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The Copenhagen test and treat hepatitis C in a mobile clinic study: a protocol for an intervention study to enhance the HCV cascade of care for people who inject drugs (T'N'T HepC)

Jeffrey Victor Lazarus [1], Anne Øvrehus,[2] Jonas Demant,[3] Louise Krohn-Dehli,[4] Nina Weis [4,5]

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For numbered affiliations see end of article.

Correspondence to
Dr Jeffrey Victor Lazarus; jeffrey.lazarus@isglobal.org

ABSTRACT

Introduction Injecting drug use is the primary driver of hepatitis C virus (HCV) infection in Europe. Despite the need for more engagement with care, people who inject drugs (PWID) are hard to reach with HCV testing and treatment. We initiated a study to evaluate the efficacy for testing and linkage to care among PWID consulting peer-based testing at a mobile clinic in Copenhagen, Denmark.

Methods and analysis In this intervention study, we will recruit participants at a single community-based, peer-run mobile clinic. In a single visit, we will first offer participants a point-of-care HCV antibody test, and if they test positive, then they will receive an HCV RNA test. If they are HCV-RNA+, we will administer facilitated referrals to designated 'fast-track' clinics at a hospital or an addiction centre for treatment. The primary outcomes for this study are the number of tested and treated individuals. Secondary outcomes include individuals lost at each step in the care cascade.

Ethics and dissemination The results of this study could provide a model for targeting PWID for HCV testing and treatment in Demark and other settings, which could help achieve WHO HCV elimination targets. The Health Research Ethics Committee of Denmark and the Danish Data Protection Agency confirmed (December 2018/January 2019) that this study did not require their approval. Study findings will be disseminated through peer-reviewed publications, conference presentations and social media.

Strengths and limitations of this study

- This protocol presents one of the first studies globally to employ a peer-led integrated model of care, with the latest point-of-care technology, to target people who inject drugs for hepatitis C testing, treatment and care outside of addiction treatment.
- The study will use both antibody rapid detection tests and RNA point-of-care testing in order to simplify and expedite hepatitis C diagnosis.
- This study's point-of-care testing directly reaches marginalised populations, including people who inject drugs, undocumented migrants and homeless individuals, and involves close collaboration among on-site nurses, community-based organisations and the infectious disease departments of two major university hospitals in Copenhagen, Denmark.
- Since this study involves marginalised populations that may be reluctant to continue care, there may be potential loss to follow-up, which the implementing community-based organisation is working to mitigate.

INTRODUCTION

Owing to the high efficacy and safety of direct-acting antivirals (DAAs), in 2016 the World Health Organization (WHO) established an ambitious goal to reduce the incidence of hepatitis C virus (HCV) by 80% and to treat 80% of eligible persons with HCV by 2030.[1–3] Targeting people who inject drugs (PWID) is a practical approach to achieving this goal as unsafe injecting drug use is the main contributor to the spread of HCV in Europe, with an increasing prevalence of HCV in PWID during the last decade.[4 5] In fact, the estimated prevalence of HCV in PWID is 53.2% in Western Europe and 64.7% in Eastern Europe.[5] Moreover, researchers estimate that almost half of HCV infections among PWID in Europe are undiagnosed[6] and that more than 90% of incident infections in Europe are in PWID.[7]

Despite the need for HCV testing and treatment in PWID, this population is considered hard to reach in both of these areas.[8] Furthermore, coverage of harm reduction services to prevent HCV transmission among PWID is deficient in most settings worldwide.[9] In Australia, where specific measures have been taken to ameliorate the cascade of care among PWID, a 2017 study showed that 89% of PWID had HCV antibody testing, 57% of these were antibody positive and, of these, 46% had received

confirmatory HCV RNA testing.[10] Only 31% of PWID with active infection or chronic infection that had been previously treated had received specialist HCV assessment, 8% had received antiviral treatment and 3% were cured.[10] As such, reaching WHO goals among PWID requires substantially strengthening the cascade of care from diagnosis to post-treatment follow-up efforts and, especially, increasing efforts to test, link, care and treat PWID.[1–3]

A nationwide campaign for awareness and case finding of HCV was shown to be cost-effective among PWID in the Netherlands.[11] This aligns with the 'Find the Missing Millions' campaign of the World Hepatitis Alliance, which was launched in 2018 to diagnose individuals unknowingly living with viral hepatitis.[12] Interventions to enhance HCV testing include a wide range of measures such as on-site testing with pretest counselling and education or dried blood spot testing, although they are largely in the preliminary phases of assessment.[13] In the general practice setting, HCV testing among PWID is feasible but also has some drawbacks. For example, an Australian study with 888 participants found that 93% of PWID attending general practitioners had an antibody test, but RNA testing was incomplete for more than one-third of the antibody-positive individuals.[14]

Within Danish contexts, a regional study on PWID connected to addiction services (1996–2015) found a prevalence of persons with positive anti-HCV antibodies (Anti-HCV Ab+) of 64% and 33% for HCV RNA+ (ie, chronically infected).[15] Before the DAA era in Denmark, approximately 20 000 persons had chronic HCV, an estimated 500 persons were newly infected each year and, of these, 300 would develop chronic HCV.[16] In 2015, the estimated prevalence of people with HCV and active infection (ie, viraemic) was 0.3%[17] and at the end of 2016 the population living with diagnosed chronic HCV was 7581 people, of which the estimated undiagnosed fraction was 24% and so the total diagnosed and undiagnosed number was estimated to be 9975, corresponding to 0.21% of the adult population.[18]

In the city of Copenhagen, drug treatment centres have been obliged to offer HCV testing for all PWID, following the adoption of the 2007 Danish action plan for HCV in PWID.[19] However, testing uptake has been suboptimal, and it has only recently been encouraged through the Shared Addiction Care Collaboration.[20] This project involves an expanded collaboration among 12 counselling centres offering drug treatment in the Municipality of Copenhagen, the city of Copenhagen and the Departments of Infectious Diseases at Copenhagen University Hospitals in Rigshospitalet and Hvidovre. Thus, PWID outside of the drug treatment system have limited testing options. One prospective cohort study, based on drug-related deaths in 2006, estimated that only half of current drug injectors have been engaged in drug treatment and that this group constitutes a large population with limited testing options.[21]

Various new diagnostic techniques that allow for the rapid and simplified diagnosis of HCV are now available as a 'point-of-care' test where the person examined receives the test result immediately after the test is completed and not necessarily at a hospital or clinic. Although reflex testing (ie, conducting an Anti-HCV Ab test, and if this is positive then conducting an HCV RNA test with the same blood sample) is the norm in Copenhagen, for PWID most experts recommend administering both anti-HCV and HCV RNA tests and providing the responses during a single visit to avoid loss to follow-up between tests and/or receiving test results.[22] This strategy is feasible in various settings, including harm reduction centres and primary care and have been shown to be cost-effective in the latter.[23 24] Other interventions have been assessed with regard to their enhancement of linkage to care among PWID infected with HCV, with facilitated referral for HCV assessment and scheduling of specialist appointments among others.[13] Fast-track clinics, condensing all necessary requirements for testing in a single visit to the prescriber, have proven efficient.[25] Further, clinics dedicated to vulnerable populations are more sensitive to the stigma and lack of trust PWID might have faced in the healthcare system previously.[26]

DAAs have also proved effective and safe in real-world studies, including for PWID, when provided through a multidisciplinary model of care.[27 28] Moreover, the paradigm is shifting to the use of HCV treatment to prevent the spread of the infection (ie, treatment as prevention), which a mathematical model has demonstrated as achievable in Denmark.[29 30] However, this is reliant on engaging many more PWID in care. In a recent nationwide Danish study, ongoing substance use and non-adherence to medical appointments were the most frequent reasons for not starting HCV treatment with DAAs.[31]

Peer-based testing has been demonstrated to enhance testing uptake, which can engage individuals who are not in contact with conventional HCV care for testing and treatment.[13] Moreover, knowledge of HCV status has been proven to increase sterile syringe use among PWID, which further strengthens prevention approaches.[32] As such, it is expected that a simplified HCV care pathway protocol with peer-based support services will reach individuals not engaged in testing offered by established health services, such as Copenhagen's addiction centres. This will increase treatment uptake and improve prevention efforts in an at-risk, vulnerable population with very limited contact to the health system.

However, data are lacking on integrated models of care targeting PWID outside addiction treatment which include a peer-support component and employ the latest technology. Despite promising evidence on engaging PWID from Australia,[33] Canada,[34] Scotland[35 36] and Spain,[37 38] no interventions of this type have been carried out in Denmark or in Europe.[39] Therefore, we initiated a study to test and treat PWID outside of addiction treatment in Copenhagen.

The aim of this study is to evaluate the efficacy of a simplified, integrated protocol for testing and linkage to care and treatment among PWID consulting peer-based

testing at a mobile clinic run by a community-based organisation in Copenhagen, Denmark.

METHODS AND ANALYSIS

Study design and setting

In this single-centre intervention study, participants are recruited in a non-randomised setting at a peer-driven mobile testing unit (ie, mobile clinic) in Copenhagen. Participants will be recruited consecutively as they access services at the community-based mobile clinic.

The mobile clinic is owned and operated by the 'Users Academy' (Brugernes Akademi), a Copenhagen-based non-governmental organisation. The study group will provide a schedule for when the mobile clinic will be at a specific site (eg, every Tuesday at Halmtorvet, Copenhagen, Denmark's largest, open drug use area, and in mid 2020 was expanded to nearby homeless shelters). The expected area covered by the mobile clinic is the Region of Copenhagen. Designated 'fast-track clinics' for referral will be Copenhagen University Hospitals, Rigshospitalet and Hvidovre, as well as addiction centres in Copenhagen.

The study involves sequential interventions. First, we will offer participants a point of care Anti-HCV Ab-test. Second, if they test positive for the anti-HCV Ab-test, they will then receive an HCV RNA test. Finally, if they are HCV-RNA+, we will administer facilitated referrals to designated 'fast-track' clinics for treatment.

Patient or public involvement

Patients were involved in the planning of this study via the aforementioned community-based organisation, the 'Users Academy,' which operates the mobile clinic that forms the basis of the intervention. The Users Academy is a peer-led organisation and through its interaction with drug users across the region of Copenhagen, it is able to feed into the operations of the project. They are in charge of the study's data collection together with an on-site nurse and are in regular contact with the co-principal investigators.

Study population

The study will include HCV-positive persons aged 18 years and older with a Danish personal identification number (PIN). The subject must have a self-reported history of injecting drugs (active or former) and provide informed consent. We will report on HCV-positive persons without a PIN but exclude them from linkage to care due to current Danish law. Exclusion criteria: A subject will not be eligible to enrol in the study if any of the following criteria apply: Subject is unable to understand written material or verbal instructions in the study languages (Danish or English) or the subject has participated in the study in the previous 30 days.

Statistical analysis and sample size justification

This is an interventional, descriptive study. It is, therefore, not possible to make a power calculation. However, we calculated the precision of estimated proportions for primary endpoints to justify the sample size. We assumed a proportion of 70% of participants tested with anti-HCV but not tested previously (self-reported) and a proportion of 75% of participants initiating treatment in accordance with applicable national guidelines[40] among HCV RNA+ persons.

Based on the aforementioned assumptions and a sample size of N=1000 (see figure 1), the proportion of participants being tested with anti-HCV but not having been tested previously can be estimated with a precision of±2.8% with a 95% CI.

The proportion of participants initiating treatment among HCV RNA+ participants can be estimated with a precision of ±4.9% with a 95% CI assuming a sample size of N=300 and a proportion of 75%. Both precisions were considered sufficient.

Descriptive statistics (ie, demographics, epidemiology of HCV infection, history of injecting drug use, previous testing and outcomes) collected at baseline will be used to describe participant demographic characteristics.

Logistic regression analysis will be employed for identifying predictive factors of HCV treatment 'failure'. HCV treatment 'success' is defined as completion of the cascade of care steps and reaching sustained virologic response at 12 weeks post-treatment (SVR12) or a proxy, such as SVR at 4 weeks post-treatment (SVR 4) or end of treatment (EoT) response. Multiple logistic regression with backward elimination will be applied. ORs with 95% CI and p value will be calculated. Statistical significance will

*It is estimated that 25% of the participants will be either undocumented migrants, not want a referral or not show up for a referral.

Figure 1 Study flow: The number of participants will be 1000 during the study period, based on an estimation of persons attending the mobile clinic. HCV, hepatitis C virus; SVR 12, sustained virologic response 12 weeks post-treatment.

be determined based on a value of <0.05. We will analyse the data using IBM SPSS Statistics V.23.0 (IBM, Released 2015. IBM SPSS Statistics for Windows, V.23.0, IBM).

Study period

The study was planned for 1 March 2019 to 28 February 2021. Enrolment opened on 1 May 2019 and was anticipated to stay open until 31 October 2020 but will likely be extended to 30 April 2021 due to the COVID-19 pandemic, during which services have been suspended. As of 10 March 2020, just prior to the declaration of the pandemic, 580 people were tested and 52 individuals were HCV-RNA+. Six additional individuals with HCV infection contacted the service to be linked to care. Of the 52 individuals with chronic HCV infection, 44 were evaluated at the hospital clinic and 39 initiated DAA therapy.

Study outcomes

The primary outcome of this study is the proportion of treated persons (ie, individuals initiating treatment) in accordance with applicable national guidelines among HCV RNA+ persons.

Secondary outcomes include individuals lost at each step in the care cascade including:

- Received result of point-of-care Anti-HCV Ab test.
- Accepted to undertake point-of-care HCV RNA test.
- Received HCV RNA test results.
- The proportion of HCV RNA+ eligible and the proportion attending referral appointments.
- The proportion that received assistance to a referral appointment with an infectious disease specialist or at an addiction centre.
- The proportion that completed treatment.
- The proportion that achieved an EoT viral response.
- The proportion that achieved cure, defined as SVR 12 weeks after EoT.

Descriptive predictors for primary or secondary outcomes include prevalence of anti-HCV Ab+ and HCV RNA+ in persons using outreach testing and liver fibrosis in HCV RNA+ (liver stiffness measurement; LSM). We will also consider basic demographics (ie, age, gender, ethnicity and citizen status) and brief drug history (ie, ever enrolled in drug treatment for of all tested). For HCV RNA +patients, we will consider genotype and LSM value (Median kPa) as well.

The study will further report on barriers experienced along the cascade of care including the percentage of clients without a Danish PIN. Finally, it will report the number of patients with SVR at EoT and 12 weeks after EoT as well as any cases of reinfection.

Testing procedures

Anti-HCV antibodies test

For all participants, we will use the point-of-care test Oraquick HCV Rapid Antibody Test,[41] utilising fingerprick blood sampling (100 µL of blood). Test processing time is approximately 20 min for the antibody test. A trained study staff member will disclose results to participants in a confidential setting. Participants who test negative for anti-HCV Ab will complete their participation in the study at that point. Participants who test positive for HCV infection through the anti-HCV Antibody test will receive counselling and be offered an immediate HCV RNA test onsite.

HCV RNA test

Participants with a positive anti-HCV Ab-test will be offered the point-of-care test 'Xpert HCV VL FS' using fingerprick testing (100 µL) blood sampling, analysed by GeneXpert by Cepheid. Test processing time is approximately 60 min. The limit of quantification will be >100 IU/mL and limit of detection will be >40 IU/mL for Xpert HCV VL FS.

Procedures if HCV RNA+

Participants with a positive HCV RNA result will be offered LSM with a non-invasive transient elastography (FibroScan, EchoSens, Paris) performed by a trained study staff member, to assess fibrosis level and estimate the severity of liver disease. Participants will be asked if they are fasting and informed that any abnormal result needs to be confirmed by a second scan and in the context of a liver function test, as a high level of inflammation or a recent meal can result in a falsely elevated scan suggesting liver fibrosis. All participants are offered a Fibroscan prior to initiating treatment but it is not required. This can be performed at a hospital or drug treatment centre, and at the van from autumn 2020, and is not a prerequisite for referral.

Referral

HCV RNA+ patients will be asked to disclose their Danish PIN to the mobile clinic study staff to facilitate linkage to care and treatment. They will be informed of possibilities for referral to a fast-track clinic, and a study staff member will communicate with the relevant department of infectious diseases or an addiction centre for an appointment or contact (see figure 2). Assisted referral options will include the following:

- Telephone call to the study nurse at the designated centre or fast-track clinic of choice to establish contact/make a booking.
- Peer support to attend the appointment.

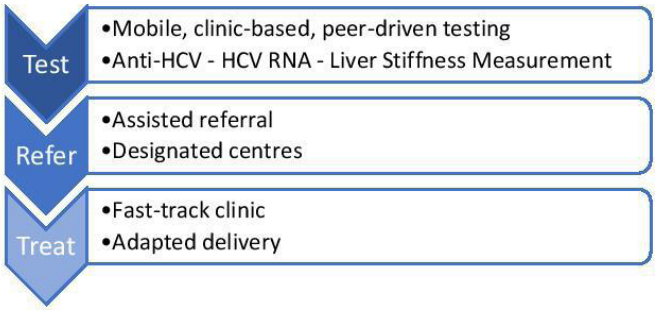

Figure 2 Intervention flow chart basics: TEST (T)-REFER (N)-TREAT (T). HCV, hepatitis C virus.

- Reminder by short message service/text or telephone call prior to appointment or at missed appointment.

All participants eligible for treatment will receive a one-page informational handout on care and treatment options including locations and peer support. If not interested in referral at the time of the test, participants can contact the staff at the mobile clinic within 30 days.

The fast-track clinics can be at a hospital or an addiction centre. Regardless of the location, all fast-track clinics are dedicated to streamlining the referral visit by facilitating the necessary blood tests and consultations within a single visit and negotiating with the participant the most convenient way for medicine pick-up/delivery. The main purpose of the fast-track clinic is to minimise the number of times the participant has to visit the hospital/clinic prior to treatment, ensure that the visit is conducted by staff sensitive to the study population and ensure that the participant is treated without stigma, discrimination or prejudice.

Additional options

We will also have an additional option for onsite confirmatory testing. HCV RNA+ participants will need venous blood sampling for HCV genotype and viral load, and a liver health assessment prior to treatment. This procedure will require 50 mL of blood, drawn by venous puncture. This can be done at the referral clinic but can also be drawn by the study nurse at the time of primary testing, so results can be ready and treatment available at the fast-track clinic. The HCV genotype will be analysed within 7 days as per the standard of care.

Disposal of blood sampling materials

All equipment used for blood sampling and test equipment will be disposed of according to standard procedure for biological specimens and sent for appropriate destruction.

Treatment for HCV

DAA therapy of HCV RNA+ patients will take place at participating clinics or addiction centres in accordance with national guidelines and is not considered the objective of this study. Study participants will be asked permission to ask treating physicians about the results of the therapy (see figure 2).

Treatment algorithm

As of the time of writing, Denmark provided treatment based on HCV genotype. The choice of therapy will follow the applicable recommendations from the Danish Medicines Council and is not part of the study objectives. For patients for whom it would be a barrier to wait 4–6 weeks, for example, for the result of a genotype test, pangenotypic treatment will be initiated before the result is available.

Data collection and management

Demographic and additional data to be collected from each participant will include: initials, age, gender, migrant status (first generation migrant, undocumented migrant or Danish citizen), first injection, injection frequency, latest injection, most frequently injected drug, drug treatment (none, opioid substitution therapy or other), alcohol use, housing status (homeless, shelter or stable housing), previously tested (standard of care or mobile clinic), previous test result, previous treatment, previous treatment result, HCV care (never, previously or currently) and Danish PIN.

The staff at the referral centre responsible for the treatment of HCV infection will have access to the participants' electronic medical record, as in standard of care. With the patients' permission, staff will provide the researchers with the following information: Date of visit, HCV genotype, final liver fibrosis assessment results, designated treatment, designated treatment delivery option (mobile clinic, hospital, addiction centre), day of treatment initiation and completion, HCV viral load at initiation, week 2, EoT and SVR12, amounts of medication received, if lost to follow-up and likely cause of lost to follow-up.

We will enter and store data in a Research Electronic Data Capture (REDCap) password-protected database on the secured server of the Capitol Region of Copenhagen, Denmark.

ETHICS AND DISSEMINATION

The Health Research Ethics Committee of Denmark (case number H-18058659, dated 17 December 2018), and the Danish Data Protection Agency confirmed (4 January 2019) that this study did not require their approval.

This study will be the first to use an integrated, peer-led model of care using the latest technology to target PWID for HCV treatment and care outside of addiction treatment in northern Europe. This model will allow for simplified, rapid point-of-care testing for HCV, strong linkage to care and easily accessible treatment with DAAs for PWID. As such, the results of this study will be useful to address HCV in PWID in Denmark. Furthermore, it may serve as a model for other settings, contributing to the global elimination of HCV as set out by WHO.

The investigators are aware of limitations and challenges such as recruitment, linkage to care and treatment adherence. We plan to overcome these through the peer-supporter model, exceptional waiving of the genotype test and the acquisition of a FibroScan (transient elastography) for the mobile clinic, which is anticipated to be available from the autumn of 2020. Waiting for test results, particularly for the confirmatory test and then the genotype test, is another major challenge that the study nurse and peers will face, coupled with language issues with some clients. A short booklet with an introduction to HCV testing and treatment has been translated into the five main languages spoken in the area where the services are provided. This will be coupled with a short film in the five languages, which is particularly relevant for those who are illiterate

On completion of this study, we will conduct a robust knowledge dissemination and exchange strategy to ensure effective uptake of research findings. In order to

reach appropriate scientific and clinical audiences, we plan to submit the findings of this study for publications to a relevant peer-reviewed journal. Additionally, we plan to present the findings of this study in relevant conferences and meetings in Denmark and abroad (eg, International Conference on Hepatitis Care in Substance Users, the European Association for the Study of the Liver International Liver Conference and the American Association for the Study of Liver Diseases Liver Meeting). We plan to make the findings available to other stakeholders through engagement with the media and on social media.

Author affiliations
[1]Barcelona Institute for Global Health (ISGlobal), Hospital Clínic, University of Barcelona, Barcelona, Spain
[2]Department of Infectious Diseases, Odense University Hospital, Odense, Denmark
[3]Users Academy, Copenhagen, Denmark
[4]Department of Infectious Diseases, Copenhagen University Hospital, Hvidovre, Denmark
[5]Department of Clinical Medicine, Faculty of Health and Medical Sciences, University of Copenhagen, Copenhagen, Denmark

Twitter Jeffrey Victor Lazarus @JVLazarus

Contributors JVL and JD conceived of the study. JVL and AØ drafted this protocol with input from NW, JD and LK-D. All authors reviewed subsequent versions and approved the final protocol for submission to the international review board.

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ORCID iDs
Jeffrey Victor Lazarus http://orcid.org/0000-0001-9618-2299
Nina Weis http://orcid.org/0000-0002-3133-2724

REFERENCES

1 Scott N, Doyle JS, Wilson DP, *et al*. Reaching hepatitis C virus elimination targets requires health system interventions to enhance the care cascade. *Int J Drug Policy* 2017;47:107–16.
2 Grebely J, Dore GJ, Morin S, *et al*. Elimination of HCV as a public health concern among people who inject drugs by 2030 - What will it take to get there? *J Int AIDS Soc* 2017;20:22146.
3 Lazarus JV, Pericàs JM, Colombo M, *et al*. Viral hepatitis: "E" is for equitable elimination. *J Hepatol* 2018;69:762–4.
4 Nelson PK, Mathers BM, Cowie B, *et al*. Global epidemiology of hepatitis B and hepatitis C in people who inject drugs: results of systematic reviews. *Lancet* 2011;378:571–83.
5 Degenhardt L, Peacock A, Colledge S, *et al*. Global prevalence of injecting drug use and sociodemographic characteristics and prevalence of HIV, HBV, and HCV in people who inject drugs: a multistage systematic review. *Lancet Glob Health* 2017;5:e1192:207–1207.
6 Wiessing L, Ferri M, Grady B, *et al*. Hepatitis C virus infection epidemiology among people who inject drugs in Europe: a systematic review of data for scaling up treatment and prevention. *PLoS One* 2014;9:e103345.
7 Trickey A, Fraser H, Lim AG, *et al*. The contribution of injection drug use to hepatitis C virus transmission globally, regionally, and at country level: a modelling study. *Lancet Gastroenterol Hepatol* 2019;4:435–44.
8 Grebely J, Bruggmann P, Treloar C, *et al*. Expanding access to prevention, care and treatment for hepatitis C virus infection among people who inject drugs. *Int J Drug Policy* 2015;26:893–8.
9 Larney S, Peacock A, Leung J, *et al*. Global, regional, and country-level coverage of interventions to prevent and manage HIV and hepatitis C among people who inject drugs: a systematic review. *Lancet Glob Health* 2017;5:e1208–20.
10 Iversen J, Grebely J, Catlett B, *et al*. Estimating the cascade of hepatitis C testing, care and treatment among people who inject drugs in Australia. *Int J Drug Policy* 2017;47:77–85.
11 Helsper CW, Janssen MP, van Essen GA, *et al*. Effectiveness and cost-effectiveness of nationwide campaigns for awareness and case finding of hepatitis C targeted at people who inject drugs and the general population in the Netherlands. *Int J Drug Policy* 2017;47:117–25.
12 Alliance WH. Find the Missing Millions [Internet, 2018. Available: https://www.worldhepatitisalliance.org/find-missing-millions [Accessed 13 Mar 2020].
13 Bajis S, Dore GJ, Hajarizadeh B, *et al*. Interventions to enhance testing, linkage to care and treatment uptake for hepatitis C virus infection among people who inject drugs: a systematic review. *Int J Drug Policy* 2017;47:34–46.
14 Butler K, Day C, Sutherland R, *et al*. Hepatitis C testing in general practice settings: a cross-sectional study of people who inject drugs in Australia. *Int J Drug Policy* 2017;47:102–6.
15 Øvrehus A, Nielsen S, Hansen JF, *et al*. Test uptake and hepatitis C prevalence in 5483 Danish people in drug use treatment from 1996 to 2015: a registry-based cohort study. *Addiction* 2019;114:494–503.
16 Razavi H, Waked I, Sarrazin C, *et al*. The present and future disease burden of hepatitis C virus (HCV) infection with today's treatment paradigm. *J Viral Hepat* 2014;21 Suppl 1:34–59.
17 Polaris Observatory HCV Collaborators. Global prevalence and genotype distribution of hepatitis C virus infection in 2015: a modelling study. *Lancet Gastroenterol Hepatol* 2017;2:161–76.
18 Nielsen S, Hansen JF, Hay G, *et al*. Hepatitis C prevalence in Denmark in 2016-An updated estimate using multiple national registers. *PLoS One* 2020;15:e0238203.
19 Sundhedsstyrelsen. National handlingsplan TIL forebyggelse AF hepatitis C blandt stofmisbrugere. *Copenhagen* 2007. [Epub ahead of print: 13 Mar 2002].
20 Centre of Excellence for Health Immunity and Infections. SACC – Shared Addiction Care Collaboration [Internet], 2020. Available: https://chip.dk/Collaboration/SACC [Accessed 13 Mar 2020].
21 Christensen PB, Kringsholm B, Banner J, *et al*. Surveillance of HIV and viral hepatitis by analysis of samples from drug related deaths. *Eur J Epidemiol* 2006;21:383–7.
22 Grebely J, Applegate TL, Cunningham P, *et al*. Hepatitis C point-of-care diagnostics: in search of a single visit diagnosis. *Expert Rev Mol Diagn* 2017;17:1109–15.
23 Schackman BR, Leff JA, Barter DM, *et al*. Cost-Effectiveness of rapid hepatitis C virus (HCV) testing and simultaneous rapid HCV and HIV testing in substance abuse treatment programs. *Addiction* 2015;110:129–43.
24 Assoumou SA, Tasillo A, Leff JA, *et al*. Cost-Effectiveness of one-time hepatitis C screening strategies among adolescents and young adults in primary care settings. *Clin Infect Dis [Internet]* 2018;66:376–84.
25 Ryan P, Valencia J, Troya J, *et al*. Screening for HCV with dried blood spot test in active drug users. evaluation of magnitude before intervention. *Poster 131 INHSU* 2018.
26 Radley A, van der Pol M, Dillon JF. Application of a discrete choice experiment approach to support the design of a hepatitis C testing service in primary care. *Int J Drug Policy* 2019;65:1–7.

27 Read P, Lothian R, Chronister K, *et al*. Delivering direct acting antiviral therapy for hepatitis C to highly marginalised and current drug injecting populations in a targeted primary health care setting. *Int J Drug Policy* 2017;47:209–15.
28 Alimohammadi A, Holeksa J, Thiam A, *et al*. Real-World efficacy of direct-acting antiviral therapy for HCV infection affecting people who inject drugs delivered in a multidisciplinary setting. *Open Forum Infectious Diseases* 2018;5:ofy120–ofy120.
29 Martin NK, Hickman M, Hutchinson SJ, *et al*. Combination interventions to prevent HCV transmission among people who inject drugs: modeling the impact of antiviral treatment, needle and syringe programs, and opiate substitution therapy. *Clin Infect Dis* 2013;57 Suppl 2:S39–45.
30 Fraser H, Martin NK, Brummer-Korvenkontio H, *et al*. Model projections on the impact of HCV treatment in the prevention of HCV transmission among people who inject drugs in Europe. *J Hepatol* 2018;68:402–11.
31 Sølund C, Hallager S, Pedersen MS, *et al*. Direct acting antiviral treatment of chronic hepatitis C in Denmark: factors associated with and barriers to treatment initiation. *Scand J Gastroenterol* 2018;53:849–56.
32 Fisher KA, Cahill LM, Broyles S, *et al*. Knowledge of hepatitis C status moderates the relationship between history of drug treatment and sterile syringe use. *PLoS One* 2018;13:e0196157–e0196157.
33 Wade AJ, Macdonald DM, Doyle JS, *et al*. The cascade of care for an Australian community-based hepatitis C treatment service. *PLoS One* 2015;10:e0142770–e0142770.
34 Alimohammadi A, Holeksa J, Parsons R, *et al*. Diagnosis and treatment of hepatitis C virus infection: a tool for engagement with people who inject drugs in Vancouver's Downtown Eastside. *Canadian Liver Journal* 2018;1:14–33.
35 Radley A, Tait J, Dillon JF. DOT-C: a cluster randomised feasibility trial evaluating directly observed anti-HCV therapy in a population receiving opioid substitute therapy from community pharmacy. *Int J Drug Policy* 2017;47:126–36.
36 Schulkind J, Stephens B, Ahmad F, *et al*. High response and re-infection rates among people who inject drugs treated for hepatitis C in a community needle and syringe programme. *J Viral Hepat* 2019;26:519–28.
37 Valencia J, Alvaro-Meca A, Troya J, *et al*. High rates of early HCV reinfection after DAA treatment in people with recent drug use attended at mobile harm reduction units. *Int J Drug Policy* 2019;72:181–8.
38 Saludes V, Antuori A, Lazarus JV, *et al*. Evaluation of the Xpert HCV VL Fingerstick point-of-care assay and dried blood spot HCV-RNA testing as simplified diagnostic strategies among people who inject drugs in Catalonia, Spain. *Int J Drug Policy* 2020;80:102734.
39 Lazarus JV, Pericàs JM, Picchio C, *et al*. We know DAAs work, so now what? Simplifying models of care to enhance the hepatitis C cascade. *J Intern Med* 2019
40 Danish Infectious Disease Society. Hepatitis B and C Guidelines (2018) [Internet], 2018. Available: http://www.infmed.dk/guidelines#hepatitis_guidelines_v8_2018.pdf [Accessed 23 Apr 2020].
41 OraSure Technologies. OraQuick® HCV Rapid Antibody Test [Internet]. Available: https://www.orasure.com/products-infectious/products-infectious-oraquick-hcv.asp [Accessed 16 Mar 2020].