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Hepatitis C Education, Testing, and Treatment in Homeless Shelters: Models for Linkage to Care in High-risk Populations

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HEPATITIS C EDUCATION, TESTING, AND TREATMENT IN HOMELESS SHELTERS: MODELS FOR LINKAGE TO CARE IN HIGH-RISK POPULATIONS

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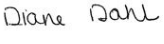
Dean/Chief Nursing Administrator Signature: 

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Abstract for Critical Review of Literature

Background: With the increase of IV drug use, Hepatitis C viral (HCV) infections have increased considerably among the homeless population. The introduction of direct-acting antiviral (DAA) medications has made treating marginalized populations much easier. However, getting homeless patients and people who inject drugs (PWID) linked to care remains a challenge worldwide. More research is needed to ensure that all persons with HCV are able to access treatment regardless of social or economic status.

Theoretical Framework: Nola Pender's Health Promotion Model (HPM) guided this systematic review of literature.

Methods: Eighteen articles were analyzed for this review of literature. The majority of the studies used for this review were published within the past 5 years. All the studies selected included homeless participants, and one or more of the following; HCV education, linkage to care related to HCV testing and treatment, and SVR12 rates. The articles were assessed using John Hopkins Evidence Based Practice Model (Dang & Dearholt, 2018) and findings were organized using Garrard's Matrix Method (Garrard, 2017).

Purpose: The purpose of this critical review of research is to identify models of care for treating HCV among the homeless. This review was done to support research regarding linkage to care for homeless patients with HCV currently being conducted by Hennepin County's Healthcare for the Homeless and Hennepin Healthcare Gastroenterology and Liver Clinic located in Minneapolis, Minnesota.

Results: Following the framework of HPM, the research identifies that homelessness comes with significant barriers to receiving HCV education, testing, and treatment interrupting the goal of health promotion. Additionally, patients who are homeless recognize the benefits of being treated

and perceive a cure as erasing the stigma associated with HCV (Williams, et al., 2019). However, many homeless patients are often lost to follow up when referred to off-site providers for treatment. The literature revealed that HCV healthcare models most effective in treating the homeless include; HCV education with a process for providing the HCV care continuum at homeless shelters, community clinics, or other places where the homeless frequent; and an enhanced level of nursing support to control barriers to care.

Conclusion: This review regarding HCV healthcare models indicate that navigating homeless patients through the HCV care continuum is challenging and requires further research. However, the review of literature identifies essential components of HCV healthcare models, as well as factors to consider when treating this population. First, PWID and are homeless should be considered for treatment to reduce disease burden. Secondly, the shift from specialty care to a broader treatment team for patients without advanced liver disease has allowed HCV care to occur in a location convenient for the homeless to access. Lastly, addressing the social and interpersonal barriers through an enhanced support model for HCV care has shown to increase medication initiation, adherence, completion, and SVR12 testing.

Implications for Research and Practice: Gaps in HCV education, testing, and treatment among the homeless provides continued opportunities for nurses to educate both communities and students in an effort to decrease disease burden. Nursing research should focus on understanding what type of enhanced support is most effective in getting homeless patients through the HCV care continuum.

Keywords: Hepatitis C (HCV), homelessness, HCV healthcare models, HCV education, public health nursing.

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Chapter One: Introduction

Homeless adults with associated intravenous drug use (IVDU) are disproportionately affected by Hepatitis C infection (HCV), compromising their overall health (Fuster & Gelberg, 2019). The introduction of highly effective and safe direct-acting antivirals (DAAs) for the treatment of HCV has allowed previously labeled "difficult to treat" populations to be readily treated (Yek, et al., 2017). These new improved short duration treatments have a 95% cure rate, encouraging the ramp-up of treatment for underserved populations in an effort to decrease the burden of HCV infection (Grebely, Hajarizadeh, Laarus, Bruneau, & Treloar, 2019). Research regarding obstacles to providing treatment and increasing awareness for HCV in this vulnerable population has provided a foundation for helping clinicians in community settings design pathways to screening, linkage to care and treatment (Grebely et al., 2019). However, homeless patients continue to be the hardest population to connect to treatment, despite being one of the populations most affected by this disease (Dever et al., 2017).

Statement of Purpose

This Capstone project is written to provide a review of research to inform an HCV study being done in coordination with the Hennepin County's Healthcare for the Homeless and Gastroenterology-Liver Clinic at Hennepin Healthcare. The goals of this critical review of the literature are to assess knowledge and attitudes about HCV, identify barriers to testing, and understand if treatment uptake improves through integrative services such HCV education, on-site treatment, and adherence support. The larger ongoing study will look at whether a model providing education and testing for HCV in homeless shelters with linkage to treatment in an on-site clinic is an effective way to decrease disease burden within this population. The goal of this critical review is to determine what healthcare model is most effective in providing access to

comprehensive HCV treatment with a sustained viral response at 12 weeks post-treatment (SVR12) for the homeless population.

Need for Critical Review

Hepatitis C infection is only spread by blood-to-blood contact; it is more prevalent than HIV and is one of the most common causes of cirrhosis and liver cancer (National Institute of Diabetes, Digestive and Kidney Disease [NIH], n.d.). The Centers for Disease Control and Prevention (CDC) (n.d.) attributes the rising rate of reported Hepatitis C viral infection from 2010 through 2016 to the rising rates of intravenous drug use (IVDU). Homeless adults have a high rate of IVDU and non-injected drug use (NIDU) which makes them a high-risk group for acquiring HCV (Beiser, Leon, & Gaeta, 2017). Hakobyan et al., (2018) meta-analysis of 15 epidemiological studies showed a 28% prevalence rate of HCV in the homeless, which has remained unchanged since 2012. In addition, treatment uptake (initiation of medications) and adherence is low among the homeless due to loss of follow up (Coyle et al., 2019). Within the last eight years, new oral treatments, known as direct-acting antivirals (DAA), have made achieving a cure much more attainable than the previous intravenous treatments (Hepatitis Central, n.d.). DAA oral medications have been shown to cure HCV in as little as eight to twelve weeks with daily oral treatment and minimal side-effects (Hakobyan et al., 2018). However, many homeless individuals are not connected to the healthcare system and have never been tested for HCV (Tyler et al., 2014). Infection is being spread to others because those infected receive little education on HCV and are not aware they have it, nor the debilitating symptoms that can occur with chronic infection (Tyler et al., 2014). HCV, as well as homelessness, is a world-wide issue with an estimated 71 million chronic infections globally (World Health Organization [WHO], 2019a). Therefore, the WHO has implemented a global initiative of

eliminating HCV as a major global health threat by reducing new HCV infections by 90% and reducing HCV deaths by 65% between now and the year 2030 (World Health Organization [WHO], 2019b).

Research has shown how homelessness is an independent risk factor for HCV infection due to the high rates of IVDU among the homeless (Strehlow et al., 2012). This association has led to several research studies looking at how to improve HCV knowledge and increase treatment among homeless adults (Grebely et al., 2019). Some homeless shelters in large urban areas have partnered with public health departments to staff advanced practice providers, nurses and pharmacists within the shelters to help clients with medication adherence and access to healthcare. Hennepin County's Healthcare for the Homeless program is one example of this type of partnership in Minneapolis, Minnesota (National Healthcare for the Homeless Council, n.d.). With an estimated 5,500 homeless people in Hennepin County, it is important to understand what methods can be used to increase HCV awareness, testing, and treatment to decrease rates of HCV transmission (National Healthcare for the Homeless Council, n.d.). The research currently trending shows community outreach through onsite clinics at homeless shelters as a developing approach to ensuring a pathway to better healthcare in this high-risk group. This trend is seen specifically in HCV research being done in large cities around the world such as Boston, Los Angeles, Philadelphia, Sidney, Australia and Tehran, Iran (Alavi et al., 2019; Coyle et al., 2015; Coyle et al., 2019; Bajis, 2019; Beiser, Smith, Ingemi, Mulligan, & Baggett, 2019; Fuster & Gelberg, 2019). The goal of this research study is to show that a model supporting HCV education and point of care testing within two Minneapolis homeless shelter clinics can effectively link HCV infected homeless adults to treatment while providing a model

for continued care for other health concerns related to homelessness. The following abbreviations as shown in Table 1 will be used throughout the rest of this review.

Table 1

Common Abbreviations Used in HCV Research

Abbreviation	Meaning
CDC	Center for Disease Control and Prevention
DAA	Direct-acting antiviral
EOT	End of treatment
HCV	Hepatitis C virus
IV drugs	Drugs that are inserted intravenously
IVDU	Intravenous drug use
NSP	Needle and syringe program
OAT	Opioid agonist therapy
OUD/SUD	Opioid use disorder/substance use disorder
POC	Point of care
PWID	People who inject drugs
RNA	Ribonucleic acid
SMA	Shared medical appointment
SVR12	Sustained viral response 12 weeks post-treatment
VA	Veteran's Administration
WHO	World Health Organization

Significance to Nursing

Nurses work in a variety of healthcare settings and are often in the role of screening and educating patients. Patients with Hepatitis C infection are not always clinically ill (CDC, n.d.). Therefore, initiating screening guidelines to determine risk factors is the best way to determine if a patient should be tested for this infection (Pilger & Costanzo, 2018). Before the Centers for Disease Control and Prevention (CDC) published the recommended screening guidelines for Hepatitis C in 2012, this infection was predominantly viewed as a health issue for PWIDs (people who inject drugs) (Pilger & Costanzo, 2018). This led to a misconception that all HCV infected patients had used IV drugs (as cited in Pilger & Costanzo, 2018). Although IVDU increases the risk for acquiring HCV, it is not the only risk factor. Receiving blood transfusions or organ transplants before 1992 increased the risk of HCV exposure along with many other factors (Pilger & Costanzo, 2018). Currently, the CDC recommends screening for HCV for:

> Anyone who was born between 1945-1965, history of IV drug use, those who received blood or organ transplant prior to 1992 or blood clotting products before 1987, anyone born to a mother with HCV, a known exposure to HCV, and anyone with elevated alanine transaminase. (as cited in Pilger & Costanzo, 2018, p. 71)

Understanding and identifying patients who could be at risk for Hepatitis C infection are important elements in providing better health outcomes for our patients, which will inevitably lead to better overall public health. Knowing all the risk factors for HCV allows nurses to educate patients about the infection, eliminate associated stigmas, and recommend screening.

There are two blood tests used to identify exposure to HCV. The anti-HCV test is used for screening and identifies antibodies, but this does not confirm infection (Pilger & Costanzo, 2018). Positive anti-HCV tests should be followed up by HCV ribonucleic acid (RNA) testing

that confirms infection (Pilger & Costanzo, 2018). Nurses should be aware that antibodies for HCV show past exposure, but about 25% of people clear infections on their own (Pilger & Costanzo, 2018). HCV RNA is also used to confirm a cure. According to the American Association for the Study of Liver Diseases (AASLD) (2017, Table 2), "Quantitative HCV viral load testing is recommended 12 or more weeks after completion of therapy to document a sustained viral response (SVR) (cure)." Some Hepatologists will test response at the end of treatment since testing for a negative HCV RNA provides an indication that the patient has adhered to treatment (J. Powell, personal communication September 4, 2019). However, because relapse can occur after treatment, a second blood test should always be done 12 weeks after treatment completion to confirm a sustained viral response (SVR12) (AASLD, 2017). Studies being done with treatment compliant participants show less than 10% of those treated with DAA agents do not achieve SVR12 (Yek et al., 2017). When patients test positive for HCV, it is important for nurses to be able to explain the treatment as well as the importance of the blood tests to ensure a cure is achieved. Achieving SVR12 is very important because eradicating the HCV infection will decrease the risks of developing cirrhosis and hepatocellular cancer (HCC), significantly improving the patient's quality of life (Yek et al., 2017).

Before 2012, HCV treatment involved an immunomodulating therapy called Interferon and was combined with oral Ribavirin (Yek, et al., 2017). The treatment lasted for up to 48 months, had many intolerable physical, neurological and psychiatric side effects, and provided only a 50% chance of obtaining an SVR (Yek et al, 2017). Incidentally, there was only a 20% chance of achieving SVR12 if the patient was African American (J. Powell, personal communication, September 4, 2019). Through personal correspondence with patients formerly treated with Interferon therapy and being re-treated with the DAA agents, I have found that

patients are mostly concerned about experiencing side effects similar to those of Interferon**.** Because HCV treatment has become much more accessible with new DAA oral treatments, it is important for nurses to explain the treatment to patients who have acquired a new HCV infection or did not achieve SVR12 with prior therapy, so they understand how much shorter, tolerable, and effective treatment has become.

Theoretical Framework

The ultimate goal of Hepatitis C treatment is to cure HCV infection and improve one's overall health and eliminate the spread of this infection to others. The literature review regarding the need to increase awareness of Hepatitis C infection among the homeless to promote testing and treatment is well supported by Nola Pender's Health Promotion Model (HPM). This theory is based on the two human behavior theories, Fishbein & Ajzen's Expectancy Theory and Bandura's Social-Cognitive Theory (McCullagh, 2016). Expectancy Theory suggests that achieving a goal is based on its perceived value and benefits while Social-Cognitive Theory explores the need for self-efficacy to engage in behavioral change (McCullagh, 2016). The HPM provides a framework of behavioral cognitions that the nurse must consider, such as the patient's lifestyle and commitment to discontinue risky behaviors while being treated and after treatment. The nurse can evaluate for situational and personal influences that might prohibit behavioral changes needed for better health outcomes (McEwen, 2014). Patients living in homeless shelters have several barriers that prevent them from committing to healthy behaviors. Being uneducated about HCV infection, combined with homelessness, lack of insurance, chemical addictions, mental illness, competing priorities, social influences, and transportation issues all affect the client's ability to commit to a plan for HCV testing and treatment. Pender's revised 2006 model acknowledges that past experiences, along with personal issues, are major motivating factors in

committing to a health promotion plan and suggests that nurses can direct the patient towards interventions that are specific to the client's needs (McEwen, 2014). By implementing treatment readiness visits with homeless clients interested in starting medications, the nurse is able to screen for specific barriers that could prevent a patient from being compliant. During these visits, the nurse can have a conversation with the patient to understand their own unique challenges to completing treatment. My experience working with HCV patients has shown that clinic visits with a nurse prior to starting treatment have helped to expose and solve issues that could be problematic in treatment uptake and adherence.

Additionally, Pender's model is intended to increase the level of wellness for an individual, group or community (McCullagh, 2016). Therefore, HPM is a model that can be applied to both the wellness and education of Hepatitis C at the community level in homeless shelters and help evaluate treatment readiness for each individual patient. Applying Pender's model to homeless patients in promoting awareness and education regarding HCV risk factors can assist in implementing a comprehensive program that leads to increased HCV testing and instills self-efficacy among clients to make informed decisions regarding treatment and avoid re-infection.

Summary

Although achieving a cure is easier with DAA therapies, getting marginalized populations through treatment remains a challenge as noted by the research done by Yek et al. (2017). For the homeless, there are many barriers preventing effective treatment such as substance abuse, stable housing, keeping medications secure, lack of insurance, and transportation issues. Nurses can assist in educating vulnerable populations about HCV so they

can make informed decisions about testing and treatment and help them find solutions to treatment barriers.

Chapter Two: Methods

There has been an increasing interest among the medical and public health communities to test and treat the homeless population for Hepatitis C with the development of the new tolerable and effective DAA agents to help meet the World Health Organization's goal of eliminating HCV by 2030 (Grebely et al., 2019). However, Masson et al. (2013) found that individuals reporting homelessness were least likely to follow through with HCV evaluation. Additionally, even when the homeless ae linked to care, completing treatment and obtaining SVR12 rates remains difficult in many homeless populations, especially those who do not frequent shelters (Harney et al., 2019). In an attempt to identify healthcare models that are successfully treating homeless adults with HCV, a comprehensive search for articles examining this issue was completed. This chapter discusses how the search was defined and the types of research studies reviewed to answer the clinical question.

Search Strategies

A literature search was conducted using the Cumulative Index to Nursing and Allied Health Literature (CINAHL), Scopus, Science Direct, Cochrane Database of Systematic Reviews, and PubMed to address the clinical question: What type of healthcare model is most effective in providing access to comprehensive HCV treatment with SVR12 for the homeless? Terms searched included: homeless, Hepatitis C, Hepatitis infection, nurse, linkage to care, health promotion, education, direct-acting antiviral (DAA) medication, and SVR12. Due to the high prevalence of Hepatitis C infection from IVDU within the homeless and underserved populations, research regarding this issue was very accessible. A search using "Hepatitis C and homeless" together yielded 42 results on Scopus, 98 results on CINAHL, and 254 results on PubMed. Therefore, the additional terms "education" and "linkage to care" was combined with

"Hepatitis C and homeless" when entered into the search engines to narrow the findings to relevant research regarding the practice question. This yielded 85 results. To further refine the search, a limit of 8 years (2010-present) was applied to CINAHL and Scopus and a limit of 5 years (2013- present) was applied to PubMed; this yielded 58 total studies. Additionally, another search using ScienceDirect was done combining the terms "Homeless" "Hepatitis C" and "SVR12" or "Nursing" with a parameter of years 2015 -2019. This search resulted in 11 very recently published studies. These parameters kept the information relevant to the new era of treating HCV infections with DAA oral medications in homeless populations.

Inclusion and Exclusion Criteria

The majority of the studies selected were published within the last five years, providing the most current research related to the clinical question. In addition, any of the studies that addressed the issue of HCV treatment would be using the more tolerable DAA oral treatments. The studies were excluded if patients were treated with outdated HCV therapies, such as Interferon combined with ribavirin, with the exception of one study that was kept for the high-quality research it provided regarding factors related to homelessness and healthcare follow through. The inclusion criteria for the studies selected required that the study population include homeless participants, and one or more of the following; HCV education, linkage to care related to HCV testing and treatment, and SVR12 rates. This further reduced the number of relevant studies to 18 (see Table 2) that have been reviewed to answer the posed clinical question.

Criteria for Evaluating Research Studies

The evidence presented in the articles was appraised by both the level and quality, using tools from the *Johns Hopkins Nursing Evidence-Based Practice: Model and Guidelines* (Dang & Dearholt, 2018). The Johns Hopkins Research and Non-Research Evidence Appraisal Tools

assisted in organizing the articles by research or non-research, then further categorizing them by the type of research; Experimental (Level 1), Quasi-experimental (Level 2), Non-experimental and qualitative (Level 3), Practice guidelines (Level 4), or Expert opinion (Level 5) (Dang & Dearholt, 2018). Additionally, each article was independently assessed for high quality, good quality, and low quality/major flaws using the ratings provided in the John Hopkins Quality Guide (Dang & Dearholt, 2018, p. 278-279). The articles and findings are organized using Garrard's matrix model (Garrard, 2017) (see Appendix 1).

Number and Types of Studies Selected for Review

Level I articles are randomized control trials. Level II articles are quasi-experimental studies. Level III studies consisted of 12 non-experimental studies and one systematic review. There were no Level IV or V studies used in this review. Table 2 shows the breakdown of each level and associated quality for the 18 studies.

Table 2

Levels and Quality of Research

	Quality		
Level	High	Good	Low
I	2	1	0
II	1	1	0
III	6	7	0

Summary

This chapter highlights the process used to select the articles in this critical review of nursing literature. It explains how the articles were obtained using a variety of scholarly research engines, how the literature was categorized using the John Hopkins Evidence-Based Research and Appraisal Tool (Dang & Dearholt, 2018) and the inclusion and exclusion criteria used to select the 18 articles reviewed for the matrices.

Chapter Three: Literature Review and Analysis

The selected articles are alphabetically presented using Garrard's Matrix Model (2017) (see Appendix 1). The matrix model includes the article title, purpose for the research, sampling and setting, design method, conclusion, strengths, limitations, results and the level and quality of evidence as appraised the John Hopkins Level of Evidence and Appraisal Tool (Dang & Dearholt, 2018). The Level I studies support the importance of providing HCV education as a pathway to treatment. There are two quasi-experimental, Level II, studies that both compare two different healthcare models and their impact on HCV treatment outcomes among homeless populations. The 13 Level III studies include a variety of non-experimental studies and one systematic review. These studies looked specifically at healthcare models being used to test and treat HCV infection among underserved populations, including the homeless. This chapter will discuss the synthesis of the major findings regarding HCV healthcare models for the homeless, as well as the limitations and strengths of the research reviewed.

Synthesis of Major Findings

The United States is not the only country experiencing a high HCV disease burden among its homeless population. Global rates of HCV infection among the homeless are estimated to be between 4 to 36% (Grebely et al., 2019). Four of the 18 articles reviewed include healthcare models for treating HCV infection among homeless populations outside the United States. These studies were conducted in Melbourne and Sidney Australia; Tehran, Iran, and Dublin, Ireland. The ideal healthcare model for targeting and treating the HCV infected homeless populations with DAA medications continues to be explored through ongoing global research.

The research reviewed reveals themes that appear within the HCV healthcare models in an attempt to get patients through the HCV care continuum. The most prominent themes

observed from the healthcare models reviewed are: Providing education increases awareness, knowledge gain, and HCV testing; POC testing and onsite treatment have better outcomes than POC testing and linkage to care off-site; the level of support provided can impact HCV treatment outcomes; treating homeless clients who currently inject drugs has the potential to decrease disease burden; and homelessness is the most significant barrier to completing the HCV care continuum.

The care continuum is a series of steps that must happen to successfully treat the HCV patient. The healthcare continuum for viral hepatitis according to the WHO consists of prevention, screening with linkage to care, and treatments (as cited in Heffernan et al., 2017) (see Figure 1). Figure 1 explains the HCV care continuum and illustrates how the number of homeless clients actively engaged in HCV care decreases with each stage.

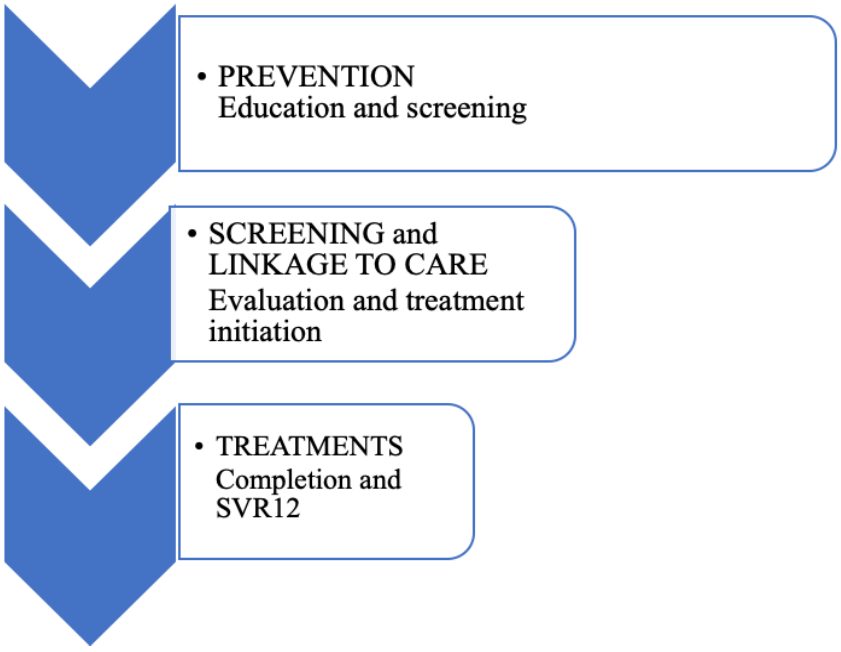

Figure 1. HCV care continuum. Adapted from "Aiming at the Global Elimination of Viral Hepatitis: Challenges Along the Care Continuum," by A. Hefferman, E. Barber, N. A. Cook, A. Gomaa, Y. Harley, C. R. Jones, … S. D. Taylor-Robinson, 2018, *Open Forum Infectious Diseases, 5*(1), p. 2. Copyright 2017 by Oxford University Press.

HCV Education

Research regarding HCV has found that providing education increases awareness, knowledge gain, and testing. Grebely et al. (2019) systematic review of 21 original research studies, two systematic reviews, and three expert opinions acknowledge that a lack of HCV knowledge prevents testing and treatment. Three out of the 18 studies for this review of literature looked specifically at education techniques and their effectiveness in educating homeless adults about HCV. Additionally, another eight studies reviewed indicate that a pre-test, post-test, initial education or counseling was provided to patients as part of the HCV treatment model. Level III research with high quality done by Norton et al. (2014) exemplifies why

providing HCV education for the homeless should be included in healthcare treatment models. Norton et al. (2014) assessed the knowledge gain of 140 participants from two homeless shelters, two drug and rehabilitation centers, and a women's drop-in shelter after participants were provided a 15-minute verbal discussion regarding HCV prevention, testing, clinical importance, and treatment. The research outcomes showed baseline HCV knowledge was low, and participants had many misconceptions regarding how HCV is spread. Sixty-five percent of the participants thought there was no cure for HCV. Significant knowledge gains ($p < 0.05$) in the categories of how the infection is spread, what makes the infection worse and understanding treatment were achieved with a significance of $p < 0.0074 - 0.0001$ (Norton et al., 2014). Additionally, Norton et al. (2014) findings showed increasing HCV knowledge among homeless adults led to an increase in HCV testing although treatment was not offered in correlation with the study. Alavi et al. (2019) showed that after education was provided to their participants, 97% of HCV infected homeless participants surveyed (n=22) were willing to be treated after receiving the education and 87% initiated HCV treatment.

Masson et al. (2013) research consisted of a randomized control trial (RCT) of 489 participants from two methadone treatment clinics located in New York and San Francisco with 40% reporting homelessness in the past six months. Their research concluded that the intervention group receiving motivational interviewing (MI) enhanced counseling regarding Hepatitis was more likely to complete Hepatitis A (HAV) and B (HAB) vaccines offered on-site, have greater reductions in alcohol use, and receive HCV evaluations sooner when compared to the group who received the standard education with off-site referral for vaccines and HCV evaluations. However, participants reporting homelessness in the past six months were less likely to attend the initial HCV evaluation (Masson et al., 2013). Larios et al. (2104) RCT also looked

at MI and its effectiveness in HCV knowledge gain and retention among 440 participants at the same two sites studied by Masson et al. (2013). It was concluded that MI enhanced education provided by MI trained staff did not provide an additional gain in knowledge when compared to a nurse-led standard education intervention (Larios et al., 2014). Lastly, a RCT study by Nyamathi et al. (2013) assessed the impact of a nurse led cognitive health promotion program (HPP) versus an arts therapy program for improving HIV and hepatitis knowledge and overall mental health for 156 homeless youth and young adults, ages 15-25 (median age 21.1) currently using drugs and frequenting a homeless drop-in shelter. This study showed just a bit more improvement of HIV ($p < .001$), HBV and HCV ($p < .001$) knowledge and psychological wellbeing with those who participated in the nurse led HPP versus the arts therapy program.

Although some of the studies also include education on HIV and HBV infections, conclusions drawn from this research indicate the importance of education regarding HCV transmission, testing, and treatment in improving knowledge about HCV and increasing interest in HCV testing regardless of the teaching style used. None of these studies followed participants through HCV treatment to understand the effect of education on treatment adherence. The research reviewed indicates that education is only a piece of this very complicated healthcare issue and cannot solely drive the homeless towards testing and treatment. This research suggests that in addition to homeless shelters, community-based primary care clinics and opioid treatment centers are appropriate places to educate at-risk populations about HCV (Norton, et al., 2014; Masson et al., 2013). Incorporating education, understanding treatment barriers and providing on-site testing are initial steps that can help control HCV disease burden (Norton et al., 2014).

POC Testing and Linkage to Care

Ten of the 18 studies reviewed are Level III non-experimental studies that presented research using models for treating homeless adults with HCV through shelters, community clinics, SUD clinics, and referrals to off-site specialists. The research indicates that POC testing and onsite treatment show better outcomes than POC testing and linkage to care off-site (Coyle et al., 2019). Grebely et al. (2019) systematic review showed that POC HCV testing and treatment increases overall uptake of HCV treatment. Coyle et al. (2015) study recognized that having on-site HCV RNA testing and treatment teams yielded higher rates of completing referral appointments because all services were offered in the same setting. This study did not follow participants through treatment and SVR12.

Sena et al. (2016) demonstrated that linkage to HCV care was improved among underserved populations when the Department of Health sites already testing for HIV, HCV and STD infections in Durham Country, NC began treating HCV infections. In this study, 241 out of 2,004 tested for HCV were positive with the highest percentage of chronic HCV infection among the homeless (Sena et al., 2016). Many of the participants were not attending their off-site clinic visits for evaluation and treatment. Therefore, the center began treating at the POC test sites. Consequently, 81.7 % of participants received HCV results and counseling and 91.8% of patients attended their first appointment (Sena et al., 2016).

Coyle et al. (2019) compared HCV treatment and cure rates between four federally funded HCV test only sites and one test and treatment center in Philadelphia, PA (n=885). The results found similar results to Sena et al. (2016) regarding high rates of breaks in treatment with referrals to off-site treatment centers and higher prevalence rates of HCV infection seen in sites serving the homeless. Additionally, Coyle et al. (2019) followed patients through treatment and

found that their test and treat centers had SVR12 achievement rates that were six times that of test only sites. Notably, the homeless participants were treated through the test only site and SVR12 rates from those sites were only 2.5% (Coyle et al., 2019).

Lastly, qualitative research with high quality by Lambert et al. (2019) regarding HCV burden among the homeless in Dublin, Ireland noted that only 46 out of 199 Hepatitis C antibody positive participants actually received a referral to hospital-based care for confirmation testing and treatment, of which 21 attended two or more appointments. Consequently, only two treatment completions were seen (Lambert et al., 2019). Lambert et al. (2019) did note that their research was done during a homeless crisis which affected the amount of support provided for participants in the referral process and providing on-site treatment for Hepatitis C was not an option in Ireland at the time of the study.

Overall, recommendations from the studies reviewed in this section suggest expanding on-site HCV test and treat centers to avoid a loss to follow up by referring to off-site providers. However, more research is needed to provide information regarding the hurdles to on-site treatment, as seen in Ireland (Lambert et al., 2019).

The Impact of HCV Treatment Support

The level of support given can impact HCV treatment outcomes by controlling barriers to treatment. As discussed in chapter one, competing priorities and transportation issues can considerably affect the homeless client's ability to commit to a plan for HCV testing and treatment. Grebely et al. (2019) concluded from their systematic review regarding Hepatitis C infection among PWID that barriers to treatment must be understood to provide equitable HCV healthcare.

The Coyle et al. (2015) study regarding the initiation of an HCV care coordination model between five federally funded qualified health centers (FQHC) serving the homeless in Philadelphia, Pennsylvania used reflex testing to immediately test persons with positive HCV antibodies (n=4,514) for HCV RNA. Patients with HCV RNA were connected to a care coordinator for treatment on-site if available or through referrals to an off-site treatment clinic. Coyle et al. (2015) research showed that implementing a care coordinator to provide intensive services, such as rescheduling missed appointments and addressing barriers to care, was instrumental in increasing the number of patients receiving their results by almost 70%, referrals for treatment by 49.2%, and the number of patients being seen by a specialist by 29.6%.

Hodges, Reyes, Campbell, Klein, and Wurcel's (2019) quasi-experimental research looked at SVR12 results between patients from a community health center serving high numbers of homeless patients who selected a shared medical appointment (SMA) with their peers during HCV treatment versus those who choose an independent appointment. The SMA model provided peer support which helped to decrease HCV stigma and encourage healing (Hodges et al., 2019). Although both groups had high rates of treatment completion, participants in the SMA model had a higher rate of SVR12 than in the independent appointment model, 91% to 69% respectively (Hodges et al., 2019). Additionally, this model treated HCV patients where their substance use disorders (SUD) were being managed which may have positively influenced treatment adherence by participants (Hodges et al., 2019).

Another study by Beiser et al. (2019) assessed the HCV care continuum from treatment initiation to SVR12 for 300 predominantly nonwhite males who were either homeless (n=84) or living in transitional treatment facilities Boston, Massachusetts. Beiser et al. (2019) provided adherence support through a nursing care coordination model ranging from monthly, weekly, and

daily reminder calls to medication storage; and weekly pill box fills with follow up pathology at four weeks, EOT, and SVR 12. The study yielded impressive results with 255 achieving SVR 12 out of the 300 who initiated treatment (Beiser et al., 2019). Beiser et al. (2019) concluded that designated nursing support positively impacts medication adherence and cure rates for the homeless.

Read et al. (2017) quasi-experimental study looked at outcomes of DAA treatment using two different adherence models, enhanced and standard, at a primary health care setting in Sydney, Australia. Thirty percent of the patients in the study had been homeless in the past year and 44% reported injecting drugs at least weekly (Read et al., 2017). Standard support allowed the patient to pick up and administer their medication independently with a call from a nurse coordinator ensuring they initiated treatment and followed through with the standard lab work at four weeks, EOT, and SVR12 (Read et al., 2017). Level of support was decided between the nurse and patient and based on "patient's drug use, social stability, ability to store medication safely, and success in prior medication adherence" (Read et al., 2017, p. 210). Twenty-five out of 72 participants elected enhanced support, where a nurse provided weekly phone calls to ensure medication adherence, observed daily, weekly or monthly administration of medications, and partnered with prisons, psychiatric units or hospital units to deliver medications to patients (Read et al., 2017). Overall, 19 (n=25) participants achieved SVR 12 with enhanced support (Read et al., 2017). Fifty-nine participants achieved SVR12 overall from both groups, although 47 % attended SVR12 testing over four weeks late (Read et al., 2017). These results indicate that HCV care support is essential for achieving post-treatment follow up for marginalized populations and enhanced support may be critical in getting patients through treatment who would otherwise be lost to follow up (Read et al., 2017).

The studies reviewed in this section indicate that providing HCV care coordination for the homeless appears to increase treatment adherence, completion and SVR12 testing by eliminating barriers that cause loss to follow up. These studies indicate that high levels of support can help control treatment barriers and improve the completion of the HCV care continuum among the homeless. However, the studies reviewed suggest that more research is needed in all areas of HCV treatment models for the homeless to truly understand what part of the support model is most influential in completing the care continuum.

Treating PWID to Reduce Disease Burden

As discussed earlier, research has shown how homelessness is an independent risk factor for HCV infection due to the high prevalence of IVDU (Strehlow et al., 2012). Yet, the research indicates that treating the homeless who continue to use drugs has the potential to decrease disease burden although reinfection can occur. Several studies in this review show that people using IV drugs are highly motivated to cure their HCV infection and complete treatment and that substance abuse is not a barrier to treatment (Alavi et al., 2019; Bajis et al., 2019; Beiser et al., 2019; Read et al., 2017; Williams et al., 2019). Specifically, Williams et al. (2019) qualitative study looked at themes that motivated PWID to complete DAA treatment within a life project analysis. The study was done between two groups in Portland, Oregon receiving HCV treatment from a homeless clinic and either receiving OAT or partaking in a needle and syringe program (NSP) (Williams et al., 2019). Both groups identified removing the social stigma, improved self-worth, and the ability to care for themselves as the result of completing HCV treatment (Williams et al., 2019). In the Beiser et al. (2019) study there was no significance ($p < 0.05$) between opioid use disorder (OUD) and missing doses of medication ($p < 0.375$).

The research also indicates that SVR12 can be achieved among PWID. Read et al. (2017) showed high rates of SVR12 achievement among a group of participants with 44% reporting weekly IV drug use. Grebely et al. (2019) systematic review also found that recent injection drug use did not affect SVR12. Although Beiser et al. (2019) identified a CI of 95% for both treated and untreated opioid use disorder (OUD) as having lower odds of achieving SVR12, high percentages of SVR12 in both groups (82.8 % untreated OUD and 87.1% treated OUD obtained SVR) was achieved. Alavi et al. (2019) identified in their research that 100% of participants who had injected drugs within the last 12 months (n=13) initiated HCV treatment. Consequently, 62% (n=8) completed treatment and achieved SVR12, four were lost to follow up and one participant relapsed.

There was only one Level III study with good quality by Dever et al. (2017) regarding HCV engagement among Veterans (reporting homelessness within the past five years) that showed with significance ($p < 0.05$) that alcohol and drug use within the prior year of being offered HCV treatment affected one's ability to engage in care ($p=0.045$).

Study recommendations suggest that HCV treatment models should be targeted to support PWID in an attempt to decrease disease burden worldwide. However, more research will need to be done regarding reinfection rates to understand if disease burden is being positively affected by treating people who continue to inject drugs (Grebely, et al., 2019).

Impact of Homelessness on HCV Care Continuum

The research in this literature review points to housing instability as the most significant barrier to completing the HCV healthcare continuum. All the Level III studies considered for this review of the literature included participants that reported being homeless in the past five years, the past year, or were currently homeless at the time that study took place. Dever et al. (2017)

looked at socio-demographic characteristics and comorbidities related to HCV treatment engagement among participants (n=202) from a Veteran Affairs (VA) hospital in San Diego, CA. Dever et al. (2017) showed being homeless within the last five years was the most significant of all socio-demographic variables ($p<0.001$) for not engaging in HCV treatment. Read et al. (2017) univariate analysis showed homelessness in the past year was the only factor influencing loss to follow up, SVR12 data, and delayed SVR12 testing. Additionally, Read et al. (2017) showed no correlation between the loss to follow up during HCV treatment and IVDU among 72 participants reporting IVDU in the past six months.

Beiser et al., 2019 identified significant predictors of SVR12 using multivariate modeling between HCV untreated (n=210) and treated (n=300) predominantly non-Hispanic white males with 29% reporting homelessness. This research showed that loss to follow up and social instability were the most common reasons for not initiating HCV treatment (Beiser et al., 2019).

Bajis (2019) evaluated SVR12 results for HCV treatment provided at a test and treat clinic adjoined to a homeless shelter in Sidney, Australia for men age 18 and older (n=47) that reported unstable housing (couch surfing, crisis center, shelter). A high percentage reported being street homeless (n=28). This research showed 23 participants finished treatment, but only a known 15 participants achieved SVR12; the other eight participants never returned to be tested (Bajis, 2019).

Harney's et al. (2019) study evaluated a pilot-nurse led model of care for two homeless services looking to increase HCV treatment initiation at two inner-city homeless shelters with one on-site clinic, located in Melbourne, Australia. The study evaluated the relationship of initiating DAA treatment and achieving SVR12 with associated factors that could affect treatment outcomes among 39 participants, predominantly non-indigenous males (Harney et al.,

2019). Through the study, 24 participants started treatment and 13 achieved SVR12 (Harney et al., 2019). Harney's et al. (2019) research showed with significance ($p < 0.05$) that sleeping rough or "on the street" prior to engaging in treatment ($p < 0.019$) contributed to lower rates of treatment completion and SVR12 compared to other types of homelessness.

Fuster and Gelberg (2019) study regarding a model of HCV care for the homeless, the majority being adult black men on Skid Row in Los Angeles, California ($n = 174$), were screened and counseled for HCV infection then referred to primary care for treatment. This study showed that having slept in a shelter the night before the clinic visit was a significant factor in attending the primary care visit, with 74.5% of participants following through to receive test results and initiate treatment (Fuster & Gelberg, 2019).

Lastly, qualitative research conducted by Lambert et al. (2019) in Dublin, Ireland regarding barriers associated with attending off-site referrals for HCV treatment indicated that housing instability was the most common barrier to attending appointments and starting treatment. Recommendations from these studies include exploring innovative ways to increase adherence to treatment, follow up, and SVR12 testing by bringing the care to the homeless and tailoring services to meet their needs (Dever, et al., 2017; Grebely, 2019).

Strengths and Limitations

A major strength of the research is that all 18 studies indicate that understanding HCV treatment barriers among the homeless is vital in developing HCV treatment models that can decrease disease burden within this population. Research from three level I studies, and one level III study showed how providing HCV education, regardless of the educational method, significantly increased HCV awareness and testing. The level III studies are all of the high or good quality and show similar results regarding qualitative data indicating that PWID and/or

homeless are very interested in getting HCV treatment to improve their health. Both the level II studies and the 13 Level III studies evaluating treatment models recognized the importance of enhanced support for improving outcomes at all stages of the HCV care continuum for those who are homeless and/or inject drugs. The research is also in agreement that being homeless affects HCV treatment outcomes more than IVDU. Additionally, the Level II studies and the thirteen level III studies reviewed looked at providing HCV treatment for the homeless in a variety of countries and settings, including primary care clinics, community care clinics, SUD (substance use disorder) clinics, and on-site homeless shelter clinics. This provided a wide range of data regarding HCV care models currently being used to target and treat at-risk populations worldwide, with special attention to both PWID and/or the homeless.

A major limitation of the research in this review is that there were only four studies where the entire sample population was reporting homelessness (Bajis, 2019; Harney et al., 2019; Lambert et al., 2019; Nyamathi et al., 2013). The other 14 studies reviewed included research among a sampling of underserved at-risk populations which included homeless participants. Additionally, the sample population in all 18 studies was predominantly homeless adult men often with a ratio of men to women of 2:1 or greater. Although this might be representative of the homeless demographic, we cannot assume that homeless adult women would present along the HCV care continuum exactly as their male cohorts. Eight out of the 18 studies did not follow participants through treatment completion and/or discuss SVR12 results. The aim of this literature review is to determine what type of healthcare model is most effective in providing access to comprehensive HCV treatment with SVR12 testing for the homeless population. It's important to note that not all of the studies reviewed followed participants through treatment completion and SVR12 which limits the conclusions that can be drawn

regarding their efficacy. Additionally, in some studies, incentives such as gift cards were provided for participants for following through with the care continuum which would not be offered in the "real-world". Whether this affects motivation to continue treatment and return for SVR12 testing needs further investigation.

Another limitation is the generalizability of the outcomes to other high-income, or mid-low-income countries. The actual cost of the HCV healthcare models used in the studies was not discussed. Because the research was funded from either pharmaceutical companies or government grants, it is unknown if any of HCV healthcare models reviewed, especially those that included intense support, would be economically feasible in all geographical locations. Some of the research done outside the United States (US) indicates that the medications were paid for by the country's government. However, HCV medications in the US research were supplied by the pharmaceutical company or the participant's own health care insurance. Those who were uninsured were assisted in getting access to insurance through State aid which can add administrative costs to providing HCV care.

Summary

This chapter includes a synthesis of major findings and recommendations of the 18 studies selected for this critical review of the literature. The Matrix method (Garrard, 2017) was used to organize the findings. The major findings were categorized into themes related to HCV healthcare models displayed in the research. The strengths and limitations of the studies reviewed were also discussed.

Chapter 4: Discussion, Implications, and Conclusion

This chapter will reexamine the clinical question, What type of healthcare model is most effective in providing access to comprehensive HCV treatment with SVR12 for the homeless? The synthesis of research from the 18 articles reviewed agree that underserved populations are hard to treat due to the social and economic burdens that coincide with homelessness. This information obtained from this literature review will be synthesized to identify the necessary components needed in a healthcare model for treating HCV among the homeless. Current trends and gaps in the literature will be discussed as well as recommendations for further research. Additionally, Pender's Model of Health Promotion in conjunction with Fishbein and Ajzen's Expectancy Theory and Bandura's Social-Cognitive Theory will be used to discuss implications and recommendations for nursing practice as it relates to providing enhanced support in treating HCV among the homeless.

Synthesis of Literature

The clinical question guiding this review of literature is, What type of healthcare model is most effective in providing access to comprehensive HCV treatment with SVR12 for the homeless? Many of the models reviewed in the literature achieve treatment uptake and adherence through a variety of methods. However, four prominent features of HCV healthcare models for the homeless were found within the18 articles reviewed. These components included:

- HCV POC testing and education at shelters, community clinics, and SUD clinics increased awareness and interest in treatment
- Treatment support through a nurse coordinator or patient navigator is essential for getting patients through the HCV care continuum

- Providing the entire HCV care continuum at shelters, community clinics, and SUD clinics had better outcomes than referring to off-site treatment
- Homeless clients using IV drugs should be considered for treatment to decrease disease burden

Trends in the Literature

Being homeless was found to have the greatest impact on treatment uptake and completion. This is why a comprehensive model providing education, POC testing, evaluation, and onsite treatment at shelters, community clinics, or SUD clinics with strong adherence support is critical in treating the homeless population for HCV. The on-site treatment removes many barriers, such as transportation, that exists with off-site referrals (Sena et al., 2016). The models reviewed all mention some form of care coordination, with many using nurses as patient navigators to assist with appointment reminders, transportation issues, administration of medications, housing instability, and health insurance issues in an attempt to decrease barriers that compete with treatment completion. By broadening the HCV treatment care team from off-site specialists to advanced practice practitioners (APP) and general practitioners (GP) staffing community clinics and homeless shelters, access to HCV treatment is occurring globally (Grebely et al., 2019). Additionally, due to the high prevalence of IVDU among the homeless, many of the reviewed HCV treatment models are testing and treating the homeless patients with HCV at SUD clinics as well. Regardless of being homeless, using drugs or having a mental illness, research shows that there is still a desire to seek healthcare (Fuster & Gelberg, 2019). This desire for good health helps support the research seen in this review indicating that those who use IV drugs are able to achieve SVR12. Additionally, treating people currently injecting

drugs has the potential to decrease disease burden at greater rates and meet the WHO's goal (Grebely, 2019).

Gaps in the Literature

RCT trials regarding treatment models were lacking, perhaps due to the ethics of treating an underserved population known to be facing an HCV epidemic. Many of the studies showed treatment completion and even SVR12 was possible among the homeless even though treatment uptake and completion remain suboptimal when compared to populations who are not homeless. This is most likely due to their complex social needs (Bajis, 2019). More studies regarding HCV treatment and concurrent homelessness would be useful in understanding "real-time" treatment barriers for this population. Additionally, more research is needed to fully understand how best to tackle HCV treatment for street homeless versus sheltered homelessness. Enhanced support for the homeless was utilized in several of the studies, but more qualitative research would be useful in understanding what component of the support model is most impactful for treatment completion and controlling loss to follow up. Consequently, it's not fully understood at this time if treating people who are homeless and concurrently using IV drugs without SUD support is effective. More research is also needed before knowing whether treating PWID will decrease the burden due to the risk of reinfection (Grebely et al., 2019). In regard to cost-effectiveness and treatment uptake, additional research comparing countries where government funding is available for HCV treatment versus countries where medical insurance enrollment is required would provide important information on tackling the insurance barrier seen in the U.S.

Integration of Theoretical Framework

The application of Pender's Health Promotion Model (HPM) to the WHO's goal of decreasing HCV infection significantly worldwide by 2030 can be used to assist nurses in making this goal a reality. According to McCullagh (2016), HPM has not been tested in situations with unstable living conditions. However, there is still much to consider about this nursing theory and how it applies to the HCV treatment models for the homeless. According to Pender's HPM, individual characteristics and experiences will influence behavioral changes related to health (McCullagh, 2016). This helps to explain why some clients may initiate HCV testing and treatment after receiving HCV education and others decide not to. The research shows how enhanced support helps a client through the HCV continuum. Pender's theory suggests that nurses can be the agent that helps lead the client through behavioral changes that promote improved health (McEwen, 2014). Regarding HCV support, the nurse can use the HPM to assess clients for perceived benefits, perceived barriers, perceived self-efficacy, as well as interpersonal support and situational influences that may affect their ability to commit to HCV treatment (McCullagh, 2016).

Perceived Benefit

From the qualitative study done by Williams et al. (2019), clients associated being cured of Hepatitis C with an opportunity to erase the stigma of being a drug user and obtain stable housing, employment, and healthy living. Incorporating questionnaires regarding quality of life provides important information about how the client feels they will benefit from HCV treatment and provide motivation for testing and treatment.

Perceived Barriers

As seen by the research in this review, people who are homeless with HCV infection have many competing factors that prevent them from making HCV treatment a priority. Non-published research results from focus groups conducted among HCV infected homeless adults in Minneapolis, Minnesota indicated that main barriers regarding testing and treatment centered around perceived susceptibility to HCV, medication side effects, medical mistrust, competing priorities, and the negative impact of substance use. Nola Pender recognized that there are *immediate competing demands and preferences* that distract individuals from engaging in health promotion activities (McCullagh, 2016). For the homeless, finding shelter due to extreme cold, maintaining a job, or not feeling safe are significant reasons why an individual might not show to a clinic visit for HCV testing or treatment initiation, especially in the absence of feeling ill.

Perceived Self-Efficacy

To understand the effects of homelessness on an individual and their ability to partake in health promotion, the provider must understand if the person believes they are capable of completing the HCV care continuum. According to Pender, self-efficacy is "…the confidence in his or her ability to successfully carry out an action" and its behavioral cognition that affects one's commitment to a plan of action (McCullagh, 2016, p. 230). If the client is feeling displaced by their homeless, their confidence in tackling HCV treatment may wane.

Interpersonal and Situational Influences

Pender's HPM identifies interpersonal and situational influences as being able to directly and indirectly influence a plan of action (McCullagh, 2016). In the setting of homelessness, shelter clinics with an enhanced clinical support system for treating HCV may provide missing social support, which is identified as a basic human need that proves beneficial in helping one

cope (Pender, Murdaugh, & Parsons, 2011). Hodges et al. (2019) research showed that HCV shared medical appointment (SMA) among clients with similar socioeconomic demographics and characteristics significantly increased treatment completion. Clients that receive enhanced support during HCV treatment may benefit from the social pressures of committing to a plan of action.

Nursing Implications and Recommendations

Providing HCV models with enhanced support requires resources and sustainability. Nurse educators are at the forefront of educating new nurses about HCV and the populations who are at risk for infection. Ensuring public health courses include HCV education about "at-risk" populations and the treatments available arms them with the necessary information needed to provide primary, secondary, and tertiary prevention. Nurses must take an active role in screening for HCV whenever appropriate to ensure their patients are informed to make good decisions regarding their health. Additionally, the nursing profession, with the addition of advanced practice nursing, has the ability to provide services through outreach initiatives or a referral network for HCV education, testing, and treatment. Nurses can identify locations where the homeless frequent, such as drug treatment facilities, community clinics, shelters, needle exchange programs, and food services within their own community to promote HCV awareness. Once treatment is started, having a convenient place for clients to access care on a daily, weekly, or monthly basis is a critical component for enhanced models and can be supported solely by a nursing team (Harney et al., 2019).

Community models for HCV testing and treatment involve funding that must be supported and sustained. Nurses can explore grants that provide funding for these efforts, as well as lobbying legislators through union initiatives for better access to HCV care for the homeless.

Additionally, buy-in from the shelter staff and community clinics along with effective planning and implementation will be essential for an enhanced HCV healthcare model to succeed.

Nursing Research

Due to the transient nature of the homeless and the difficulty in obtaining SVR12 results, research regarding HCV in this population should focus on how to get more HCV infected homeless tested and through treatment. The high percentage of cure rates with DAA medications provides reassurance that a significant number could be cured as long as the medication is taken correctly and the treatment course is finished (J. Powell, personal communication, December 23, 2019). For this reason, research for HCV enhanced support models for the homeless should continue to explore how to obtain higher rates of treatment uptake and completion with EOT pathology. Although every effort should be made to capture SVR12 data among the homeless, the reality is that having someone who is a transient return for testing three months post-treatment is difficult.

More randomized control trials and quasi-experimental research is needed regarding what nursing interventions within a support model are most effective in increasing HCV testing and treatment uptake. This research would be useful in providing a standard nursing support model that could be adopted by other community and shelter clinics treating HCV. Ideally, having a data collection tool that captures the physical and mental health benefits of being cured of HCV could be beneficial in encouraging treatment among the homeless.

Conclusion

Navigating homeless patients through HCV care continuum requires a healthcare model that controls the barriers preventing treatment uptake and adherence. From the trends in research, the HCV healthcare model that will be most effective for achieving SVR12 among the homeless

will provide the HCV continuum in one location, preferably a clinic adjoined with a homeless shelter providing enhanced support to control barriers to treatment. In addition, due to the high prevalence of injection drug use among the homeless, special consideration must be given to treating HCV regardless of past or present use of IVDU to decrease disease burden. Shifting the treatment team from a Hepatologist to a broader treatment team that includes general practitioners or advanced practice providers has allowed HCV care to occur in a location convenient for the homeless to access. Broadening access to testing and treatment along with the oral DAA medications has dramatically changed our ability to treat HCV in the homeless. However, advanced treatments and broader access alone cannot control disease burden among this population. Addressing the social and interpersonal barriers through an enhanced support model for HCV care that is reinforced by evidence-based research has the potential to be an essential tool in decreasing disease burden among the homeless worldwide.

References

Alavi, M., Poustchi, H., Merat, S., Kaveh-ei, S., Rahimi-Movaghar, A., Shadloo, B., . . . Malekzadeh, R. (2019). An intervention to improve HCV testing, linkage to care, and treatment among people who use drugs in Tehran, Iran: The ENHANCE study. *International Journal of Drug Policy, 72,* 99-105. doi:10.1016/j.drugpo.2019.07.002

American Association for the Study of Liver Diseases (AASLD). (2017). Monitoring patients who are starting HCV treatment, are on treatment, or completed treatment. Retrieved from https://www.hcvguidelines.org/evaluate/monitoring

Bajis, S. (2019). Hepatitis C virus testing, liver disease assessment and direct acting antiviral treatment uptake and outcomes in a service for people who are homeless in Sydney, Australia: The LiveRLife homelessness study. *Journal of Viral Hepatitis, 26*(8), 969-978. doi:10.1111/jvh:13112

Beiser, M., Leon, C., & Gaeta, J. M. (2017). Needs assessment of HCV-infected individuals experiencing homelessness and implications. *Journal of Health Care for the Poor and Underserved, 28*(1), 596-606.

Beiser, M. E., Smith, K., Ingemi, M., Mulligan, E., & Baggett, T. P. (2019). Hepatitis C treatment outcomes among homeless-experienced individuals at a community health centre in Boston. *International Journal of Drug Policy, 72*, 129-137. doi:10.1016/j.drugpo.2019.03.017

Centers for Disease Control and Prevention (CDC). (n.d.). Viral hepatitis. Retrieved from https://www.cdc.gov/hepatitis/

Coyle, C., Moorman, A. C., Bartholomew, T., Klein, G., Kwakwa, H., Mehta, S. H., & Holtzman, D. (2019). The hepatitis C virus care continuum: Linkage to hepatitis C virus

care and treatment among patients at an urban health network, Philadelphia, PA. *Hepatology, 70*(2), 476-486. doi:10.1002/hep.30501

Coyle, C., Viner, K., Hughes, E., Kwakwa, H., Zibbell, J. E., Vellozzi, C., & Holtzman, D. (2015). Identification and linkage to care of HCV-infected persons in five health centers -- Philadelphia, Pennsylvania, 2012-2014. *Morbidity & Mortality Weekly Report, 64*(17), 459-463.

Dang, D., & Dearholt, S. L. (2018). *Johns Hopkins nursing evidence-based practice: Model and guidelines* (3rd ed.). Indianapolis, IN: Sigma Theta Tau International.

Dever, J., Ducom, J., Ma, A., Nguyen, J., Liu, L., Herrin, A., . . . Ho, S. B. (2017). Engagement in care of high-risk hepatitis C patients with interferon-free direct-acting antiviral therapies. *Digestive Diseases & Sciences, 62*(6), 1472-1479. doi:10.1007/s10620-017-4548-4

Fuster, D., & Gelberg, L. (2019). Community screening, identification, and referral to primary care, for hepatitis C, B, and HIV among homeless persons in Los Angeles. *Journal of Community Health, 44*(6), 1044-1054. doi:10.1007/s10900-019-00679-w

Garrard, J. (2017). *Health sciences literature review made easy: The matrix method.* Burlington, MA: Jones & Bartlett Learning.

Grebely, J., Hajarizadeh, B., Lazarus, J. V., Bruneau, J., & Treloar, C. (2019). Elimination of hepatitis C virus infection among people who use drugs: Ensuring equitable access to prevention, treatment, and care for all. *International Journal on Drug Policy, 72*, 1-10. doi:10.1016/j.drugpo.2019.07.016

Hakobyan, S., Sepehry, A. A., Nikoo, N., Khachatryan, D., Nikoo, M., Song, M.J., … Krausz, R. (2018). An update of hepatitis C prevalence rates in homeless adults after hepatitis C treatment paradigm change: A systematic review and meta-analysis. *Medical Research Archives, 6*(1), 1-15. Retrieved from https://journals.kei.org/index.php/mra/article/view/1596

Harney, B. L., Whitton, B., Lim, C., Paige, E., McDonald, B., Nolan, S., . . . Doyle, J. S. (2019). Quantitative evaluation of an integrated nurse model of care providing hepatitis C treatment to people attending homeless services in Melbourne, Australia. *International Journal of Drug Policy, 72,* 195-198. doi://10.1016/j.drugpo.2019.02.012

Hefferman, A., Barber, E., Cook, N. A., Gomaa, A., Harley, Y. X., Jones, C. R., ...Taylor-Robinson, S. D. (2018). Aiming at the global elimination of viral hepatitis: Challenges along the care continuum. *Open Forum Infectious Diseases, 5(1),*1-8. doi:10.1093/ofid/ofx252

Hepatitis Central. (n.d.). Medications to treat hepatitis C – A timeline. Retrieved from http://www.hepatitiscentral.com/medications-to-treat-hepatitis-c-a- timeline/

Hodges, J., Reyes, J., Campbell, J., Klein, W., & Wurcel, A. (2019). Successful implementation of a shared medical appointment model for hepatitis C treatment at a community health center. *Journal of Community Health, 44*(1), 169-171. doi:10.1007/s10900-018-0568-z

Lambert, J. S., Murtagh, R., Menezes, D., O'Carroll, A., Murphy, C., Cullen, W., . . . Van Hout, M. C. (2019). 'HepCheck Dublin': An intensified hepatitis C screening programme in a homeless population demonstrates the need for alternative models of care. *BMC Infectious Diseases, 19*(1), 1-9. doi:10.1186/s12879-019-3748-2

Larios, S. E., Masson, C. L., Shopshire, M. S., Hettema, J., Jordan, A. E., McKnight, C., . . . Perlman, D. C. (2014). Education and counseling in the methadone treatment setting improves knowledge of viral hepatitis. *Journal of Substance Abuse, 46*(4), 528-531. doi:10.1016/jsat.2013.10.012

Masson, C. L., Delucchi, K. L., McKnight, C., Hettema, J., Khalili, M., Min, A., . . . Perlman, D. C. (2013). A randomized trial of a hepatitis care coordination model in methadone maintenance treatment. *American Journal of Public Health, 103*(10), e8-e88. doi:10.2105/AJPH.2013.301458

McCullagh, M. C. (2016). Health promotion. In T. S. Bredow & S. J. Peterson (Eds.), *Middle range theories: Application to nursing research* (4th ed., pp. 227-239). Philadelphia, PA: Lippincott Williams & Wilkins.

McEwen, M. (2014). Overview of selected middle range nursing theories. In M. McEwen & E. M. Willis (Eds.), *Theoretical basis for nursing* (4th ed., pp. 229-257). Philadelphia, PA: Lippincott Williams & Wilkins.

National Healthcare for the Homeless Council. (n.d). Hennepin County Healthcare for the Homeless. Retrieved from https://nhchc.org/hennepin-county-health-care-for-the-homeless/

National Institute of Diabetes, Digestive and Kidney Disease (NIH). (n.d.) Cirrhosis. Retrieved from https://www.niddk.nih.gov/health-information/liver-disease/cirrhosis

Norton, B. L., Voils, C. I., Timberlake, S. H., Hecker, E. J., Goswami, N. D., Huffman, K. M., . . . Stout, J. E. (2014). Community-based HCV screening: Knowledge and attitudes in a high-risk urban population. *BMC Infectious Diseases, 14*(1), 74. doi:10.1186/1471-2334-14-74

Nyamathi, A., Kennedy, B., Branson, C., Salem, B., Khalilifard, F., Marfisee, M., . . . Leake, B. (2013). Impact of nursing intervention on improving HIV, hepatitis knowledge and mental health among homeless young adults. *Community Mental Health Journal 49*(2), 178-184. doi:10.1007/s10597-012-9524-z

Pender, N., Murdaugh, C., & Parsons, M.A. (2011). *Health promotion in nursing practice* (6th ed.). Upper Saddle River, NJ: Pearson.

Pilger, E., & Costanzo, C. (2018). Screening and management of hepatitis C: Use education to dispel the myths about the disease and increase screening and treatment. *American Nurse Today, 13*(9), 70-72.

Read, P., Lothian, R., Chronister, K., Gilliver, R., Kearley, J., Dore, G. J., & van Beek, I. (2017). Delivering direct acting antiviral therapy for hepatitis C to highly marginalised and current drug injecting populations in a targeted primary health care setting. *International Journal of Drug Policy, 47,* 209-215. doi:10.1016/j.drugpo.2017.05.032

Sena, A. C., Willis, S. J., Hilton, A., Anderson, A., Wohl, D. A., Hurt, C. B., & Muir, A. J. (2016). Efforts at the frontlines: Implementing a hepatitis C testing and linkage-to-care program at the local public health level. *Public Health Reports, 131*(2), 57-64. doi:10.1177/00333549161310S210

Strehlow, A., Robertson, M., Zerger, S., Rongey, C., Arangua, L., Farrell, E., ...Gelberg, L. (2012). Hepatitis C among clients of health care for the homeless primary care clinics. *Journal of Health Care for the Poor and Underserved, 23*(2), 811-833. doi:10.1353/hpu.2012.0047

Tyler, D., Nyamathi, A., Stein, J. A., Koniak-Griffin, D., Hodge, F., & Gelberg, L. (2014). Increasing hepatitis C knowledge among homeless adults: Results of a

community-based, interdisciplinary intervention. *Journal of Behavioral Health Services & Research, 41*(1), 37-49. doi:10.1007/s11414-013-9333-3

Williams, B. E., Nelons, D., Seaman, A., Witkowska, M., Ronan, W., Wheelock, H., . . . Garcia, J. (2019). Life projects: The transformative potential of direct-acting antiviral treatment for hepatitis C among people who inject drugs. *International Journal of Drug Policy, 72*, 138-145. doi:10.1016/j.drugpo.2019.03.015

World Health Organization (WHO). (2019, July 9a). Hepatitis C. Retrieved from https://www.who.int/news-room/fact-sheets/detail/hepatitis-c

World Health Organization (WHO). (2019, July 26b). The WHO urges countries to invest in eliminating hepatitis. Retrieved from https://www.who.int/news-room/detail/26-07-2019-who-urges-countries-to-invest-in-eliminating-hepatitis

Yek, C., Flor, C., Marshall J., Zoellner, C., Thompson, G., Quirk, L., ...Jain, M. K. (2017). Effectiveness of direct-acting therapy for hepatitis C in difficult-to-treat patients in a safety-net health system: a retrospective cohort study. *BMC Medicine, 15*(204), 1-8. doi:10.1186/s12916-017-0969-3

Appendix A- Matrices

Source: Alavi, M., Poustchi, H., Merat, S., Kaveh-ei, S., Rahimi-Movaghar, A., Shadloo, B., …Malekzadeh, R. (2019). An intervention to improve HCV testing, linkage to care, and treatment among people who use drugs in Tehran, Iran: The ENHANCE study. *International Journal of Drug Policy, 72,* 99-105. doi:10.1016/j.drugpo.2019.07.002

Purpose/Sample	**Design (Method/Instruments)**	**Results**	**Strengths/Limitations**
Purpose: To trial an HCV treatment model, ENHANCE, that encouraged and increased availability of DAA treatment among former and current drug users (PWUD). **Sample/Setting:** Tehran, Iran Opioid substitution treatment (OST) clinics, community-based drop-in centers, homeless reception center. n=652 158 participants from the homeless reception center. **Johns Hopkins Evidence Appraisal** **Level of Evidence:** III **Quality:** Good	Non-experimental study. Participants agreed to participate in the ENHANCE interventions – onsite HCV rapid antibody testing, venipuncture for HCV RNA testing, and non-invasive liver fibrosis assessment, linkage to care, and treatment initiation among PWUD. **ENHANCE Model-** Self-reported behavioral survey was collected which included: demographics collected, drug use history, alcohol consumption, HCV and liver disease knowledge, and desire to receive HCV treatment. SVR at 12 weeks. **Homeless Shelter** – Reunited with family or referred homeless shelter for stable housing. GP or Nurse dispensed medications weekly or daily and monitored HCV treatment.	100% of PWID, in the last 12 months, initiated treatment. 8/13 completed treatment and achieved SVR 12. -22/158 homeless with detectable HCV RNA initiated treatment. All 22 completed treatment and had undetectable HCV RNA at the end of treatment. None could be followed for SVR12. HCV knowledge was poor – but 97% surveyed were willing to be treated after HCV Education. 87% of all HCV RNA + participants initiated treatment. **Conclusion:** A community- based HCV care model can provide a high level of adherence support and SVR 12 for marginalized populations, including the home.	**Strengths:** -Provides a healthcare model that includes medication dispensing can provide high rates of treatment initiation and completion. **Limitations:** Interest in treatment may have been increased since the medication was free. Participants on OST Clinical care practices may be hard to transfer unless testing and treatment are free. Unable to follow the homeless participants for SVR 12.
Author Recommendations Providing more HCV care models for treating PWID is recommended.			
Implications: Models supporting weekly or daily dispensing of medication can be more costly but seem to provide a higher adherence to treatment and SVR 12.			

Source: Bajis, S. (2019). Hepatitis C virus testing, liver disease assessment and direct-acting antiviral treatment uptake and outcomes in a service for people who are homeless in Sydney, Australia: The LiveRLife homelessness study. *Journal of Viral Hepatitis, 26*(8), 969-978. doi:10.1111/jvh:13112			
Purpose/Sample	**Design (Method/Instruments)**	**Results**	**Strengths/Limitations**
Purpose: Evaluate a community-based model of care that integrates health promotion and liver fibrosis testing for HCV treatment uptake among homeless people. **Sample/Setting:** n=202 men > age18 receiving services from an inner-city community center with a daily nurse-led clinic in Sydney, Australia. Support was provided twice a week by general practitioner. Homeless shelter adjoined to the clinic. **Johns Hopkins Evidence Appraisal** **Level of Evidence:** III **Quality:** Good	Non-experimental. Education provided over several campaign days. Enrollment included on-site point of care HCV antibody testing, self-reported behavioral survey, HCV RNA testing, Fibroscan testing, and treatment. Participants were categorized between unstable housing (no home, couch surfing, shelter, hostel, crisis center, boarding house) and stable housing (own home, rent apartment/flat). CI of 95% were used to analyze the factors associated with HCV treatment uptake. $P < 0.05$ was statistically significant.	n=47/202 or 23% of those enrolled had detectable HCV infections. **n=47** - 93% reported injecting drugs in the previous month. 57% injected daily. - 43% had moderate to significant fibrosis -60% reported unstable housing/street homeless. -65% who initiated DAA treatment achieved SVR 12. -80% of participants who received weekly dispensing of medications achieved SVR 12. -Observed higher uptake associated with participants on OST (opioid substitution therapy). Not shown to be significant (p=0.239). **Conclusion:** HCV treatment uptake completion among homeless people continue to be "suboptimal" most likely due to complex barriers, such as "social needs and competing priorities" (Bajis, 2019,p. 977)	**Strengths:** Evaluates only a homeless population. Incorporates a comprehensive model of care for HCV. Findings are consistent with other research showing HCV+ homeless have increased risk for not being linked to care and "lost to follow up." **Limitations:** Small sample size Men only study Not easily generalized to other inner-city homeless shelters. May have missed other homeless (sleeping rough population) who are harder to reach that could change study results.
Author Recommendations: Strategies to enhance HCV testing and treatment needs to be enhanced among the homeless.			
Implications: Programs that combine HCV treatment with housing resources, opioid substitution therapy, and mental health services could help improve treatment uptake and adherence.			

Source: Beiser, M. E., Smith, K., Ingemi, M., Mulligan, E., & Baggett, T. P. (2019). Hepatitis C treatment outcomes among homeless-experienced individual a community health centre in Boston. *International Journal of Drug Policy, 72*, 129-137. doi:10.1016/j.drugpo.2019.03.017			
Purpose/Sample	**Design (Method/Instruments)**	**Results**	**Strengths/Limitations**
Purpose: To assess the HCV cascade of treatment including SVR 12 and reinfection rates among homeless patients receiving adherence support through a community care model in in Boston, MA. **Sample/Setting:** n=510 HCV infected n=210 untreated n=300 homeless experienced patients received HCV treatment between January, 2014 – March, 2017 80% were male, 52.3% were non-white, 29% were homeless at the time of treatment. 30.7% stayed at transitional treatment facilities. **Johns Hopkins Evidence Appraisal of Evidence:** **Level:** III **Quality:** High	Non-experimental Review of data with data analysis. Multivariate modeling was used to identify important predictors of achieving SVR 12.	-Loss to follow up and social instability were the most common reasons for not being treated. -285/300 completed treatment. -255/285 achieved SVR12. -78% reported no missed doses -3.7% were lost to follow up during treatment. -87.1% treat opioid use disorder (OUD) achieved SVR 12. -81.8% with untreated OUD achieved SVR 12. -Medication missed doses where more likely due to insurance changes while on treatment ($p<0.029$). **Conclusion:** Adherence support through a designated nursing model increases medication compliance in HCV treatment in the homeless population.	**Strengths:** Large sample size of homeless patients at the time of their treatment. Recognizes insurance issues, such an interruption in coverage, as a factor in medication adherence. **Limitations:** Community care model requires funding that may not be available in all communities.
Author Recommendations: Continue research in the area HCV treatment models for the homeless, including on-site clinics, mobile medical units, as well as increasing collaboration with addiction medicine and behavioral health providers.			
Implications: Community care models that provide adherence support are key factors in keeping HCV infected homeless patients cured.			

Source: Coyle, C., Moorman, A., Bartholomew, T., Klein, G., Kwakwa, H.,Mehta, S., & Holtzman, D. (2019). The hepatitis C virus care continuum: Linkage to hepatitis C virus care and treatment among patients at an urban health network, Philadelphia, PA. *Hepatology, 70*(2), 476-486. doi:10.1002/hep.30501

Purpose/Sample	**Design (Method/Instruments)**	**Results**	**Strengths/Limitations**
Purpose: Compare HCV treatment and cure rates between HCV test and treat healthcare centers and HCV testing only healthcare centers in an urban network in Philadelphia, PA. **Sample/Setting:** Five federally funded qualified health centers (FQHCs). HCV antibody + adults (18 and older). Four FQHCs including one center treating homeless patients exclusively where test only centers who referred out for HCV treatment. N=885 chronically infected with HCV **Johns Hopkins Evidence Appraisal Level of Evidence:** III **Quality:** High	Non-Experimental Chart review of all FQHC patients testing HCV antibody positive was performed. Multivariate logistic regression was used to identify what factors interrupted the care continuum at two crucial steps.1) medical evaluation 2) liver disease staging. Covariates such as demographics, injection drug use, incarceration, and homelessness were evaluated using a *p* value of <0.10. SVR assessment and SVR 12 outcomes were assessed cumulatively for all sites.	-Highest prevalence of HCV + antibody and HCV RNA detection seen at the center serving the homeless. -The test and treat centers had SVR 12 achievement rates 6 times that of the other "test only" sites. -Referring outside the health center for treatment was associated with breaks in the care continuum. **Conclusion:** Providing on-site HCV care is essential in removing barriers such as transportation and reluctance to seeking care. Funding and support are crucial in being able to support HCV treatment in every situation.	**Strengths:** Large sample size Strong statistical analysis. Long time frame – could see how treatment trends had changed from 2014 to 2017. Reflects other research findings that high HCV infection rates are prevalent among the homeless population. **Limitations:** Expanding facilities that test and treat may not be feasible in every city. Homeless population was not treated at test and treat facility which might have contributed to lower adherence & not achieving SVR 12.
Author Recommendations: Expand test and treat centers to avoid loss to follow up from referring outside for evaluation and treatment.			
Implications: Increasing "test and treat" sites is more feasible now with the ability of primary care physicians to prescribed DAA medications.			

Source: Coyle, C., Viner, K., Hughes, E., Kwakwa, H., Zibbell, J. E., Vellozzi, C., & Holtzman, D. (2015). Identification and linkage to care of HCV-infected persons in five health centers -- Philadelphia, Pennsylvania, 2012-2014. *Morbidity & Mortality Weekly Report, 64*(17), 459-463. Retrieved from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4584550/			
Purpose/ Sample	**Design (Method/Instruments)**	**Results**	**Strengths/ Limitations**
Purpose: To initiate a process between 5 federally qualified health centers (FQHC) serving the homeless and public housing residents that encourages testing for Hepatitis C (HCV) in high-risk groups and connects patients to care coordination. **Sample/Setting:** 4.514 patients were tested for HCV antibodies across 5 sites (FQHC) in Philadelphia, PA. **Johns Hopkins Evidence Appraisal** **Level of Evidence:** III **Quality:** Good	Non-Experimental - National Nursing Centers Consortium (HHCC) provided Hepatitis C education using a HCV expert to 5 sites. - Eligible patients were born 1945-1965 (Baby Boomers), injection drug users, and/or homeless. - Medical Assistants (MA) initiated HCV testing/education once identifiers were confirmed. - Used reflex testing on + HCV antibodies to test immediately for HCV RNA (Chronic virus). - Electronic Medical Record (EMR) was used to remind providers that patient's +HCV patients should be referred for care coordination.	- The use of reflex testing increased overall testing for HCV confirmation to 96.3%. - MA testing increased HCV diagnosis by 6.3%. - Linkage to care coordination helped increase the patients who actually received their +HCV results by almost 70%, referrals for treatment by 50% and patients actually seen by a provider increased almost 30%. - Sites that provided testing and treatment versus just testing with a referral to treatment, linked more patients to coordinated care specialist. **Conclusion-** Routine HCV testing can be easily incorporated into clinic visits with the help of a well-coordinated process.	**Strengths:** Provides feasibility for targeting HCV high-risk populations, providing testing and a pathway to treatment. Shows a positive relationship between care coordination and patient compliance. **Limitations:** Didn't follow patients through treatment and cure.
Author Recommendations: To provide continued research in larger public health care systems using this model to test, educate, and treat patients at risk for HCV.			
Implications: Community healthcare agencies are positioned to help create access for high risk populations to get tested and treated for HCV when they partner with public health agencies in providing support services to guide patients through the process.			

Source: Dever, J., Ducom, J., Ma, A., Nguyen, J., Liu, L., Herrin, A., . . . Ho, S. B. (2017). Engagement in care of high-risk hepatitis C patients with interferon-free direct-acting antiviral therapies. *Digestive Diseases & Sciences, 62*(6), 1472-1479. doi:10.1007/s10620-017-4548-4			
Purpose/Sample	**Design Method/Instruments**	**Results**	**Strengths/Limitations**
Purpose: To determine if patient engagement to more tolerable oral direct-acting antiviral (DAA HCV treatments are influenced by a patient's socio-demographic characteristics and comorbidities. **Sample/Setting:** n=202 Patients diagnosed with HCV and had Fibrosis scores of 4 within the HCV registry of the Veterans Affairs (VA) hospital in San Diego, CA that had never been seen by a HCV clinic provider or were lost to follow-up care. **Johns Hopkins Evidence Appraisal** **Level of Evidence:** III **Quality:** Good	Non-experimental -Outreach letters and calls were made to patients informing them about eligibility to receive HCV treatment. -Participants in groups were divided between those responding (Engaged, n=88) and those not responding (non-engaged, n=114)). -Using Chi-square, Fisher's exact and Wilcoxon rank sum tests along with regression analyses was completed to show variables that were significant ($p< 0.05$) in engaged (responded to outreach efforts) versus non-engaged (didn't respond) in HCV care.	-Homeless within the last 5 years was the most significant of all socio-demographic variables ($p<0.001$) for non-engagement. -Only 24 % of homeless engaged in care. - Multivariate regression analysis showed that active alcohol/drug use was significant to one's ability to engage in HCV care. -Groups had similar # of comorbid disorders, distance to travel, and mental health diagnoses. -COPD ($p<0.03$) was the most significant comorbidity for non-engagement. **Conclusion:** High percentage of patients were linked to HCV treatment or enrolled in HCV clinic over the course of the study. 74% of patients treated with DAA achieved a cure.	**Strengths:** Captured homeless, at risk population. Characteristics regarding barriers to HCV treatment similar to other studies. **Limitations:** Patients had already been tested positive HCV prior to being contacted. Sample size might have been lower if patients required testing to participate. Low percentage of homeless engaging in care Assumes "non-engaged" are those not interested but could be that they just moved, don't have a permanent address (since homeless was the more significant variable) or got a new phone number
Author Recommendations: Further research studies investigating barriers related to receiving access, as well as innovative ways for healthcare professionals to provide access to DAA treatments is needed on both local and national levels. Using mailers and phone calls may not be the best way to engage homeless patients in HCV treatment.			
Implications: This study provides evidence that linking HCV patients to treatment with DAA provides high cure rates. The concerning issue is that effective outreach, homelessness, alcohol/drug use and some comorbidities are strong barriers to linking patients to treatment.			

Source: Fuster, D., & Gelberg, L. (2019). Community screening, identification, and referral to primary care, for hepatitis C, B, and HIV among homeless persons in Los Angeles. *Journal of Community Health, 44*(6), 1044-1054. doi:10.1007/s10900-019-00679-w			
Purpose/Sample	**Design (Method/Instruments)**	**Results**	**Strengths/Limitations**
Purpose: To test a model of community-based screening, identification, and counseling for homeless clients with referral to return to a primary care clinic in one month for secondary prevention and treatment for HIV, HCV, and HBV. **Sample/Setting:** n=172 Majority were adult men Homeless population in Skid Row, Los Angeles testing positive for one of the following: HIV, HCV, HBV. **Johns Hopkins Evidence Appraisal Level of Evidence:** III **Quality:** High	Non-experimental correlates study. Participants were chosen though simple random or systematic random sampling. Questionnaire regarding barriers to follow up and serum blood testing was done on all participants. Linkage to primary care for positive HIV, HCV, and HBV was provided for 172 adults. Reminders cards and calls regarding clinic appointments were done for all participants. Chi-square and t-test analysis was performed on categorical and continuous variables, respectively. Logistic regression analysis was used to find predictors related to following through on one-month scheduled follow-up.	-74.5% testing positive for an infection were seen at a primary care clinic. -Having slept in a shelter the night before the clinic visit had a 95 % CI and showed statistical significance in attending the clinic visit. -There was no evidence that homelessness, drug or alcohol use, or mental illness affected care seeking. **Conclusion:** Sleeping in a shelter provides stability needed to attend health services if they are within close proximity to the shelter.	**Strengths:** Large sample size Participants were selected randomly from a variety of homeless shelter and food programs. **Limitations:** Long-term outcomes such as treatment and SVR were not assessed. Unable to generalize finding due to the high intensity of homeless services found in Skid Row. Patients were compensated for following through with the study parameters. Study was done when patients would have been treated with older interferon-ribavirin drugs versus the more tolerable DAA agents.
Author Recommendations: Future work is indicated in testing, treating, and counseling with primary care referral for HBV, HIV, HCV.			
Implications: Being sheltered is a key factor in getting homeless people to seek primary healthcare services.			

Source: Grebely, J., Hajarizadeh, B., Lazarus, J. V., Bruneau, J., & Treloar, C. (2019). Elimination of hepatitis C virus infection among people who use drugs: Ensuring equitable access to prevention, treatment, and care for all. *International Journal on Drug Policy, 72*, 1-10. doi:10.1016/j.drugpo.2019.07.016

Purpose/Sample	**Design (Method/Instruments)**	**Results**	**Strengths/Limitations**
Purpose: Provide a summary of research regarding Hepatitis C infection among PWID in an attempt to provide equal access to testing, treatment, and care. **Sample/Setting:** 21 original research studies (combination of RCTs, quasi-experimental and nonexperimental). 2 Systemic reviews 3 Expert opinion. **Johns Hopkins Evidence Appraisal** III **Quality:** Good	Systematic Review	-Understanding barriers to care is necessary to providing equitable access. -Point of care testing and treatment increase uptake HCV treatment. -Lack of knowledge about HCV prevents testing and treatment. -Lower SVR12 compared to clinical trials are due to loss to follow up, not virologic response. -Recent injecting drug use didn't affect SVR 12. -HCV infection is highly prevalent among the homeless – global rates of 4 to 36%. High rates of drug use in this population yields lower treatment uptake. -Risk for reinfection must be considered. -Erasing stigma needs to be prioritized. **Conclusion** -Identified the "cascade of care" for HCV infection as living with HCV, diagnosed with HCV, linked to care, treated, and cured.	**Strengths:** Comprehensive review of studies looking at HCV treatment in PWID. **Limitations:** Summary based. No meta-analysis provided.

Author Recommendations: HCV treatment programs must be developed in different settings, especially where resources are lacking such as low and middle-income countries, and underserved populations.

Implications: The best way to tackle the HCV epidemic is to tailor treatment programs to the target population.

Source: Harney, B. L., Whitton, B., Lim, C., Paige, E., McDonald, B., Nolan, S., …Doyle, J. S. (2019). Quantitative evaluation of an integrated nurse model of care providing hepatitis C treatment to people attending homeless services in Melbourne, Australia. *International Journal of Drug Policy.*, 72, 195-198. doi: 10.1016/j.drugpo.2019.02.012

Purpose/Sample	**Design (Method/Instruments)**	**Results**	**Strengths/Limitations**
Purpose: Evaluate a pilot-nurse led model of care for two homeless services looking to increase HCV treatment initiation. **Sample/Setting:** Two inner-city homeless services, with one on-site clinic. n=39 64% male **Johns Hopkins Evidence Appraisal** **Level of Evidence:** III **Quality:** Good	Non-experimental study Two outcomes were evaluated 1) Initiation of any DAA medication. 2) Achieving SVR 12. Questionnaire was given to participants that provided information regarding injection drug use and sleeping accommodations that could possibly affect outcomes. Logistic regression methods were used to examine these factors.	Sleeping rough (literally on the street) contributed to lower rates of treatment completion and known SVR 12 when compared to other types of homelessness. 17/21 those considered sheltered completed treatment. 7/18 living rough completed treatment. SVR12 test were available for 60% of those treated – which all showed a cure. This study aligns with findings from other studies that showed that testing for SVR is sub-optimal in this population, as well as treatment uptake. **Conclusion:** Nurse-led models of care can be effective in engaging clients. for HCV treatment in the homeless population.	**Strengths:** Focus was homeless population only and HCV treatment uptake. Looked at differences in HCV uptake and SVR in two types of homelessness. **Limitations:** Small sample with no mental health questions Pilot program with funding – not necessarily transferrable to other organizations.
Author Recommendations: Continue research in tailored treatment services for the homeless**.**			
Implications: Same day testing and treatment initiation for HCV for the homeless may increase treatment uptake and continued tailoring of services may encourage SVR follow up.			

Source: Hodges, J., Reyes, J., Campbell, J., Klein, W., & Wurcel, A. (2019). Successful implementation of a shared medical appointment model for hepatitis C treatment at a community health center. *Journal of Community Health, 44*(1), 169-171. doi:10.1007/s10900-018-0568-z

Purpose/Sample	**Design (Method/Instruments)**	**Results**	**Strengths/Limitations**
Purpose: To test the feasibility of a shared medical appointment (SMA) in HCV treatment provide by non-specialist providers in a community health center to help improve self-care and adherence as it has been shown to do for other chronic diseases. **Sample/Setting:** Community health center on Cape Cod serving a population with high rates of homelessness, substance abuse and mental illness. N=102 64% male **Johns Hopkins Evidence Appraisal Level of Evidence:** II **Quality:** Good	Non-randomized, Quasi-experimental study This study looked at SVR 12 rates between patients who selected to use SMA model versus those who selected an independent appointment model. Confidence Intervals were done to ensure accuracy of results.	SMA- 76% continued after one appointment. 99% Completed full treatment course. 91% Achieved SVR. Individual appointment- 88% completed treatment 69% achieved SVR. **Conclusion:** Participants in the SMA model were 6 times more likely to achieve SVR 12 compared to those who selected the individual appointment.	**Strengths:** Identifies the how peer support may decrease HCV stigmas and encourage healing. Encourages non-specialized treatment of HCV for more accessible care. **Limitations:** SMA was provided to patients with similar socioeconomic demographics and characteristics. Smaller sample size, one location. Study was done where substance use disorders were managed allowing participants to be more adherent to HCV treatment and thus, likely yielding higher SVR 12 rates.

Author Recommendations: More research is needed to know if SMA can impact HCV adherence and SVR 12 so there can be buy-in from stakeholders, clinicians, administrators, insurers, and patients.

Implications: The SMA model identifies a support system that could be crucial for improving treatment adherence among the homeless and the encouragement to return for SVR12 testing.

Source: Lambert, J. S., Murtagh, R., Menezes, D., O'Carroll, A., Murphy, C., Cullen, W., . . . Van Hout, M. C. (2019). 'HepCheck Dublin': An intensified hepatitis C screening programme in a homeless population demonstrates the need for alternative models of care. *BMC Infectious Diseases, 19*(1), 1-9. doi:10.1186/s12879-019-3748-2

Purpose/Sample	**Design (Method/Instruments)**	**Results**	**Strengths/Limitations**
Purpose: To provide characterization of HCV burden for homeless individuals to provide an "integrated" care model for HCV treatment between primary care and specialists. **Sample/Setting:** n=538 people Screened 78% male Median age 36 n=199 HCV + (112 new and 87 known) **Johns Hopkins Evidence Appraisal Level of Evidence: III** **Quality: A**	Qualitative study Participants recruited over a 19 -month period from 11 Safety net services (offering primary care and methadone treatment) in Dublin, Ireland and in-reach services (coffee shops, mobile units, needle-exchange programs). Questionnaire were used to collect data from both groups. A convenience sample (n=48) of participants with known HCV + were given a 79 open-ended questionnaire exploring reasons for not following up for treatment. Follow through to attending three specialist appointments were tracked and analyzed using unadjusted negative binomial regression (NBR).	-46 referrals to specialists, --21 attended at least two appointments, seven received liver testing, and two out of 199 completed treatment. -HCV + known group previously referred to specialists cited unstable housing accommodation as the most common barrier to not attending an appointment and accessing treatment. -78% living a hostel, others were couch surfing, sleeping rough) 85% homeless longer than one year -42% saw GP once/week (reasons not specified) -50% who started specialized, discontinued before completing treatment. **Conclusion:** HCV referrals and attendance at follow up care are challenges for the homeless. Current referral system in Ireland is not adequate.	**Strengths:** HepCheck Dublin part of a larger European initiative to drive HCV testing and treatment among the homeless. A large sample size recruited from various homeless settings. Highlights the complexities of HCV care for the homeless in Dublin which parallel complexities world-wide. Housing instability is recognized as a major barrier to HCV treatment retention. **Limitations:** Not all participants had access to a "keyworker" to assist in the referral process. Unable to send reminders to all participants**.** Study was done during a homeless crisis in Dublin, which may have complicated the process for HCV referrals.

Author Recommendations: The homeless population in Dublin could be better served through a community-based treatment model of care.

Implications: Creating community-based clinics for treating the homeless for HCV would alleviate some of the major challenges created by a specialist only referral system in Dublin, Ireland**.**

<table>
<tr><td colspan="4">Source: Larios, S. E., Masson, C. L., Shopshire, M. S., Hettema, J., Jordan, A. E., McKnight, C., . . . Perlman, D. C. (2014). Education and counseling in the methadone treatment setting improves knowledge of viral hepatitis. Journal of Substance Abuse Treatment, 46(4), 528-531.doi: 10.1016/jsat.2013.10.012</td></tr>
<tr><td>Purpose/Sample</td><td>Design
Method/Instruments</td><td>Results</td><td>Strengths/
Limitations</td></tr>
<tr><td>Purpose:

To compare effectiveness of providing Hepatitis education using a motivational enhanced interviewing method for education and counseling versus a standard didactic manner.

Sample/Setting:

n= 440 adults receiving methadone maintenance treatment in two Methadone clinic sites (New York city & San Francisco) who were 18 years or older, Hepatitis C (HCV) negative or unknown, or if HCV + had never received treatment, able to consent.

Johns Hopkins Evidence Appraisal
Level of Evidence: I
Quality: High</td><td>Randomized Control Trial (RCT) Experimental

Participants were randomized into two intervention groups after completing baseline interviews.
1) Standard Hepatitis education and counseling provided by nurse (control).
2) MI-enhanced hepatitis education and counseling presented by staff trained in MI techniques during a 4-hour session (intervention).

Identical educational topics were used in both groups and administered over a 3 -month time frame.

2 educational sessions were done for each group

ANOVAs were used to analyze time as a predictor of changes in HCV knowledge.</td><td>-Knowledge scores for all Hepatitis education increased from baseline to immediately following education and continued through the 3-month follow up at both sites.
-Knowledge retention was greater at 3-month post intervention than immediately after.
-No significant difference between baseline characteristics and HCV prevalence existed between groups.

Conclusion:
There were no additional gains in HCV knowledge associated with MI enhanced techniques when compared to the nurse led intervention.</td><td>Strengths:

RCT eliminates unintended bias.
Group characteristics were similar between both sites.
Knowledge retention was examined.
Results are similar to other studies that have evaluated MI enhanced Hepatitis education.

Limitations:

Study did not address whether increase in knowledge led to desire to be tested and treated.</td></tr>
<tr><td colspan="4">Author Recommendations: Further research using facilitators that have extensive MI training in MI enhanced methods to facilitate HCV education is recommended.</td></tr>
<tr><td colspan="4">Implications: Traditional methods for educating at risk or infected patients about Hepatitis are effective and can be applied without additional training.</td></tr>
</table>

Source: Masson, C. L., Delucchi, K. L., McKnight, C., Hettema, J., Khalili, M., Min, A., … Perlman, D. C. (2013). A randomized trial of a hepatitis care coordination model in methadone maintenance treatment. *American Journal of Public Health*, *103*(10), e81–e88. doi:10.2105/AJPH.2013.301458			
Purpose/Sample	**Design (Method/Instruments)**	**Results**	**Strengths/Limitations**
Purpose: To compare outcomes from a care coordination intervention to improve linkage to Hepatitis A (HAV) and Hepatitis B (HAB) vaccines and Hepatitis C (HCV) evaluation. **Sample/Setting:** 489 participants from methadone treatment clinics in New York and San Francisco. **Johns Hopkins Evidence Appraisal** **Level of Evidence:** I **Quality:** High	Randomized control trial Both groups received individual 2-session Hepatitis and HIV pretest counseling, blood testing, and posttest counseling -*Intervention group* (n=244) – on-site vaccination, and motivational interviewing (MI) -enhanced counseling, and off-site clinical evaluations for 6 months. -*Control group* (n=245) – counseling without motivational interviewing enhanced style, off-site referral for vaccination and hepatitis evaluation. – t-test and Pearson's test applied to compare variables. - Logistic regression models were used to compare outcomes between the two groups.	-40 % were homeless in the past 6 months from both groups -Roughly 70% had injection drug use -Intervention group received HCV evaluation sooner, more likely to complete vaccinations and HCV and HBV treatment recommendations, have greater reductions in alcohol use. -Co-infection with HIV increased likeliness for HCV evaluation. -Individuals reporting homelessness were most likely to not follow through with HCV evaluation. **Conclusion:** -Providing on-site vaccination for HAV/HBV at drug treatment facilities has the potential to increase series compliance. Intervention group's compliance was better overall, but it is unclear which element of the care coordination helped the most.	**Strengths:** Provides insight on how to use existing drug treatment facilities to assist in the testing and treatment for populations at risk for hepatitis. **Limitations:** Low external validity to other settings besides drug treatment centers. Looks at data for linkage with initial evaluation, not compliance for treatment, sustained viral response (SVR12).
Author Recommendations: More research is needed to understand whether the care coordination model is cost effective compared to outcomes it provides.			
Implications: This study shows how Hepatitis C evaluation can be more effective when done onsite at methadone treatment facilities than at off -site referrals, especially among the homeless.			

Source: Norton, B. L., Voils, C. I., Timberlake, S. H., Hecker, E. J., Goswami, N. D., Huffman, K. M., . . . Stout, J. E. (2014). Community-based HCV screening: Knowledge and attitudes in a high-risk urban population. *BMC Infectious Diseases, 14*(1), 74. doi:10.1186/1471-2334-14-74			
Purpose/Sample	**Design (Method/Instruments)**	**Results**	**Strengths/Limitations**
Purpose: To assess attitudes of Hepatitis C (HCV) screening and knowledge of high-risk populations and assess knowledge gain after receiving an education intervention. **Sample/Setting:** n = 140 participants 5 sites utilized by the Wake County, NC public health department. 2 homeless shelters serving men and women. 2 Drug and alcohol rehabilitation facilities. 1 Women's "drop-in" center. **Johns Hopkins Evidence Appraisal** **Level of Evidence:** III **Quality:** High	Nonexperimental (Quantitative) descriptive correlation study. A baseline survey was verbally administered to assess attitudes towards HCV screening and socio-demographic information. A 15-minute educational verbal discussion at a 5th grade education level was conducted that explained HCV disease, clinical importance, prevention, testing, and treatment. This was given by the same investigator at all 5 sites to ensure consistency of information taught. Post evaluation was verbally administered and performed immediately after the education intervention. McNemar test was to assess the correlation between knowledge gain and acceptance of HCV testing from pre to post evaluation.	-Baseline knowledge of HCV was low. Baseline attitudes were favorable to learning about HCV and receiving free Hepatitis vaccines. -Almost all surveyed wanted screening, even if they weren't going to receive treatment. -Post survey results showed the15-minute education intervention increased understanding about treatment the most (71% increase in correct answer). Understanding risk factors and the importance of less alcohol intake also increased. All values were ($p < 0.0074 – 0.0001$). -Participants who refused testing because treatment was not being offered scored lower in HCV knowledge. -Younger white males who knew someone with HCV was associated with greater knowledge gain. **Conclusion:** -Combining screening strategy with on-site education can aid in both compliance and HCV knowledge among high-risk populations and be an initial step in improving the high rates of HCV infection in the homeless.	**Strengths:** Indicates that on-site education is an easy way to increase awareness and desire to be tested. **Limitations:** Convenience sample Bias can exist when verbal administration is used versus written. Impact of HCV education was measured immediately after intervention. Sustainability of results is questionable.
Author Recommendations: In addition to homeless shelters, other community-based primary care clinics and opioid treatment centers are excellent places to educate at risk populations about HCV.			
Implications: The study provides good understanding of HCV attitudes that exist among homeless individuals and gives a good evidence that providing HCV education regarding treatment, risk, and testing increases overall HCV understanding and health compliance.			

Source: Nyamathi, A., Kennedy, B., Branson, C. ,Salen, B., Khalilifard, F., Marfisee, M., …Leake, B. (2013). Impact of nursing intervention on improving HIV, hepatitis knowledge and mental health among homeless young adults. *Community Mental Health Journal, 49*(2), 178-184. doi:10.1007/s10597-012-9524-z			
Purpose/Sample	**Design (Method/Instruments)**	**Results**	**Strengths/ Limitations**
Purpose: To assess the impact of a two-group intervention between a nurse-led Hepatitis Health Promotion (HHP) program and an Arts messaging (AM) program to improve HIV, hepatitis knowledge and mental health conducted over a six -month period in a "drop-in" shelter. **Sample/Setting:** n=156 young adults, predominantly white male, ages 15-25, use of drugs with the last 6 months, homeless. **Johns Hopkins Evidence Appraisal Level of Evidence:** I **Quality:** Good	Random Control Trial -All participants randomized in HHP or AM programs after completing a questionnaire regarding demographics. HHP – 3-4, 45-minute group sessions regarding Hepatitis A & B vaccines, Hepatitis C and (HCV) education. AM program had Arts faculty engage in creative ways to discuss mental health with a one-hour discussion on HCV. Hepatitis B (HBV) and Hepatitis C (HCV) questionnaire was used to test knowledge gained over six months in both groups. Linear regression modeling quantitatively compared AM and HHP knowledge measures.	-HHP group had improved knowledge gains in HBV/HCV. -Well-being scores increased in HHP, but not in AM group. -HHP program had higher scores for all knowledge measures at six months. -Participants citing that "they were trying to get life together" on mental health surveys scored higher in knowledge in all measures, except HBV (all $p < 0.05$). -Decreased drug use noted in HHP group at six months. **Conclusion:** -Using a culturally sensitive interactive, flexible, and empathetic approach for educating homeless at-risk youth and young adults increases knowledge and engagement regarding studied health issues.	**Strengths:** Provided data on younger at-risk populations. Supports the understanding that positive mental health can associate to being more interested in taking care of oneself. Identifies predictors of Hepatitis C risk for youth and young adult as being similar to older adults. **Limitations:** Sample size was not ethnically diverse Results may reflect the sample size's comfort with learning more traditionally. Possible that AM would have been more effective with other ethnicities.
Author Recommendations: HHP intervention may work best with a nurse who is experienced in working/engaging with vulnerable, at risk youth.			
Implications: Homeless youth are becoming more likely to be exposed to HBV and HCV due to prevalent drug use. Understanding how to relate to young adults may be an important factor in delivering education to this high-risk group.			

Source: Read, P., Lothian, R., Chronister, K., Gilliver, R., Kearley, J., Dore, G. J., & van Beek, I. (2017). Delivering direct acting antiviral therapy for hepatitis C to highly marginalised and current drug injecting populations in a targeted primary health care setting, *International Journal of Drug Policy, 47,* 209-215. doi:10.1016/j.drugpo.2017.05.032

Purpose/Sample	**Design (Method/Instruments)**	**Results**	**Strengths/Limitations**
Purpose: To look at outcomes of DAA treatment using two different adherence support models. Enhanced and standard. **Sample/Setting:** Primary health care setting in Sidney, Australia treating IV drug users, sex workers, and at-risk youth for Hepatitis C, HIV, and sexually transmitted diseases. 72 patients commenced for the study. 30% of their participants had been homeless in the last year. 75 % had IV drug use 6 months prior to being treated. Small percentage of participants were on opioid therapy. **Johns Hopkins Evidence Appraisal Level of Evidence:** II **Quality:** High	Quasi-experimental (Observational cohort study) Level of support given was determined by patient and nurse, based on the patient's social situation, ability to store medications safely, and adherence to other daily medications. **Standard support** – Independent pick up medications, follow-up phone call to confirm medication start date, pathology care at week 4, end of treatment (EOT) and SVR (sustained viral response) 12. **Enhanced support-** Weekly phone calls to ensure adherence, observed monthly, weekly or daily dispensing of medication at the healthcare setting, liaison with partner organizations delivering meds to patients (prison, psychiatric units, or hospital units).	-30% reported homelessness. -44% reported IV drug use at least weekly. -25 of the 72 participants elected for the enhanced support. 0% monthly, 13% weekly, 16% daily. -6 of 9 participants in weekly enhanced support received SVR12 testing. -13/16 daily participants received SVR 12 testing. -Univariate analysis showed that homelessness in the last year as the only factor impacting lost to follow up and the ability to obtain SVR 12 data or delayed SVR testing. -The study showed no correlation between non SVR or loss to follow up and injection drug use. **Conclusion:** -Homelessness and greater social marginalization appear to have the greatest impact on completing HCV treatment through SVR 12 than injection drug use alone.	**Strengths:** "Real-world data" affecting DAA treatment for Hepatitis C in highly marginalized populations with a high rate of injection drug use. **Limitations:** Small sample size. Outcomes were not compared to other tertiary settings. Government funded the medications with no limits on disease stage, injection drug use, or alcohol use. No restrictions placed on reinfection treatment.
Author Recommendations: Specific strategies are needed to increase adherence to post-treatment follow up and testing, especially among the homeless. More linkage to care and follow-up models for highly marginalized populations should be explored.			
Implications: Enhanced support models as discussed in this study are opportunities for nursing to provide more support to these communities to ensure treatment adherence.			

Source: Sena, A. C., Willis, S. J., Hilton, A., Anderson, A., Wohl, D. A., Hurt, C. B., & Muir, A. J. (2016). Efforts at the frontlines: Implementing a hepatitis C testing and linkage-to-care program at the local public health level. *Public Health Reports, 131*, 57-64. doi:10.1177/00333549161310S210			
Purpose/Sample	**Design (Method/Instruments)**	**Results**	**Strengths/ Limitations**
Purpose: To increase testing for HCV infection by offering HCV testing at established sites already doing testing for HIV and STDs. **Sample/Setting:** 2,004 anti-HCV tests were performed on adults from STD clinic, community testing sites, homeless clinic, county jail in Durham County, NC **Johns Hopkins Evidence Appraisal** **Level of Evidence:** III **Quality:** Good	Non-experimental -HCV testing was performed along with testing for HIV and STDs by clinical or health educators. -Risk factor information was collected -Rapid anti-HCV tests were done at locations where it could be hard to otherwise connect with patient to give results. -Pretest/posttest counseling was done. - Linkage to care for HCV infection was provided by a health educator. Reviewed medical/drug history, drug-reduction counseling, scheduled appointments. -Prevalence of Hepatitis C by testing site was analyzed. -Referred to liver specialist or infectious disease provider.	-Linkage to care was most challenging for uninsured. (71%) -On-site clinics at homeless shelter and other testing sites were instituted. -12% (241) had chronic HCV -2.5% were co-infected with HIV. -Highest percentage of HCV chronic infection was among the homeless (22.6%) -81.7% received HCV results/posttest counseling. 68% referred to HCV care. 91.8% attended first appointment. -50% of birth dates of 1945-1965 had anti-HCV+ **Conclusion:** Coordination of care with appointment reminders increases compliance. Having complete contact information decreases loss to follow-up. Transportation barriers are alleviated when testing is done on-site.	**Strengths:** -Large sample size **Limitations:** - Testing was funded by public health grants specifically focused at decreasing HCV infection. -Gift card given -Low external validity. -Not transferrable to all US public health departments. - Treatment completion and sustained viral response (SVR) was not studied.
Author Recommendations: Provide HCV testing at existing HIV/STD testing sites to provide HCV awareness and linkage to a provider's network for care.			
Implications: Instituting a system of coordinated care can significantly impact HCV awareness, testing, and treatment.			

Source: Williams, B. E., Nelons, D., Seaman, A., Witkowska, M., Ronan, W., Wheelock, H., . . . Garcia, J. (2019). Life projects: The transformative potential of direct-acting antiviral treatment for hepatitis C among people who inject drugs. *International Journal of Drug Policy, 72*, 138-145. doi:10.1016/j.drugpo.2019.03.015			
Purpose/Sample	**Design (Method/Instruments)**	**Results**	**Strengths/Limitations**
Purpose: To look for emergent themes that motivated people who inject drugs (PWID) to complete direct-acting antiviral (DAA) treatment for HCV infection. **Sample/Setting:** n=27 Two groups receiving care from a healthcare for the homeless clinics in Portland, OR 1-Receiving opioid antagonist therapy (OAT) 2-partakes in a needle and syringe exchange program (NSP). **Johns Hopkins Evidence Appraisal Level of Evidence:** III **Quality:** High	Qualitative study Interviews (Life project analysis) were conducted on 27 patients (approximately half from OAT, half from NSP) that were at week 10 or 12 of HCV treatment. Motivations for seeking and completing HCV treatment was asked to all participants. Interviewers specifically wanted to know how the individual's socioeconomic background, social networks, prior medical care, history of drug use, stigma surrounding HCV, and experience with DAA treatment affected their ability to complete treatment. Data was collected, coded, and group into themes through group discussion by interviewers.	-Social incentives have a positive effect on completing HCV treatment. -Both groups viewed HCV treatment as an opportunity to shape how they viewed their health, relationships, and reflect on their drug use. -HCV treatment was viewed as an opportunity to rid the stigma associated with being a drug user and obtain stable housing, employment, and healthy living. **Conclusion:** Understanding personal motivations for completing treatment can help empower PWID to remain virus free regardless of current or future drug use.	**Strengths:** Identifies the social incentives for PWID to cure their HCV infection. Identifies the strength of interviewing patients to understand and support their motivations for better health. **Limitations:** Did not discuss SVR 12. Small sample size. Doesn't include data for themes associated with "not willing to do treatment".
Author Recommendations: The motivation to complete treatment exists among PWID. However, simplified universal access to HCV treatment needs to exist also to maximize the benefit of curing HCV infection in this population.			
Implications: Increasing HCV treatment uptake by PWID could have significant effects on disease burden. Understanding why PWID engage in HCV treatment could be used to develop programs that encourage more to partake in treatment.			