion of treatment, systematic screening for HCV in prison should become routine practice – a standard of care that is not currently in place in many developed countries including Canada and the United States (Morris, Brown, & Allen, 2017). The result is that a limited number of people with chronic HCV infection are aware of their potential need for treatment and progress along the cascade of care towards cure.

A systematic review of evidence-based interventions aimed at people in prison along the HCV care cascade has not yet been published. We sought to synthesize evidence on the effectiveness of interventions to increase HCV testing, linkage to care, and treatment uptake among people in prison.

Methods

This systematic review was performed and reported in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement (Liberati et al., 2009). A research protocol was developed *a priori* (available from authors on request).

Eligibility criteria

Studies were included if they met all of the following criteria:

1. *Population*: Participants of any age who were in prison or where at least a portion of the study sample was people in prison.
2. *Intervention*: Interventions aimed at increasing engagement at any (or combination) of the following stages of HCV care:
   a) Testing for HCV antibodies and/or HCV RNA; and/or
   b) Linkage to HCV care, defined as clinical assessment of chronic HCV infection; and/or
   c) Treatment uptake, defined as the dispensation of either interferon-based or interferon-free regimens.
3. *Comparison*: The comparison group was composed of participants receiving either no intervention or standard of care.
4. *Outcomes*: The primary outcomes were:
   a) Proportion of the study population tested for HCV;
   b) Proportion of the study population with chronic HCV who are linked to care; and
   c) Proportion with chronic HCV initiating treatment.

Exclusion criteria were studies that were not peer-reviewed scientific articles, review articles including systematic reviews, and non-comparative studies. Public health interventions targeting health care providers were excluded.

Information sources

Studies were identified by searching the following electronic databases for English-language full-text and abstract entries published between January 2007 and November 2017: Medline (Ovid 1996–present), Embase (Ovid 1996–present), and the Cochrane Central Register of Controlled Trials. Reference lists of selected articles retrieved during the initial search were hand-searched and forward citation checks were performed to further identify studies.

Search strategy

A comprehensive list of search terms, related to each of the HCV care cascade components, was used to develop search strategies for each electronic database. Keywords and phrases within groups of hepatitis C; prison population and hepatitis C outcome terms were combined using the 'OR' operator; and each group was combined using the 'AND' operator. The detailed list of search terms; as well as full search strategies used for all electronic databases; are included in the Supplementary material. Abstracts from selected scientific conferences (International Liver Congress 2016 and American Association for the Study of Liver 2016) were screened for review eligibility.

Study selection

Data retrieved through the search strategy were imported into EndNote X7 (Thomson Reuters, New York, NY, USA) and duplicates were removed. Titles obtained from the initial search strategy were screened by one reviewer (N.K.) and irrelevant citations removed. Abstracts were reviewed for eligibility by two reviewers (N.K. and B.L.). Full-texts for all identified abstracts were then assessed independently by two reviewers (N.K. and B.L.) for inclusion. Disagreements between reviewers were resolved by consensus. Reasons for exclusion were reported.

Data collection process and data items collected

Data from studies included for analysis were extracted by one reviewer (B.L.) using a standardized data extraction form. A second reviewer (N.K.) verified extracted data, and disagreements were resolved by discussion and consensus. The following variables were collected: title, first author, publication year, study design, study location, setting, population characteristics, sample size (in both intervention and control arms where applicable), intervention description, comparator description, duration of intervention, outcome description, number of participants achieving the outcome of interest (and proportions if applicable) in each of the intervention and control arms.

Risk of bias assessment in individual studies

Risk of bias in individual studies was assessed independently by two reviewers (N.K. and B.L.) using the Cochrane Collaboration's risk of bias tool for randomised studies (Higgins, 2013) and the ROBINS-I tool (Risk Of Bias In Non-randomised Studies − of Interventions) (Sterne et al., 2016) for non-randomised studies. Disagreements were then resolved by discussion between the two reviewers until consensus was reached. For randomised studies, outcomes were evaluated along the following six domains: selection bias, performance bias, detection bias, attrition bias, reporting bias, and other bias. The overall risk of bias for each outcome was classified into three categories: low risk of bias, high risk of bias or unclear risk of bias. The number of 'high risk' domains for