IMPROVING HEPATITIS C SCREENING RATES IN A PRIMARY CARE SETTING

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Improving Hepatitis C Screening Rates in a Primary Care Setting

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ABSTRACT

Hepatitis C Virus (HCV) is the most common blood borne infection in the United States and frequently develops into a chronic disease, which can lead to serious health complications including liver damage, cirrhosis, cancer, and death. Due to vague symptomology associated with HCV, half of people with chronic HCV are unaware of their condition. New HCV infections are most common in persons who inject drugs (PWID) and chronic infection is currently most prevalent in baby boomers (birth age 1945 to 1965).

The purpose of this project was to increase health care professionals' comfort level and knowledge regarding HCV screening guidelines per USPSTF as well as to improve HCV screening rates for the PWID cohort and baby boomer cohort. This project was implemented when risk-based HCV screening was recommended. Many eligible patients do not undergo screening as nationally screening rates are low at 12.8%. Lack of time and knowledge deficit are common documented barriers that health care professionals identified throughout the literature that negate screening uptake.

This project was implemented by a multidisciplinary team utilizing the PDSA method. Two one-hour educational sessions were developed and provided to all health care professionals at two federally qualified health center primary care clinics in the Midwest region. The presentations were conducted by an infectious disease physician, a pharmacist who specializes in viral hepatitis, and the co-investigator in October 2019. Academic detailing occurred to follow-up and support health care professionals.

A voluntary, post-implementation survey was distributed to participants after the educational sessions and an abbreviated survey two months later. PWID and baby boomer and

pre- and post-implementation screening rates were computed through the facility's established process.

After this project, HCV screening rates increased by 16% for the baby boomer cohort and 5.5% for the PWID cohort. Health care professionals' knowledge and confidence in HCV screening guidelines was enhanced through this intervention. With new updated universal HCV screening guidelines, continued efforts to screen for HCV is essential.

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CHAPTER ONE. INTRODUCTION

Background

Hepatitis C virus is the most common blood-borne infection in the United States and is a marked public health concern. Approximately 2.4 million adults in the United States are living with a current HCV infection. Hepatitis C virus is spread from blood products being shared from an infected person. Serious negative sequelae of chronic HCV infection include decompensated cirrhosis, severe fibrosis, hepatocellular carcinoma, and or premature death (Brady et al., 2018; Centers for Disease Control [CDC], 2018). Furthermore, hepatitis C related end-stage liver disease remains the most common indication for liver transplants in the United States (Chopra, 2019; Moyer, 2013). Hepatitis C virus continues to be the primary contributor of an increase in advanced liver disease pathology as well as increased healthcare costs (Razavi et al., 2013).

A number of agencies recommend one-time screening for "baby boomer" individuals born between the years of 1945-1965, and routine screenings for patients at risk for developing HCV infection (American Association for the Study of Liver Diseases [AASLD], 2018a; American Gastroenterological Association [AGA], 2019; CDC, 2018; United States Preventative Task Force [USPSTF], 2013). The USPSTF recommendation occurred as chronic HCV infection can contribute to diminished quality of life and increased health care costs for the individual and healthcare if left undiagnosed and untreated. Moreover, individuals born between 1945-1965 are more likely to be diagnosed with HCV infection, as individuals born within the timeframe may have received blood transfusions before blood screening occurred for HCV in 1992 (USPSTF, 2013). The prevalence of hepatitis C virus is the highest amongst baby boomers, as approximately 75% of individuals living with HCV were born within that timeframe. In addition, baby boomers account for 73% of all hepatitis C associated mortality (CDC, 2018). According to

the North Dakota Department of Health [NDDOH] (2018a) a 45% increase in HCV infections amongst 55 and older population group has been identified from 2013 to 2017 in the state (NDDOH, 2018a). Birth cohort screening for baby boomers has been demonstrated to be a cost-effective way to identify cases of chronic HCV infection (USPSTF, 2013; Rein et al., 2012). When an individual screens positive for HCV infection, effective treatments can occur thus eliminating the disease complications in most cases.

The most important risk factor for HCV infection is a past or current history of persons who inject drugs (PWID) (USPSTF, 2013). Specifically, in North Dakota 88% of individuals with HCV cases in 2017 reported injection drug use as a risk factor (NDDOH, 2018). Other at-risk individuals for developing HCV infection includes recipients of a blood transfusion prior to 1992, long-term hemodialysis, being born by an HCV infected mother, incarceration, intranasal drug use, unregulated tattooing, and percutaneous exposure (USPSTF, 2013).

A grade "B" recommendation was set for screening for HCV amongst the USPSTF in the recognized above cohorts (USPSTF, 2013). The grading system by the USPSTF is ranked A, B, C, D, or I. A grade "B" recommendation correlates to a "…high certainty that the next benefit is moderate or there is moderate certainty that net benefit is moderate to substantial," with suggestions to "offer or provide this service" for providers in practice (USPSTF, 2013, p. 1). Conversely, about 50% of individuals infected with HCV are unaware of their HCV infection status (AASLD, 2018). Even though current guidelines support screening for HCV infection, provider, facility, and patient barriers to screen for HCV infection, which supports treatment of disease, remains an ongoing concern.

In addition to the undesirable health ailments associated with untreated HCV infection, economic burdens are recognized. Razavi et al. (2013) indicated that the total cost for HCV

infections in the United States is approximately $6.5 billion for the year 2011 and the projected cost for the year 2024 is to be approximately $9.1 billion. Annual costs for HCV infection in medical and loss of work expenses were estimated to range from $600 million to $1 billion (Albeldawi, Ruiz-Rodrigues, & Carey, 2010).

Screening for HCV is the first step to identifying if an individual has HCV. Centers for Medicare and Medicaid Services (CMS) identified that current USPSTF recommendations provide necessary evidence on how screening for HCV is necessary and therefore will cover HCV screening when ordered by the beneficiary's primary care provider or practitioner within the context of a primary care setting, and performed under the following conditions:

> An HCV screening test is covered for adults at high risk for Hepatitis C Virus infection. 'High risk' is defined as persons with a current or past history of illicit injection drug use and persons who have a history of receiving a blood transfusion prior to 1992. Repeat screening for high risk persons is covered annually only for persons who have had continued illicit injection drug use since the prior negative screening test. A single screening test is covered for adults who do not meet the high risk as defined above, but who were born from 1945 through 1965 (CMS, 2014, p. 1).

Centers for Medicare and Medicaid concluded that determination of a patient at high risk for HCV is to be established by the primary care physician or practitioner (CMS, 2014). Upholding screening recommendations for HCV in primary care clinics is fundamental in order to support a decrease in the negative sequelae associated with untreated, or unidentified HCV infections.

Significance of the Project

Regardless of the observed recommendations to screen for HCV, a marked number of eligible individuals are not being screened. Primary care health care professionals may lack

knowledge of when to screen patients for HCV. A cross sectional analysis of the National Health Interview Survey Population, 2013-2015 presented by Kasting et al. (2018) validated that current HCV screening rates for birth cohort populations in the United States is 12.8%, which falls well below the national recommendations of a screening goal for 60% of those infected with HCV aware of their condition. There was a slight increase in adult cohort screening from 2014 to 2015 of 1.3%, but ongoing efforts are warranted (Kasting et al., 2018).

Hepatitis C screening has a magnitude of benefits. By detecting HCV infection early, screening facilitates virologic suppression, as treatment earlier in the course of the disease is more effective than later (USPSTF, 2013). The USPSTF (2013) denoted limited evidence on the harms of screening for HCV. The trend of low HCV screening rates nationally signifies how further interventions and research is warranted to increase HCV screening rates in order to facilitate effective treatment modalities.

National and statewide agencies place emphasis on goals that support a decrease in HCV cases to decrease morbidity and mortality for individuals. The National Viral Hepatitis Action Plan, which is our nation's action plan for fighting viral hepatitis in the United States, identifies the following goals:

- Prevention of new viral hepatitis infections.
- Reduce health and improve the health of people living with viral hepatitis.
- Reduce viral hepatitis health disparities.
- Coordinate, monitor, and report implementation of viral hepatitis activities (U.S. Department of Health and Human Services [USDHHS], 2017).

Healthy People 2020 also identified two objectives related to hepatitis C infection, which have yet to be achieved. The objectives include:

- Increase the proportion of persons aware they have hepatitis C infection.
- Reduce new hepatitis C infections (Office of Disease Prevention and Health Promotion [ODPHP], 2019).

Recognizing national goals and objectives verifies the significance of HCV infection in the United States.

At the state level, the North Dakota Department of Health (NDDOH) has established objectives to support the reduction of viral hepatitis infections by 2021. The objectives by the state includes lowering the annual number of new hepatitis C infection among people under 36 years by 50% (NDDOH, 2018b). Strategies to address this objective provided by NDDOH is to

- Ensure individuals in North Dakota have access to hepatitis C treatment.
- Ensure health care providers are educated to provide HCV treatment modalities.
- Facilitate collaboration with healthcare providers to conduct quality improvements and develop materials for best practices for healthcare providers.
- Provide education to healthcare professionals in the primary care clinic setting is fundamental in order to facilitate increases in HCV screening rates thus decreasing morbidity and mortality (NDDOH, 2018).

Project Purpose

As screening rates for HCV are significantly below national and state goals, challenges exist regarding how to impact HCV screening rates. The purpose of this quality improvement project was to determine if education through the use of an educational session, followed by academic detailing components amongst health care professionals at a primary care clinic

organization in the Midwest influenced hepatitis C screening rates. The influence of the project was measured by an overall increase in HCV screening rates in the PWID and baby boomer cohorts at the facility. Another aim for this project was to determine if providing education for health care professionals influenced comfort level and knowledge of regarding HCV screening guidelines.

Congruence of the Project to the Organization's Strategic Plan/Goals

The participating primary care clinic organization identified a need to increase HCV screening rates with measures to support healthcare professionals' education. A secondary analysis of HCV screening rates at the participating facility identified the need for improved HCV screening rates at this clinic. Educating health care professionals regarding HCV screening was supported by the participating primary care clinic organization. Additionally, the need for increased HCV screening at state and national levels further demonstrates added relevance to the clinic setting. Overall, the purpose of this project aligns well with the primary care facility's goals, to improve patient outcomes and quality care as well as national goals for HCV reduction strategies.

Project Objectives

Objective One

Enhance health care professionals' perceived HCV knowledge and comfort level in addressing HCV screening recommendations within six months of implementation.

Objective Two

Identify persons who inject drugs (PWIDs) who seek care at the clinic to enhance HCV screening opportunities for those individuals within six months of implementation.

Objective Three

Increase HCV screening rates for patients in the baby boomer cohort (birth year 1945-1965) at a primary care clinic within six months of implementation.

CHAPTER TWO. LITERATURE REVIEW

A literature review was conducted to identify studies regarding primary care provider's efficacy of HCV screening and measures which enhance HCV screening rates amongst the PWID cohort and baby boomer birth cohort (1945-1965). In addition, search on measures utilized to improve HCV identification and treatment was conducted. The databases searched included Cochrane, Cumulative Index to Nursing and Allied Health Literature (CINAHL), PubMed, EBSCOhost, UpToDate, and American College of Physicians. Key terms searched included, "hepatitis C", "HCV', and "chronic hepatitis C" in combination to "primary care", "screening", "barriers", "guideline", "recommendations", "identification", "screening tools", "diagnosis", "continuing education", "academic detailing", "treatment", "IVDU", "PWID". As an adjunct to the selected articles, various websites were examined in order to support statistical data, guidelines, and recommendations, including USPSTF, CDC, AASLD, and AGA. To further condense the articles, search filters were set for peer-reviewed, full text articles, and articles with a publication date of less than ten years. Articles pertaining to medical, nursing, or public health topics were identified as additional inclusion criteria. The articles chosen consisted of systematic reviews, meta-analysis, clinical guidelines, cohort studies, mixed methods study, a cross-sectional study, original research, and background articles.

Hepatitis C Virus

Hepatitis C is a liver infection caused by a blood borne HCV virus (CDC, 2019a). Individuals who are uninfected with HCV become infected through the HCV virus via blood transmission. Individuals can become infected with HCV by various activities such as sharing needles, syringes, or other equipment to prepare drugs for injection. Other transmission modes include needle sticks in healthcare settings and being born to a mother who has HCV. Less

common causes of HCV transmission include use of personal care items such as a razor contaminated with another individual's blood, having sexual contact with an individual with HCV, or getting a tattoo or body piercing in an unregulated setting (CDC, 2019a). Some individuals who become infected with HCV virus may have a short-term illness, but often are asymptomatic. Approximately 75 to 85% of individuals who become infected are subjected to a chronic, long-term infection unless screening and treatment occurs (CDC, 2019a). Conversely, for some reasons that are not fully understood, approximately 15% to 25% of infected people do clear HCV virus from their bodies without treatment, thus not developing long-term chronic disease. Moreover, only about 20% to 30% of individuals with acute HCV may experience fatigue, abdominal pain, decreased appetite, or jaundice. For individuals who develop symptoms from acute HCV, the estimated period from exposure to symptom(s) onset, or incubation period, is about 2 to 12 weeks. The asymptomatic nature of many HCV infections contributes to an unawareness and potential transmissibility of the disease (CDC, 2019a).

In a similar presentation to an acute HCV infection, individuals with chronic HCV infection are often asymptomatic. Chronic HCV infection may present with non-specific symptoms such as depression and or chronic fatigue (CDC, 2019a). Many individuals who have chronic HCV infection develop chronic liver diseases as the disease progresses. Chronic liver disease in HCV infected individuals often develops in a slow progression without notable signs or symptoms for years (Brady et al., 2018; CDC, 2019a; Chorpa, 2018). The CDC (2019a) findings support that HCV infection is not often recognized until asymptomatic individuals are identified though blood screening means or when elevated alanine aminotransferases (ALT) levels are found on routine examinations.

Chronic hepatitis C virus is noted to be one of the most common chronic liver diseases in the United States and accounts for approximately 19,000 deaths per years (Kim, 2019). The World Health Organization (WHO) estimated that in 2015, approximately 100 million people globally had serologic evidence of HCV exposure and 71 million people had chronic HCV infection (Kim, 2019). In the United States in 2016 there was an estimated 41,200 new HCV infections, which was a fourfold increase since the year 2005 (Kim, 2019).

Injection drug use is the most important risk factor for HCV acquisition in the United States. The increasing incidence of HCV infections among young individuals in various urban, suburban, and rural settings has mirrored the epidemic of injection prescription opioid and subsequently heroin use in these areas (Kim, 2019). Approximately 80% of patients with chronic HCV in the United States were born between 1945 and 1965 (baby boomer). The prevalence of HCV among the baby boomer cohort was 2.6% which was sixfold the prevalence among all other adults (Kim, 2019). Additional characteristics associated with chronic HCV infection include male gender, non-Hispanic black race, low socioeconomic status, high school education or less, a history of incarceration, marginal housing, and a history of at least 10 lifetime sexual partners (Kim, 2019).

Screening Methods

Screening for HCV infection relies on a two-step process consisting of anti–HCV antibody testing followed by RNA polymerase chain reaction testing for viremia which is accurate for identifying patients with chronic HCV infection (Kim, 2016; USPSTF, 2013). Interpretation of the test outcome is key in order to identify following actions to recommend.

The CDC (2013) identifies that if the test outcome is HCV antibody nonreactive, the individual does not have an HCV antibody detected therefore can be reported as HCV negative

with no further action required. However, if recent HCV exposure is suspected, one should test for HCV RNA. In cases of an immunocompromised individual, it is advisable to consider testing for HCV RNA. If the HCV antibody result is antibody reactive, the interpretation may suggest HCV infection. In this instance, the test could signify current HCV infection, past HCV infection that has resolved, or a false positive. In this case, the HCV RNA should be done in order to identify current infection. If a screening test presents as HCV antibody reactive, and HCV RNA is detected, a current HCV infection is confirmed. With a confirmed HCV infection, the patient should be counseled and linked to further treatment. In the case of a positive HCV screening, the CDC (2013) recommends that the provider should retest the patient for HCV RNA in a subsequent blood sample to confirm HCV positivity, prior to starting therapy. Lastly, if the test result denotes HCV antibody reactivity, but HCV RNA is not detected, the interpretation is no current HCV infection is detected and in most cases no follow-up is needed (CDC, 2013).

For patients who are HCV RNA positive and are treatment candidates, genotype testing should be done because results affect treatment choice and duration (AASLD, 2018). Collectively, there are six different genotypes (1-6) infection for HCV. Treatment modalities also take into consideration whether cirrhosis, or compensated cirrhosis is present (AASLD, 2018). Individuals screened in the baby boomer cohort and are not otherwise at an increased risk only need to be screened once for HCV (USPSTF, 2013). Individuals with continued risk for HCV infection, such as PWID need to be screened periodically (USPSTF, 2013).

Costs

Analysis of screening for HCV can range from $357 to $1,047 per case detected, which is comparable between other diseases that providers routinely screen for (Albeldadi et al., 2010). Rein et al. (2012) utilized a validated model to determine the cost effectiveness of birth-cohort

screening for HCV in the United States, in which the results showed $2,874 in screening cost per new case infection identified. Rein's study noted how birth cohort testing is costlier than screening based on injection-drug use or elevated alanine aminotransferase levels, but without birth cohort screening many cases of HCV remain undetected (Rein et al., 2012). Furthermore, the study predicted that birth cohort testing would help to identify an additional 808,580 cases of HCV infection and prevent 82,000 HCV related deaths, which validates birth cohort testing (Rein et al., 2012). Rein et al. (2012) disclosed that the median price at which hepatitis C treatment becomes cost-saving in the U.S. is $70,900 in 2014. The cost of recommended initial HCV therapy for a treatment-naïve, meaning no previous treatment, ranges from $26,500 to $94,500 wholesale costs. However, the actual patient cost paid for medications to treat HCV may be drastically lower than wholesale cost, due to a number of factors including contacts, rebates, and insurances plan coverage (Woolston & Kim, 2018). There are ample of opportunities to improve identification and care of patients with HCV, thus lowering the burden of morbidity and mortality resulting from undiagnosed and untreated HCV infection (Holmberg, Spradling, Moorman, & Denniston, 2013).

Barriers to Screening

From a patient perspective, there are a number of barriers to HCV screening. As identified, HCV infection is often asymptomatic or presents with vague symptoms years before the development of serious complications occur. The vague symptoms may lead to underdiagnosing this condition amongst health care providers and may not prompt patients to seek care for HCV-related ambiguous symptoms (CDC, 2019). Access to medical and preventative health services that are responsive to the needs and vulnerabilities of PWID is another important determinant of low HCV screening uptake (Barocas, Brennan, Hull, Stokes, &

Westergaard, 2014). Barocas et al. (2014) signified that PWID individuals were more likely to obtain HCV screening if they had a primary care provider versus free multi-syringe exchange program that offers HCV screening. Themes noted across the literature suggested important resources needed for PWID cohorts are access to medical and preventative services and non-judgmental providers (Barocas et al., 2014; Swan, et al., 2010). In addition, Trinh and Turner (2018) denoted how stigmatization of hepatitis C, primarily spread though PWID also leads to lack of screening. Bruggmann and Litwan, (2013) added that when PWID are transferred to other care facilities once screened positive for HCV, they often miss appointments due to stigmatization, which negates optimal treatments.

Health care professionals also face challenges to optimize HCV screening rates and uptake. Numerous sources report that HCV has been historically underdiagnosed in clinic settings (Brady et al., 2018; CDC, 2018; USPTSF, 2018). Adhering to HCV screening recommendations ranges from 6 to 20% across several studies for the baby boomer population (Konerman & Lok, 2016). Common barriers amongst health care professionals regarding HCV screening include the number of risk factors needing to be assessed, lack of time, knowledge deficit, hesitance of discussing socially stigmatizing behaviors with patients, fearful of poor reimbursement from insurers, treatment efficacy, and concern that patients may not have access to ongoing care (Jewett et al., 2015). A qualitative survey distributed to physicians, nurse practitioners, and physician assistants found that the majority of primary care providers reported limited or no knowledge of HCV care (Falade-Nwulia et al., 2016). A semi-quantitative study among six European countries identified that 56% of providers were unaware of national guidelines (Bechini et al., 2015). The same study determined when providers screened patients

for HCV and received positive HCV results the corresponding treatment and appropriate referral rates were low (Bechini et al., 2015).

Specific to PWID cohort, Linas, Hu, Barter, and Horberg (2014) identified a lack of documentation regarding drug use history in the EHR, leading to lower likelihood of those patients being screened for HCV. Another obstacle to PWID HCV screening uptake is the lack of treatment settings that are suitable for the needs of PWID. Robust screening interventions are warranted in all settings to support prompt treatments for HCV thus lowering the disease burden (Bruggmann & Litwan, 2013). Furthermore, a meta-analysis by Shehata et al. (2018) signified that barriers to HCV screening and testing for patient include low-self perceived risk of acquiring HCV, perceived stigma, and fear of a positive result (Shehata, Austin, Ha, & Timmerman, 2018)

Interventions to Increase Screening

The need to increase HCV screening rates is substantial in order to decrease the negative consequences associated with undiagnosed HCV. Fortunately, today there are several approaches documented that have supported increased HCV screening rates amongst health care settings.

Toolkits

The CDC has a hepatitis C toolkit, *A Guide to Comprehensive Hepatitis C Counseling and Testing* available for healthcare providers (CDC, n.d.). The toolkit includes a number of components which include ways to identify individuals who should be tested for HCV, scripting for providers in order to facilitate discussion, and counseling patients regarding HCV testing. The toolkit also offers recommended testing sequence algorithm for identifying current HCV infection and interpretation of results (CDC, n.d.).

Various websites have free validated evidence-based online curriculum to support enhanced knowledge of HCV for healthcare professionals. Hepatitis C Online (2019) website has five online modules to educate with the following topics:

- HCV epidemiology in the United States.
- Recommendations for HCV screening.
- HCV diagnostic testing.
- Counseling for prevention of HCV transmission.
- Diagnosis of acute HCV infection (Hepatitis C Online, 2019).

Furthermore, the Addiction Technology Transfer Center Network (ATTCN) (2019) offers online courses on HCV for health care professionals as well as a tool to guide testing and conversation modalities for HCV for providers to use. The Institute for Research, Education, and Training in Addiction (IRETA) (2019) has a toolkit for motivational interviewing to help support HCV screening uptake for health care professionals to view.

Reminder Health Record Prompts

Physical reminders to support awareness for health care professionals has been documented to increase HCV screening uptake. A systematic review and meta-analysis found that provider reminders to prompt HCV testing during clinic visits strongly correlated to increased HCV screening rates (Zhou et al., 2016). An implementation of reminder stickers (physical or via EMR) on patient's charts has been shown to prompt providers to ask about HCV-associated risk behaviors, or order HCV screening for patients born within the baby boomer cohort (Zhou et al., 2016).

Another study presented by Drainoni et al. (2012) implemented a primary care provider risk screening intervention based on a risk screening tool that successfully increased HCV testing

rates among patients. The screening tool consisted of 12 questions for risk-screening factors pertaining to HCV. The study additionally focused on prompting providers with reminder sticker to ask the screening questions in order to identify HCV risk and order HCV testing if warranted. Other interventions noted in this study involved standardized training consisting of on-site educational sessions involving a standardized presentation on HCV screening guidelines for providers (Drainoni et al., 2012). The Drainoni et al. (2012) study signified how case identification of HCV is critical to support treatment means and linkage to care.

Electronic Medical Records / Workflows

Implementation of an electronic medical record (EMR) based prompt coupled with sound workflow designs has been demonstrated to increase HCV screening rates among baby boomer cohorts in primary care settings (Konerman et al., 2017). Electronic clinical decision support (eCDS) aids also have been documented to promote increase screening and further linkage to care baby boomer cohorts (Armstrong et al., 2019). A review of three randomized controlled trials presented by Yartel et al. (2018) signified how birth cohort testing rates were three times more effective at identifying HCV cases with the EMR best-practice alert trial compared with not using EMR alerts. Although organizations may vary, implementation of these strategies may support sustainable awareness and improvement on HCV screening rates.

Education

Primary care provider focused educational interventions are essential to expand HCV screening and linkage to care (Samuel, Martinez, Chen, Markatou, & Talal, 2018). Mostofian, Ruban, Simunociv, and Bhandari (2015) showed how forms of continuing medical education interventions are effective for implementation of guidelines into practice. Additionally, the Institute for Healthcare Improvement (2019) recognized how implementation of provider

education methods such as scheduled educational sessions and the use of an expert or specialists can facilitate decision support amongst healthcare providers. A systematic review by Jones et al (2014) identified how targeted case findings with support training for primary care practitioners increased HCV testing, and influenced screening uptake in high-risk groups such as PWIDs.

After HCV education occurs, a concept known as academic detailing can further support desired outcomes. Academic detailing entails clinical practice facilitation with a regular, tailored follow-up and helps to support change (Alagoz, Chih, Hitchcock, Brown, & Quanbeck 2018). Yeh, Van Hoof, and Fischer (2016) conducted a study to ascertain key features of academic detailing using the Delphi method and concluded that a component of academic detailing entails focused provider education in order to support clinical decision making. A systematic review by Alagoz et al. (2018) demonstrated how academic detailing is a widely used organizational strategy after a multi-component implementation occurs. Specific to enhancing screening rates, a study conducted by Mader et al. (2016) was conducted to determine the impact of academic detailing impact on cancer screening rates in a primary care setting. The study concluded that combining practice facilitation and academic detailing can support system-level changes, thus improving population health (Mader et al., 2016). Although limited research exists on academic detailing components directly related to enhanced HCV screening rates, the application of other cancer screening has been shown to support increased uptake and could feasibly be applied to support HCV screening efforts.

Multidisciplinary Approaches

Abundant research exists for the implementation of combined approaches in order to enhance HCV screen rates within clinic settings, including provider education and implementation of EMR alerts. A study presented by Trinh and Turner (2018) increased HCV

screening rates in the population of patients born between 1945-1965 from 24% to 88% with six cycles of interventions after a one-year time span. The cycles of interventions in this study included:

- Collection of baseline data; baseline survey of provider knowledge.
- Distribution of guidance for providers for discussion HCV screening with patients.
- Addition of an EMR prompt in the clinic's annual visit template to remind providers to screen for HCV.
- Petition to the institution's EMR management board to include HCV as an automatic, age specific, prompt within the health maintenance section; addition of a modified prompt in the EMR "forced" response to screening.
- Incorporation of HCV screening in the health maintenance section of the EMR.
- Individualized audit of provider's HCV screening rates with rewards to those with highest screening rates (Trihn & Turner, 2018).

The most effective intervention in the Trinh and Turner study was the use of reminders built into the EMR and informing providers about their personal HCV screening rates relative to the clinic (Trinh & Turner, 2018).

A study presented by Al-Hihi, Shankweiler, Stricklen, Gibson, and Dunn (2017) also included an EMR alert paired with provider education to improve HCV screening for the birth cohort of persons born between 1945-1965 in a primary care clinic setting. The interventions consisted of developing a workflow that included best practices, health maintenance overdue alerts in the EMR, and to provide primary care provider education regarding baby boomer HCV screening recommendations. Education was completed through a single in-person educational session conducted by the Division of Gastroenterology and Hepatology in their facility. The

provider education and EMR alerts correlated to a 10% increase in screening rates over a three-month timeframe. Overall, HCV screening rates in their study rose from 30% to 55% after a nine-month completion of the study (Al-Hihi et al., 2017). A strong emphasis should be placed on provider education, EMR use, information technology, and clinic workflow development in order to support an increase in HCV screening rates.

Other models of care should be described and recognized. The U.S. Department of Veterans Affairs (VA) is the largest care provider for HCV infected patients and have notably aggressive treatment for HCV (Belperio et al., 2017). Best practices seen in VA facilities heavily support increase HCV testing through electronic point of care clinical reminder for HCV risk assessment and testing, an automated letter recommending HCV testing, and weekly primary care panel reviews identifying patients with upcoming appointments who require HCV testing (Belperio et al., 2017). Although the VA system is unique, many of the documented interventions could be used in other health care settings. At the core of the studied interventions, provider education is often warranted.

Treatment

Treatment is a key step after screening HCV screening occurs. The purpose of treatment for HCV is to prevent long-term health complications of chronic HCV and achieve sustained virologic response (SVR) (Yek et al., 2017). Sustained virologic response is absence of the detectable hepatitis C virus in blood work after completing antiviral therapy for hepatitis C infection. The gold standard for determining cure of HCV is demonstration of sustained undetectable HCV RNA levels after treatment occurs. An SVR is often undetectable after 12 weeks of completing HCV therapy by direct-acting antiviral therapy. Individuals with an undetectable HCR RNA level at 12 weeks post treatment are considered to have achieved a

virologic cure (Scott & Kim, 2018). Among those who achieve an SVR at 12 weeks, more than 99% go onto achieve an SVR at 24 weeks. Long term follow-up studies indicate that after an SVR at 24 weeks, nearly 100% remain HCV RNA negative for years after therapy (Scott & Kim, 2018).

Recommendations for direct-acting antivirals (DAAs) are based on the HCV subtype, the presence or absence of baseline NS5A resistance-associated substitutions (RASs), and the presence or absence of compensated cirrhosis (AASLD, 2017). Primary care providers may take on the role of treating patients with HCV infection, thus alleviating the burden on hepatologists or other subspecialty departments (Kabiri, Jazwinski, Roberts, Schaefer, & Chhatwal, 2014). Direct-acting antiviral are simpler to administer than previous therapies, but continued education for patients and providers is warranted in order to facilitate compliance and cure of disease. Shifting options to treat HCV infection in primary care settings comes with marked obstacles. Common barriers noted for treatment of HCV amongst primary care providers includes: Contraindications to treatment, lost to follow-up, long term duration and adverse effects, lack of access to treatment, and lack of practitioner expertise (AASLD, 2018). Furthermore, the process of obtaining insurance approval for new HCV treatment regimens can be daunting, complicated, and time-consuming for providers (Woolston & Kim, 2018).

Fortunately, interventions to promote treatment of HCV infection have been demonstrated. A nonrandomized controlled study found that providing a three-hour training to 16 non-specialty providers focusing on HCV epidemiology, screening, assessment of liver fibrosis, management, and pharmacology task shifting was safe and effective (Kattakuzhy et al., 2017). The study further concluded how there was no significant difference in SVR observed in patients treated by specialists, primary care providers, and nurse practitioners (Kattakuzhy et al.,

2017). In order to prevent the development of adverse health events noted in chronic HCV infection and facilitate effective treatment modalities, screening needs to be fundamental. Supporting a treatment cascade that involves properly screening and linkage to care in patients is vital.

Conclusion

After a thorough literature review, the negative sequelae associated with chronic HCV infection can pose is evident. The risk of HCV screening is minimal compared to the benefits achieved from early identification and treatment. Without proper treatment of HCV, patients are at an increased risk for development of serious negative health sequela, financial burden, and diminished quality of life. As supported by the USPSTF (2013), screening for HCV has been proven to be beneficial by early detection and effective treatment thus limiting the adverse health events for patients who may have HCV infection. To support effective HCV treatment modalities, screening needs to occur on the forefront. A number of documented interventions for health care settings to increase HCV screening rates have been established which often involves collaborative approaches. A common focus of the literature reviewed regarding expansion of HCV screening rates involved provider education. Hepatitis C virus is treatable, but vigorous screening, detection, treatment interventions, and further research is needed to provide linkage to care and effective treatment, which in turn would limit the negative sequelae associated with HCV.

Theoretical Framework

Theories along with evidence-based models can be applied in various forms in multiple settings. Research reveals that when applied effectively, theories along with evidence-based models enhance quality care and promote a desired change. Throughout healthcare settings,

theoretical applications and evidence-based models are used to support patient care, improve quality, and often provide a holistic model approach to nursing. The *Social Ecological Model* (SEM) was the theoretical model selected to guide the project. The Plan Do Study Act was selected as the model for project planning constructs.

Social Ecological Model

The *Social Ecological Model* (SEM) developed from the works of Urie Bronfenbrenner's *Ecological Systems Theory*, which examined relationship between the individual and environment; Kenneth McLeroy's *Ecological Model of Health Behaviors*, which signified levels of health behaviors; and Daniel Stokols's *Social Ecological Model of Health Promotion*, that identified the assumptions outlined in SEM (Chimphamba Gombachika et al., 2012). The *Social Ecological Model* is a systems model that contains multiple bands of influence, which encapsulates a rainbow formation (CDC, 2019b). The levels of bands included within the SEM model are individual, interpersonal, organizational, community, and policy.

The *Social Ecological Model* can be configured within the health care setting to address certain barriers that patients may have that limit the uptake of HCV screening recommendations. The SEM can also be applied to health care organizations to support practice change modalities or to promote health (CDC, 2019b). The Centers for Diseases Control have adopted SEM for a variety of health promotion aspects (CDC, 2019b). The individual is at the center of the model, surrounded by the other bands. The model demonstrates how the bands interrelate.

At the individual, internal determinants of behavior occur such as knowledge, skills, attitudes, or beliefs of the individual (Nyambe, Van Hal, & Kampen, 2016). The next level in the SEM is the interpersonal level, which includes external influences including, family, friends, social norms, health care providers, and or key opinion leaders which influence lifestyle and

health care choices (Nyambe et al., 2016). Next, the institutional or organizational level; policies and procedures that support behavior are included in this level. At the fourth level, the community, larger social constructs occur, such as media, organizations, institutions, and affiliations (Nyambe et al., 2016). Lastly, the policy level encompasses decisions supported by local, state, or federal bodies (Nyambe et al., 2016). Health care professionals can greatly impact the bands identified within the SEM model in order to promote optimal patient care.

The individual level, as the model identifies would encapsulate patients that meet criteria for HCV screening. Individuals recognized throughout this project included patients within the baby boomer and PWID cohort. The identified population attitudes and beliefs should be explored by providers to recognize the need for HCV screening, the risks and benefits of screening, and ensure access to affordable HCV screening modalities and treatment. Health care professionals could significantly affect patient care by ensuring individual needs are being upheld such as HCV screening recommendations, as this level supports. Moreover, ensuring that patients are knowledgeable with evidence-based recommendations may help facilitate further communications.

Next, the interpersonal level surrounds the individual band and specifically addresses health care professionals. Within the interpersonal level activities can be intended to facilitate individual behavior change and support overcoming barriers observed at the individual level. Facilitating health care professional education regarding HCV screening recommendations could impact recommendations to patients eligible to receive HCV screening and would support the interpersonal level.

The organizational level is the third band identified in the SEM. Activities that are intended to facilitate individual change through organizational components are recognized in this

level. At the organizational level, exploring provider HCV screening rates and setting benchmarks may help support desired changes. Other modalities recognized by the CDC (2019b) include promoting the use of provider and patient reminders, providing provider assessment and feedback, and adoption of worksite policies that support known recommendations. Health insurance plans, lack of insurance, and lack of access to clinic services are also included within this band.

The fourth level recognized by SEM that surrounds the organizational band is the community level. Within the community level, working in collaboration with agencies such as Centers for Diseases Control and Prevention to promote HCV screening and resources may occur. Application of published available CDC toolkits with scripting may impact providers knowledge, thus influence desired change at the individual level. In addition, a coalition of community support and awareness of HCV would be other aspects included in the community level.

Policy is the outmost band included in the SEM model. An examination of local, state, and federal policies regarding HCV screening should occur in order to identify added support. As discussed, the North Dakota Department of Health goals by 2021 are to lower the annual number of new hepatitis C infection among people under 36 years by 50 percent. The USPSTF recommendations, Healthy People 2020 goals, disease burden, and examined interventions are additional criteria that are noted within the policy band. Refer to figure 1 for adaption of this the *Social Ecological Model* to the project.

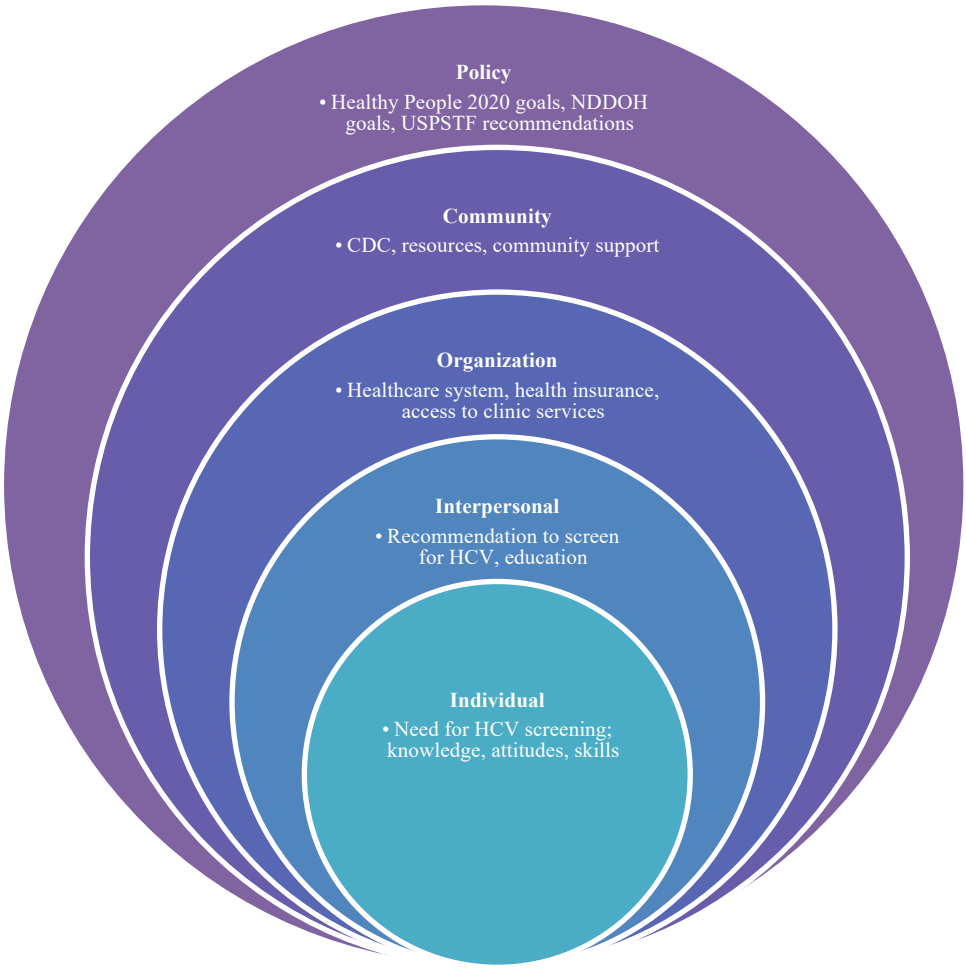

Figure 1. Adaption of Social Ecological Model.

Plan Do Study Act

The Plan Do Study Act (PDSA), provided by the Institute for Healthcare Improvement (IHI) (2018) will serve as the model to help implement the desired change. The PDSA is an industrial model of quality (Huber, 2014). The PDSA model serves to support quality and innovative process changes. Huber (2014) identified that PDSA is used widely today in a variety of settings aside from healthcare organizations. A major concept of the PDSA model is change. "Change concept is a general notion or approach to change that has been found to be useful in developing specific ideas for changes that lead to improvement" (IHI, 2018). Furthermore, integration of change concepts allows for critical and creative thinking (Christoff, 2018). Critical

thinking in turn often leads to innovations, thus impacting quality improvement strategies in a forthcoming light. When applied, the PDSA model fosters critical thinking and innovations to occur. Thinking strategies stimulate process improvements, thus setting a foundation for impacting quality care.

Laverentz and Kumm (2017) depict the following steps of plan, do, study, and act within the PDSA cycle. The first step in the PDSA model is Plan, which occurs when one plans a small change based on evaluation of data. The next step in the cycle, Do consists of implementing the desired change. The third step in the PDSA is Study, which entails assessing if the change had the desired effect by evaluating qualitative and quantitative measures. Lastly, the final step in the cycle consists of Act, which is to standardize the new process of implementing a new change. The PDSA typically occurs in small cycles. In addition, the PDSA model is the most frequent type of continuous quality improvement process used today (Laverentz & Kumm, 2017). A strategy to improve HCV screening in a clinic setting with application of the PDSA model can be utilized support desired change. Refer to Figure 2 for visual representation of PDSA model application to this quality improvement project.

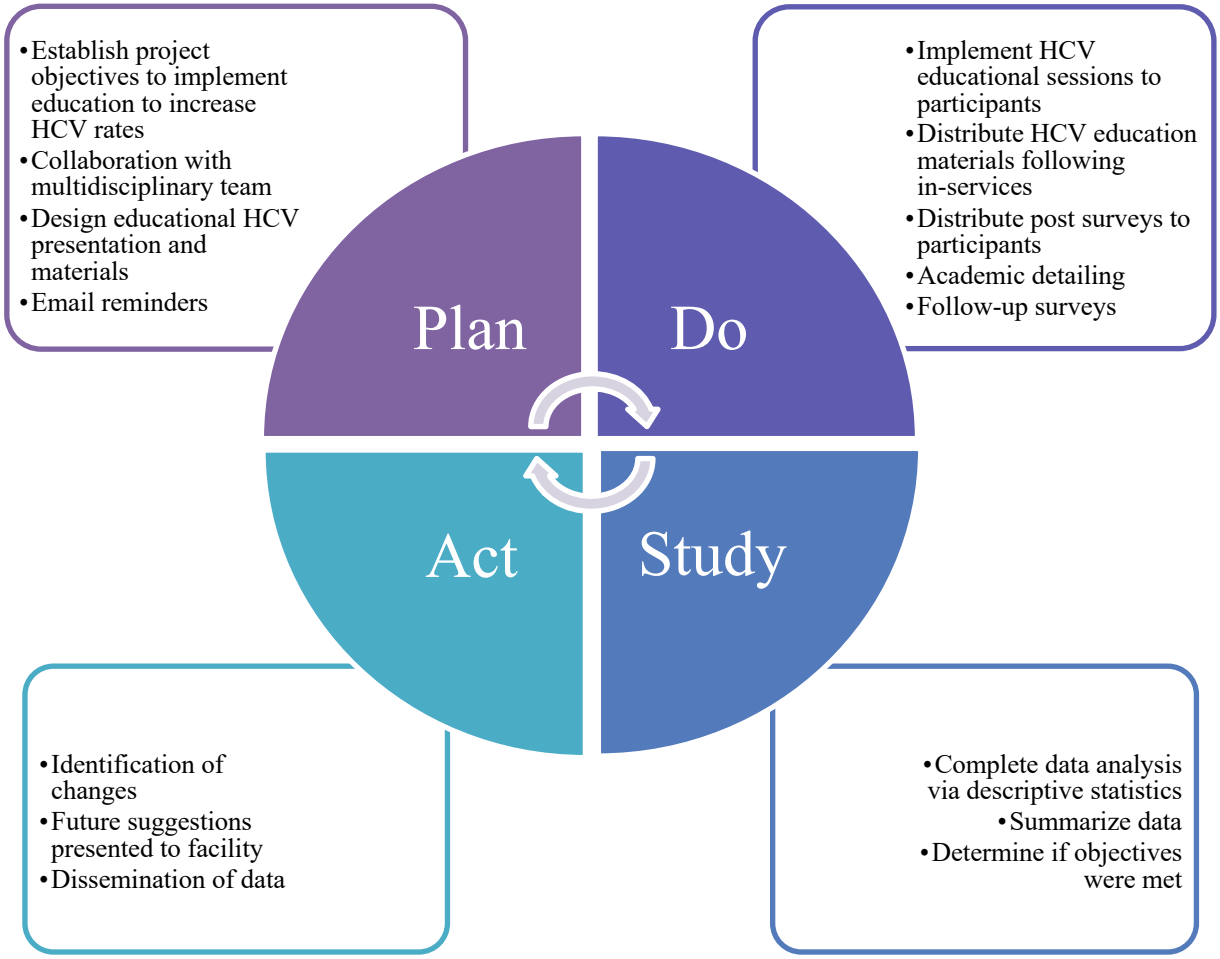

Figure 2. Adaption of PDSA Model.

CHAPTER THREE. METHODS

Project Design

This evidence-based quality improvement project was created on the basis of an identified need at the facility where the project took place. A literature review exposed a need for enhanced health care professional's knowledge on HCV screening guidelines and optimization for HCV screening rates. Throughout the literature reviewed there were a number of studies that supported evidence-based practice approaches to facilitate HCV screening education. A substantial portion of the studies reviewed showed that improved HCV screening rates involved education for health care professionals. Therefore, in collaboration with a multidisciplinary team an education session regarding HCV was developed and implemented to provide knowledge to the facility's health care professionals. The aim for this project was to increase comfort levels in addressing HCV screening recommendations. The end goals of this project were to:

1. Enhance health care professionals' perceived HCV knowledge and comfort level in addressing HCV screening recommendations within six months of implementation.
2. Identify persons who inject drugs (PWIDs) who seek care at the clinic to enhance HCV screening opportunities for those individuals within six months of implementation.
3. Increase HCV screening rates for patients in the baby boomer cohort (birth year 1945-1965) at a primary care clinic within six months of implementation.

In conjunction with this project, a separate research project at the participating facility was previously ongoing to increase HCV screening rates utilizing interventions that focused on modifications in the clinic rooming process, rooming forms, and prompts within the EMR to increase HCV screening rates. Prior to this project, the primary care facility had already developed the addition of HCV screening recommendations in the EMR for the baby boomer

population which was scheduled to be imbedded within 10 days following this project's educational session.

Implementation

Setting

The primary care clinic is a Midwestern family-orientated Federal Qualified Healthcare (FQHC) clinic with a total of three primary care sites throughout the region. The clinic provides a variety of services including medical, dental, pharmaceutical, nutrition, homeless health, behavioral health, physical therapy, vision, x-ray, and laboratory services. All patients that access this facility are able to receive care, regardless of health insurance status. This participating facility offers patients federally qualified discount opportunities to assist in accessing affordable healthcare. The participating primary care clinic began offering HCV treatments in October 2018. The participating facility has treated a total of 41 patients with a diagnosis of HCV. The medical providers across the three locations included physicians, nurse practitioners, and physician assistants, pharmacists, nursing, and support staff.

Resources

The resources needed to support the project largely consisted of the time of the targeted providers and professionals to conduct and attend the educational session. Coordination of the project between the facility and team members, the literature review and research required approximately one hundred hours of coordination. Development of the educational session required collaboration with an infectious disease expert, a pharmacist, and the co-investigator. The infectious disease physician volunteered time as a content expert speaker. An NDSU statistician was utilized to aid the co-investigator with data interpretation analysis. Other

resources for the project included the clinic medical director, and nursing leadership support in order to allow for employees to attend educational session.

The technology needed for the project included the facility's electronic medical record, a laptop computer, and Qualtrics. Qualtrics is a secure web-based survey software program that allows users to create surveys and generate reports from the survey results. A computer was needed to support data collection and computing statistical analysis for the completed post educational session surveys. Specifically, Microsoft Excel software was used to transfer post educational session surveys into spreadsheet format to allow for the necessary statistical calculations and data analysis by the NDSU statistician. The delivery of the educational sessions presentations were accomplished with Microsoft PowerPoint software.

The rendered cost for the project was minimal. The educational sessions occurred at routine monthly meeting times, to facilitate optimal attendance. Through the duration of this project, there was a dedicated one-hour meeting timeframe time during the monthly meetings to facilitate optimal attendance of the HCV educational sessions. The attending participants wages were covered by the facility at unknown costs. The printing costs of the presented educational material for participants were made available by the facility at unknown costs. Additionally, food and beverages were provided by facility to the participants at unknown costs.

Intervention

The quality improvement project's delivery of the HCV education sessions to health care professionals amongst the primary care facility's two clinical sites were implemented utilizing the Plan, Do, Study, Act multidisciplinary approach.

Plan

During the planning stage, the determination of specific activities and strategies that were necessary to meet the overarching goal and objectives for the project were conducted. Collaboration with a multidisciplinary team including pharmacists, a public health expert, two clinic providers, and an infectious disease expert was conducted. A total of 10 one-hour meetings were held with the multidisciplinary team prior to the educational session. The meetings were used to formulate approaches, develop the educational session content and discuss ongoing planning ideas. Additionally, meetings with facility providers, health care professionals, clinic director, and nursing leadership was required to describe the proposal, gain further insight, and facilitate discussions and additional recommendations. The planning stage also involved establishing the selected objectives, predicting needed education materials and content for the proposed health care professional educational session's HCV education.

Do

During the month of October 2019, a total of two one-hour educational sessions were developed and provided to all participants. The educational sessions were accompanied by educational tools regarding HCV and conducted by an infectious disease physician, a pharmacist who specialized in viral hepatitis, and the co-investigator. The HCV education session presentations focused on educating healthcare professionals' regarding:

- HCV disease burden
- HCV screening guidelines
- Clinic tools to support HCV care
    - Rooming form and EHR-based reminders

- Components of CDC Hepatitis C Toolkit, “Talking to Patients About Hepatitis Testing” and “Counseling Patients for HCV Positive Result” (Centers for Disease Control and Prevention, n.d.)
- Distribution of HCV educational tools

A voluntary post-implementation Likert scale survey was distributed to all participants after the educational sessions to assess components of health care professional’s knowledge, comfort levels, benefits, perceived benefits and potential barriers regarding HCV and screening. An abbreviated survey was also administered two months later which evaluated for the sustainment of personal knowledge regarding HCV screening guidelines.

During the timeframe from November 2019 to January 2020, the co-investigator conducted clinic site visits and academic detailing in follow-up of the October 2019 educational sessions. The site visits consisted of observing of the clinic’s HCV screening workflow and process. An environmental scan was also conducted to identify the workflow processes and barriers that may impede HCV screening implementation. A total of five site visits were conducted between the three primary care sites of the facility. The following site visits were conducted by the co-investigator:

- November 15, 2019 for a 50-minute increment
- November 19, 2019 for a 35-minute increment
- November 21, 2019 for a 30-minute increment
- January 7, 2020 for 20 minute and 45 increments

The site visit times varied in duration due to variations in clinic size, the number of staff working, and whether questions or concerns arose. During the site visits, visual identification of the workflow processes, the assessment rooming form utilization, barriers, suggestions, or needs

were assessed amongst health care professionals. Informal discussions were conducted with staff to further assess needs or concerns. A checklist with the aspects observed during the site visits was utilized for documentation purposes (Appendix F).

Study

Throughout this stage, the co-investigator with the assistance of a statistician completed data analysis from the completed educational session surveys. The co-investigator also completed a secondary data analysis regarding HCV screening rates for the clinic for the PWID and baby boomer cohorts. Furthermore, this stage determined if the projects objectives were met.

Evaluation and Data Analysis

Survey Evaluation

The evaluation of objective one, which was enhance health care professionals' perceived HCV knowledge and comfort level in addressing HCV screening recommendations within six months of implementation, occurred after implementing the HCV educational session by administering a voluntary survey to the participants. Participants were able complete the survey with via Qualtrics. Qualtrics is a secure web-based survey software program that allows users to create surveys and generate reports from the survey results. For participants who did not have access to computers or mobile devices to complete the electronic survey, paper copies of the post educational session survey were provided. Questions on the post educational session survey consisted of demographic information, Likert scales, knowledge and comfort with HCV screening guidelines prior and post educational in-service content. The post educational session survey was a confidence Likert scale survey that used strongly agree, somewhat agree, neutral, somewhat disagree, or strongly disagree to answer the questions related to the HCV session's education content. A confidence Likert scale that used very confident, confident, neutral, a little

confident, and not confident was also utilized. For each non-demographic question, mean values were calculated which allowed for value analysis of the question responses. In addition, questions regarding the HCV guidelines were conducted in the post educational session survey to assess the participant's knowledge level of the guidelines. A two-month post-educational session abbreviated survey was also administered to participants to assess sustained knowledge (Appendix B).

Survey questions that evaluated objective three from the initial post educational session survey were questions four through eleven, which pertained to pre- and post-intervention knowledge, benefits, and confidence regarding HCV screening guidelines and recommendations. Specifically questions five, seven, nine, and eleven in the post educational session survey examined post session education aspects regarding HCV screening knowledge, benefits, and confidence. Survey questions that evaluated objective three from the abbreviated two-month post educational session survey were questions four and five that assessed sustained knowledge post-educational session and overall benefits on screening for HCV.

Secondary HCV Data

The evaluation of objectives two and three were accomplished through a secondary analysis of HCV screening data obtained from the facility's established process and chart reviews. Objective two was, identify persons who inject drugs (PWIDs) who seek care at the clinic to enhance HCV screening opportunities for those individuals within six months of implementation. Objective three was increase HCV screening rates for patients in the baby boomer cohort (birth year 1945-1965) at a primary care clinic within six months of implementation. HCV screening rates for the identified cohorts (PWID and baby boomers) were analyzed from the pre-implementation timeframe of October 2018 to October 2019 and

compared to the timeframe of October 2019 to February 2020 which was the time frame post educational session implementation. Prior to this project, the participating facility already had an established method to retrieve HCV screening rates data, therefore chart reviews did not occur by the co-investigator. Per the facility, HCV screening rates data were obtained from the EMR using a software called "i2i" to extract patient data. Manual chart reviews also occurred and data was obtained and exported into an Excel document. The HCV screening data was stored on an internal, secure hard drive at the facility in a password protected Excel document. The data was de-identified and coded to remove patient health information (PHI) from the main data set and reported as cohort data. The code/PHI was also stored as a password protected Excel document on an internal facility secure hard drive.

Per the facility, PWID status was obtained through an established process of reviewing an electronic health record (EHR) report generated based on two criteria: the patient had an ICD-10 code related to illicit drug use or the utilized patient rooming nursing form indicated that that patient reported current or former intravenous drug user (IVDU). If a patient was identified as a PWID an individual chart review was conducted to verify the IVDU history. During a chart review, the patient's problem list was examined for free text notes indicating a medical provider had confirmed current or former IVDU. The paticipating facility defined a completed HCV screening as the presence of a completed HCV antibody and HCV RNA quantitative PCR in the patient's chart. If no HCV screening tests were identified withing the patients EMR, outside records were searched for evidence of HCV screenings. If no outside records were available, then they were counted as not screened for HCV. Per the facility's definition, baby boomer status was defined as birth years from 1945 to 1965 which was used to generate a report for baby boomer HCV screening rates.

Act

During the act stage, identification of the changes needed to support the desired change occurred. The act cycle helped to develop future recommendations for health care professional use. Dissemination of results and future recommendations were distributed via summary to the participating facility.

Protection of Human Subjects

The participants of the project included the facility's health care professionals between their three clinic sites. The recruitment of participants was conducted by the clinic leadership by informing the facility's health care professionals of the opportunities at monthly meetings both one and two months prior to the educational sessions. Email reminders sent by the clinic leadership were also utilized one month and two weeks prior to the educational sessions. Implied consent was obtained from participants by their voluntary attendance of the one-hour education session. Prior to delivering the session, all participants were informed of the project's benefits which were also described in the email invitation to participants (Appendix C). Benefits of the in-service included improving personal knowledge of HCV screening recommendations, improving comfort levels in addressing HCV screening, and the enhancement of quality care. Participants were allowed to withdraw from the educational session and post-survey at any time. Participant confidentiality was secured by omitting personal identifiers which included name and date of birth on the post-surveys.

After the session, the paper forms of the post educational session surveys were collected, placed in a sealed envelope and stored in a locked drawer by the co-investigator. If participants used Qualtrics to complete the post educational session survey, the results were stored on a password, finger-print protected computer that was only available to the co-investigator. The

secondary data that was provided to the co-investigator by the participating facility did not contain any form of patient identification. The secondary data information consisted of demographic information regarding IVDU status and HCV screening rates. Women were included in the study. Children were not included in this study as all potential participants were over the age of eighteen.

Institutional Review Board (IRB) Approval

An Institutional Review Board (IRB) approval by North Dakota State University was obtained. Approval for protocol #PH20061 was received from North Dakota State University's IRB board (see Appendix D). The participating institution IRB approval relied on the North Dakota State University approval status, so a separate IRB application was not required.

CHAPTER FOUR. RESULTS

Objective One

The first objective of the quality improvement project was, "Enhance health care professionals' perceived HCV knowledge and comfort level in addressing HCV screening recommendations within six months of implementation." In total, there were 35 participants who attended the October 2019 educational sessions. The total participants included 15 nurse practitioners or physician assistants, two physicians, one pharmacist, one medical director, seven registered nurse coordinators, eight rooming staff (nurses, certified nursing assistants, certified medical assistants), and one laboratory staff.

Of the 35 participants who attended there were a total of 17 post educational session surveys completed immediately following the HCV educational session, correlating to a response rate of 48.6%. The participant response rate for nurse was 58.82% (n=10), nurse practitioner was 17.65% (n=3), physician was 5.88% (n=1), physician assistant was 5.88% (n=1), medical assistant was 5.88% (n=1), and other was 5.88% (n=1). The participant demographics obtained from the completion of the post educational session survey is outlined in Table 1.

Table 1

Demographics for Post Educational Session Survey

Sex	Frequency	Percent
Female	14	82.35
Male	3	17.65
Type of Participant		
Physician	1	5.88
Nurse Practitioner	3	17.65
Physician Assistant	1	5.88
Nurse	10	58.82
Medical Assistant	1	5.88
Other	1	5.88
Participants' Years of Experience		
1-3 years	8	47.06
4-6 years	2	11.76
7-9 years	2	11.76
10-12 years	1	5.88
>12 years	4	23.53

The survey questions that pertained to the participant's post-education knowledge, benefits, and comfort level in HCV screening guidelines in the initial post educational session survey were question five, question seven, question nine, and question eleven. All questions had 17 completed responses. The post educational session survey is shown in Appendix A. A Likert scale measuring from the highest probability (5) to the lowest (1): *Strongly Agree=5, Somewhat Agree=4, Neutral =3, Somewhat Disagree=2, Strongly Disagree=1* was utilized for question four through nine that assessed pre- and post-education session content.

The Likert scale mean for question five, that assessed post education session knowledge enhancement on HCV screening guidelines was 4.59 (91.8%). The Likert scale mean for question seven, that assessed post education session increased awareness on benefits in screening for HCV was 4.82 (96.4%). The Likert scale mean for question nine, that assessed the post educational in-service likelihood of increasing HCV screening discussions with patients was 4.59

(91.8%). Overall, the Likert scale means increased in post- session content compared to pre-session content. Table 2 contains the post session survey results from the October 2019 education session with computed Likert scale means for each question.

Table 2

Post Educational Session Survey Results

Survey Question Number	Strongly Agree (5)	Somewhat Agree (4)	Neutral (3)	Somewhat Disagree (2)	Strongly Disagree (1)	Total	Likert Scale Mean
4. Prior to the education session, I had sufficient knowledge on HCV screening guidelines		9		6	2	17	2.88
5. After the education session my knowledge was enhanced on HCV screening guidelines	10	7				17	4.59
6. Prior to the session, I knew the benefits of screening for HCV	4	6	2	4	1	17	3.47
7. After the education session my awareness increased of the benefits of screening for HCV	15	1	1			17	4.82
8. Prior to the education session, I felt confident discussing HCV screening recommendations with patients	1	7	2	3	4	17	2.71
9. After the education session, I will increase hepatitis C screening discussions with patients	12	4		1		17	4.59

Given the small sample size and the use of a Likert rating scale on the data included in the post session survey may not be appropriately modelled as a continuous distribution. This precludes the use of t-tests, (whether for matched samples or otherwise) and one-way ANOVA.

Instead, the ordinal information in the Likert scale responses are most appropriately modelled using the Wilcoxon signed rank test, a nonparametric analog of the matched sample t-test. Given the lack of prior information, and that the middle point of the scale was indifference (i.e., "neutral"), a decision was made to adopt a conservative null hypothesis (especially for question five, question seven, and question nine, in the post session survey that assessed the post-education aspects compared to pre- educational sessions questions four, questions six, and questions eight) that the median population response was equal to 3. All the post- education aspects which were assessed by questions five, question seven, and question nine had a p-values for <0.0001 and are outlined in Table 3. The p-value for questions five, seven, and nine all signified that the median response was greater than three, as an estimated median of five was found.

Table 3

Post Educational Session Survey Results Analysis

Survey Question Number	*N*	Mean	Median	SD	p-value
4. Pre-Knowledge	17	2.941	4.000	1.197	0.758
5. Post-Knowledge	17	4.588	5.000	0.507	<0.0001
6. Pre-Benefits	17	3.471	4.000	1.281	0.176
7. Post Increased Benefits	17	4.824	5.000	0.529	<0.0001
8. Pre-Discussions	17	2.882	3.000	1.364	0.628
9. Post-Increase Discussions	17	4.588	5.000	0.795	<0.0001

Questions 10 and 11 evaluated the pre- and post-PIP interventions in regard to the health care professional's confidence in identifying abnormal laboratory value for HCV. A Likert scale measuring from the highest probability (5) to the lowest (1): *Very Confident=5, Confident=4, Neutral =3, A Little Confident=2, Not Confident=1* was utilized for question 10 and question 11. The Likert scale mean for question 11, which assessed post- education session confidence in

identifying an abnormal laboratory value for HCV was 3.24 (64.8%). A total of three participants increased their confidence level after the educational session. A majority of participants had the same confidence level before and after the educational session as entailed in Table 4. Figure 3 contains a graphic of the post educational session survey results.

Table 4

Post Educational Session Survey Results Confidence Scale

Survey Question Number	Very Confident (5)	Confident (4)	Neutral (3)	A Little Confident (2)	Not Confident (1)	Total	Likert Scale Mean
10. Prior to the educational session, rate your confidence level in identifying an abnormal laboratory value for HCV	1	7	3	4	2	17	3.05
11. After the educational session, rate your confidence level in identifying an abnormal laboratory value for HCV	1	9	3	1	3	17	3.24

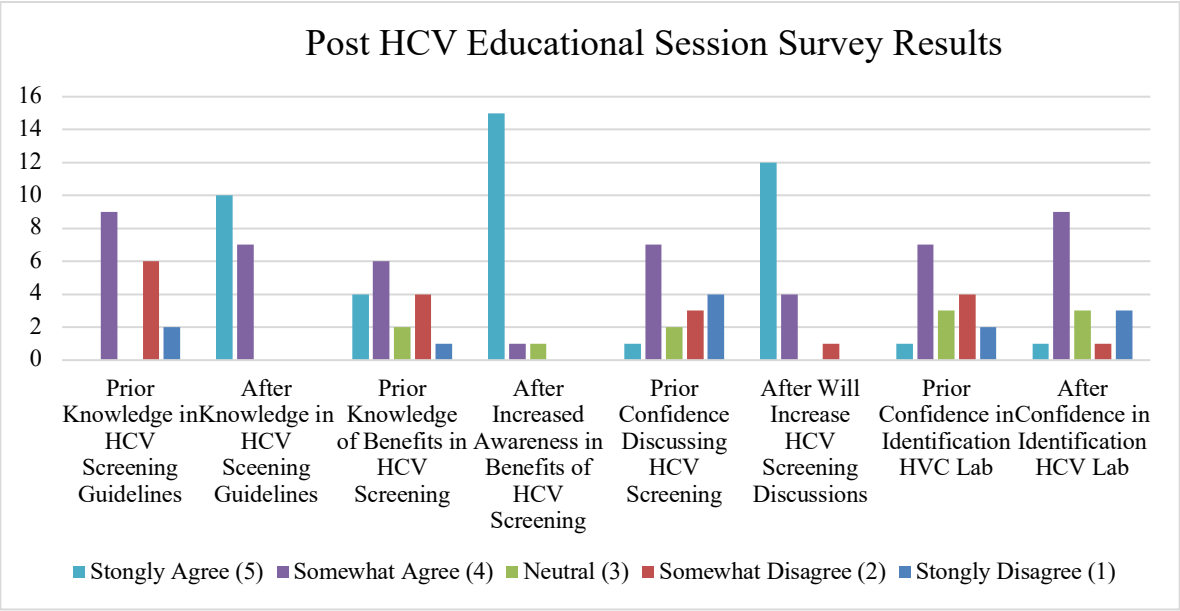

Figure 3. Post HCV Educational Session Survey Results

Question 12 in the post educational session survey asked the participants to identify their top barriers related to screening for HCV with the options of lack of time, lack of resources, knowledge deficit, difficulties of testing for HCV, and "other" which had a free text option to specify answers. Of the total 27 responses to question 12, the barriers identified included, lack of time was 29.6% (n=8), lack of resources was 11.1% (n=3), knowledge deficit was 22.2% (n=6), difficulties ordering testing for HCV was 3.7% (n=1), and other was 33.3% (n=9). Free text responses utilizing the "other" response included "providers are in charge of ordering," "do not routinely room patients – only when short staffed," "knowing what to do with the information," "unclear process," and "getting patients to actually get blood work."

Questions 13 in the post educational session survey assessed the health care professional's perceived relevance of the education session to clinical practice. Of the 17 participants surveyed, 16 completed question 13 and one participant provided a comment, which did not tabulate into the Likert scale configuration, therefore that participant's answers were excluded. Of the 16 responses, 14 respondents selected "strongly agree," two respondents

selected “somewhat agree.” The Likert scale mean for question 13 was 4.87 (97.5%). One participant included the comment, “I mostly work with refugees who are automatically screened.”

Of the 35 participants who attended the education sessions, there were a total of 13 participants who completed the abbreviated two-month follow-up post educational session surveys, correlating to a response rate of 37.1%. The participant response rate for nurse was 61.54% (n=8), nurse practitioner was 30.77% (n=4), and medical assistant was 7.69% (n=1). The participant demographics obtained from the completion of the education post session survey is outlined in Table 5.

Table 5

Demographics for Two Month Follow-up Post Educational Session Survey

Sex	Frequency	Percent
Female	11	84.62
Male	2	15.38
Type of Participant		
Physician	0	0
Nurse Practitioner	4	30.77
Physician Assistant	0	0
Nurse	8	61.54
Medical Assistant	1	7.69
Other	0	0
Participants’ Years of Experience		
1-3 years	5	38.46
4-6 years	2	15.38
7-9 years	0	0
10-12 years	2	15.38
>12 years	4	30.77

The two-month follow-up post educational session survey questions that pertained to sustained knowledge and benefits in HCV screening guidelines were question four and question five. All questions had 13 completed responses. The Likert scale mean for question four that

assessed sustained sufficient knowledge on HCV screening guidelines was 4.38 (87.6%). The Likert scale mean for question five that assessed sustained knowledge of the benefits in screening for HCV was 4.62 (92.3%). Table 6 contains the abbreviated two-month follow-up post educational session survey results.

Table 6

Two Month Follow-up Post Educational Session Survey Results

Survey Question Number	Strongly Agree (5)	Somewhat Agree (4)	Neutral (3)	Somewhat Disagree (2)	Strongly Disagree (1)	Total	Likert Scale Mean
4. Compared to prior to the education session, I have sufficient knowledge on HCV screening guidelines	8	3	1	1		13	4.38
5. Compared to prior to the education session, I have enhanced my knowledge of benefits in screening for HCV	9	3	1			13	4.62

Given the small sample size and the use of a Likert rating scale, the data included in the two-month follow-up post educational session survey may not be appropriately modelled as a continuous distribution. This precludes the use of t-tests (whether for matched samples or otherwise) and one-way ANOVA. Instead, the ordinal information in the Likert scale responses are most appropriately modelled using the Wilcoxon signed rank test, a nonparametric analog of the matched sample t-test. Given the lack of prior information, and that the middle point of the scale was indifference (i.e., “neutral”), a decision was made to adopt a conservative null hypothesis (especially for question four and question five in the two-month follow-up post

educational session survey that assessed the sustainment of post- education aspects related to HCV guidelines and screening) that the median population response was equal to 3. The following results for p-values are outlined in Table 7. The p-value for question five was 0.002, indicating that the median response to question four was different from three and the median was significantly greater than three. The p-value for question six was 0.005, indicating that the median response to question four was different from three and the median was significantly greater than three.

Table 7

Two Month Follow-up Post Educational Session Survey Results Analysis

Question Number	*N*	Mean	Median	SD	p-value
4. Sufficient Knowledge	13	4.385	5.000	0.961	0.002
5. Enhanced Benefits	13	4.615	5.000	0.65	0.005

Question six from the two-month follow-up post educational session survey assessed the participant's perception regarding the interventions that produced the biggest difference for enhancing their HCV screening rates. Question six had a select all that apply format for the options which included: electronic health record, education session, workflow changes, academic detailing, and "other." Of the 22 total responses for question six, the dataset showed that EMR was 18.2% (n=4), education session was 40.9% (n=9), workflow changes was 22.7% (n=5), academic detailing was 9.1% (n=2), and other was 9.1% (n=2). The "other" free text responses for this question were not able to be retrieved from Qualtrics due to an unknown system error.

The results from the academic detailing visits, which included data such as location, time, demographic information, and observations are shown in Appendix I, Table I1. Of the health care professionals assessed, the rooming form had been utilized, and there were no questions or concerns identified. A total of three barriers were identified which included time, uncertainty

about how to document refusals, and patients not always being accurate about their actual IVDU status.

Objective Two

The second objective of the quality improvement project was, "Identify persons who inject drugs (PWIDs) who seek care at the clinic to enhance HCV screening opportunities for those individuals within six months of implementation." As part of the secondary analysis, the inclusion criteria used for participants included being seen by a primary care provider (PCP) between the timeframe, age of 18 years or older, and confirmation of current or former intravenous drug use (IVDU). A total of 871 patients had an EMR related diagnosis of IVDU during the pre-implementation timeframe and 1,326 patients had an IVDU during the post implementation timeframe with or without identification of hepatitis C screening. After further chart reviews occurred, a total of 742 patients were identified within the PWID inclusion. A total of 562 patients met the inclusion criteria during the pre-intervention phase, and 435 patients during the post-intervention phase. There was a total of 245 patients that were seen during both the pre- and post-educational session intervention phases.

The PWID demographic information can be found in Appendix G, Table G1. A chi-square test was used to account for demographic variable in each category and the results are found in Appendix G, Table G1. The data in Table G1 implies there were no significant differences existing across the time period of the patient visit and patient gender ($P = 0.621$) and by patient ethnicity ($P = 0.792$). Significant differences in a patient's age were noted between the pre-intervention, post-intervention, and those patients seen in both periods. Cumulative demographic information can be found in Appendix G, Table G2.

The pre-intervention HCV screening rates for the PWID population was 59.6%. The post-intervention HCV screening rates for the PWID population was 65.1%, resulting in a 5.5% increase in HCV screening rates for the PWID cohort. The findings relevant to this objective can be found in Figure 4 for graph visualization.

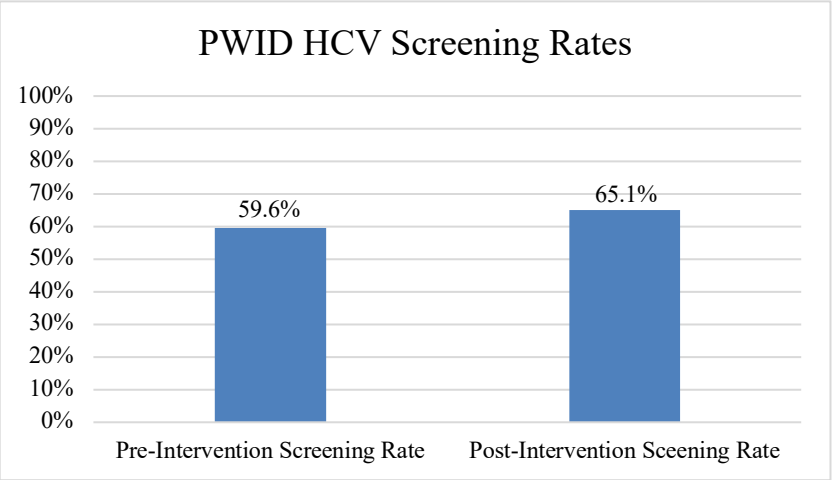

Figure 4. PWID HCV Screening Rates

Objective Three

The third objective of the quality improvement project was, "Increase HCV screening rates for patients in baby boomer cohort (birth year 1945-1965) at a primary care clinic within six months of implementation." As part of the secondary analysis the inclusion criteria used for participants included being seen by a primary care provider (PCP) between the timeframe of April 16, 2019 through February 28, 2020, and a birth year age of 1945-1965.

A total of 714 patients were identified in the baby boomer timeframe. Appendix H, Table H1 displays HCV screening rates pre-, post-implementation, and patient's seen in both periods with demographic information gender, age, and ethnicity. A chi-square test was used to account for demographic variable for patients seen in the pre-intervention, post intervention, and patients seen in both periods. The data in Appendix H, Table H1 implies that there were no significant demographic variable differences across the time period when comparing the patient's visit and

patient's age (P = 0.848) against the patient ethnicity (P = 0.908) and against the patient's gender (P = 0.066). Appendix H, Table H2 displays cumulative HCV screening rates for baby boomer cohort with cumulative demographic information, gender, age, and ethnicity throughout the cumulative time the HCV screening rate data was collected.

The secondary analysis of HCV screening rates in the baby boomer cohort, identified 714 patients within the baby boomer birth year timeframe. Prior to the educational session intervention, the HCV screening rate for the baby boomer cohort was 35.0%. The post-educational session intervention HCV screening rates was 51.0%, resulting in a 16% increase in HCV screening rates in the baby boomer cohort. Additionally, a chi-square test was configured with a value of <0.001. The chi-square test of homogeneity yields a probability that is less than 0.001, indicating a significant relationship between the pre- and post-intervention, and screening outcomes. The findings relevant to this objective can be found in Table 8. Refer to Figure 5 for graph visualization.

Table 8

Comparison of HCV Screening Among Baby Boomers Pre- and Post-Intervention

	Screening Outcome		
Patient Visit	Not Screened	Screened	Total
Patient Seen Pre-Intervention Period Only	273	143	416
Patient Seen Post-Intervention Period Only	111	112	223
Patient Seen in Both Periods	35	40	75
Total	419	295	714
Chi-Square Test Probability			< 0.001

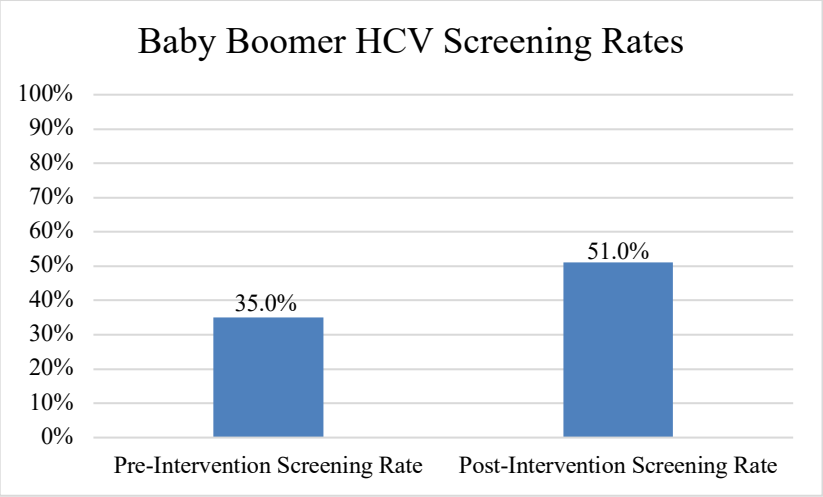

Figure 5. Baby Boomer HCV Screening Rates

CHAPTER 5. DISCUSSION AND RECOMMENDATIONS

Summary

The need for health care professionals to obtain enhanced knowledge regarding HCV screening guidelines and an improvement in HCV screening rates was identified based on the facility's identification of an unmet need. In collaboration with key stakeholders, and a multidisciplinary team, an educational session and academic detailing components were developed as interventions for this quality improvement project. Interventions for this quality improvement project included evidence-based education regarding HCV screening guidelines, implementation of components of the CDC Hepatitis C Toolkit, and academic detailing.

There were a total of 35 health care professional participants who attended at least one of the two education sessions implemented. Of the 35 participants who attended, 17 surveys were completed immediately following the educational session, correlating to a response rate of 48.6%. There were a total of 13 of the original 35 participants who completed the abbreviated two-month follow-up post educational session survey, which correlated to a response rate of 37.1%. This PIP had three proposed objectives which were evaluated following the implementation of the educational session.

Overall, this project met all of the proposed objectives. First the participating health care professionals' reported an increase in knowledge and comfort with HCV screening guidelines, and they identified barriers to HCV screening. Second the HCV screening opportunities for PWID cohort increased from 59.6% to 65.1%, which was a 5.5% increase, as well as increased identification of IVDU status. Lastly, there was an increase in HCV screening rate for baby boomer cohort from 35.0% to 51.0%, which was a 16.0% increase.

Discussion

Objective one which was, “Enhance health care professionals’ perceived HCV knowledge and comfort level in addressing HCV screening recommendations within six months of implementation,” was considered met if the mean percentile of all Likert scales found in the post educational session and two-month follow-up post educational session survey had a calculated score of 3 (60%).

All of the questions in the post educational session survey that had data regarding post session knowledge and confidence of HCV screening guidelines had calculated to a score of 3 (60%) or greater. The combined survey results correlates to enhanced knowledge and comfort levels on HCV screening guidelines as well as sustained knowledge on HCV screening guidelines.

The data indicated that a majority (13 participants) had the same confidence level in identifying an abnormal laboratory value for HCV pre- and post-intervention. Confidence values were just one component of the established objective. The pre- and post- implementation mean percentiles scores all indicated that the mean percentile was higher in the post-implementation category than the pre-implementation category, indicating the intervention was successful. Based on the data above, this objective was considered met.

Objective two which was, “Identify persons who inject drugs (PWIDs) who seek care at the clinic to enhance HCV screening opportunities for those individuals within six months of implementation,” was considered met if the HCV screening rates post implementation were greater than screening rates pre-implementation and the identification of PWID was enhanced. The secondary analysis revealed a total of 871 patients who had an EHR related identifier IVDU pre-implementation and 1,326 patients had an IVDU identifier post implementation. The pre-

intervention HCV screening rate for the PWID cohort was 59.6%. The post-intervention HCV screening rates for the PWID cohort was 65.1%, yielding an increased screening rate of 5.5%. A chi-square test was configured with a value of <0.001. The chi-square test of homogeneity yields a probability that is less than 0.001, indicating a significant relationship between the pre- and post-intervention, and screening outcomes. Based on the data above objective two was considered met.

Objective three which was, "Increase HCV screening rates for patients in the baby boomer cohort (birth year 1945-1965) at a primary care clinic within six months of implementation," was considered met if screening rates post implementation were greater than screening rates pre-implementation. The secondary analysis of the pre-intervention HCV screening rates for the baby boomer population was 35.0%. The post-intervention HCV screening rates was 51.0%, yielding an increased screening rate of 16.0%. Additionally, a chi-square test was configured with a value of <0.001. The chi-square test of homogeneity yields a probability that is less than 0.001, indicating a significant relationship between the pre- and post-intervention, and screening outcomes. Based on the above data this objective was considered met. Along with meeting the objectives described, this project signified how the various interventions influenced participants enhancement on HCV screening guidelines.

This multidisciplinary quality improvement project resulted in an increased awareness among health care professionals regarding HCV screening guidelines and an increase in HCV screening rates for the baby boomer and PWID cohorts. In addition, the session participants reported the educational session was the leading contributor to the increased HCV screening rates (41%) followed by clinic workflow changes (23%) and the EMR changes (18%).

The findings of this project have been noted to be consistent with the review of literature. Many of the quality improvement projects reviewed in the literature supported a multifactorial approach that combined education, EMR changes, and continued support through academic detailing components in order to support an increase in screening rates (Trihn & Turner, 2018; Al-Hihi et al., 2017; Belperio et al., 2017). Of note, other interventions in the literature review that were not utilized in this project included specific EMR prompts to help identify patient that may be due for HCV screening (Trinh & Turner, 2018).

Throughout this project, the proportion of eligible patients screened for HCV pre- and post- intervention at the participating facility was significantly higher than the screening rates reported in the literature. According to the literature, HCV screening rates at community health centers were noted to be approximately 8.3% (USPSTF, 2020). In this PIP, the increased HCV screening rates in the PWID cohort could be the cofounding variables of interventions taken by the facility prior to implementation of this project. Prior to this project implementation, the facility developed an initiative for improving the identification and documentation of PWID in their EMR. The facility used an initiative to ensure the PWID cohort were properly identified before assessing HCV screening rate proportions. Prior to this PIP, the participating facility had also implemented a new questionnaire to increase identification and documentation of current or former IVDU at each clinic visit. Previous electronic medical record modifications had occurred, which could have confounded the HCV screening uptake for the PWID cohort in this PIP.

The USPSTF released HCV screening guidelines in March of 2020 which recommended a universal one-time screening recommendation for all adults aged 18 to 79 years of age. The new USPSTF HCV screening recommendations indicate that all adults should be screened at

least once in their lifetime, during each pregnancy, and regularly for people who are at continued risk such as IVDU.

The *Social Ecological Model* (SEM) which was utilized during this project aided the identification of patient and health care professionals' strengths and barriers which impact HCV screening uptake. Throughout this project, various levels were recognized, and actions were conducted within each level to support the project.

The individual level included the HCV screening need identification, the assessment of knowledge and comfort levels of health care professionals regarding HCV guidelines. At the interpersonal level, education for health care professionals utilizing an educational session was conducted. The organizational level involved having key stakeholders, and organizational support for this project. The community level focused on providing established published resources for health care professionals such as the CDC HCV toolkit. The examination of policy and guidelines were also conducted through a literature review, emphasis on the USPSTF HCV screening guidelines, the NDDOH goals for HCV, and the goals of Healthy People 2020 initiative.

Since the completion of this PIP, the Viral Hepatitis National Strategic Plan: A Roadmap to Elimination 2021-2025 (Viral Hepatitis Plan) has been published by the United States Department of Health and Human Services (2021). The Viral Hepatitis National Strategic Plan provides a framework to eliminate viral hepatitis as a public health threat in the United States by the year 2030, which further provides support and guidance to optimize HCV screening uptake.

The examination of all layers of the *Social Ecological Model* were needed to promote changes at the individual level. Further expansion of the PIP focusing of patient centered needs and organizational needs within the utilization of the SEM could further impact HCV screening

rates in the future. The SEM model depicts how barriers can be decreased if several surrounding elements such as policy, community, organizational interpersonal, and individual levels are explored and recognized as identified above.

Recommendations

Based on the results of this PIP, future recommendations include replicating this project with adherence to the newly published March 2020 HCV screening guidelines from the USPSTF. Ongoing attention to continued efforts that focus on IVDU as an HCV risk factor is crucial. IVDU will continue to need further exploration, but identification of IDVU status and IVDU cohort often poses barriers as noted in the literature and in this project. Further examination of the identified HCV screening barriers for PWID which were noted throughout the literature and modest increase in HCV screening rates that occurred during this project, should be further explored, in order to promote optimal screening opportunities for PWID individuals. One of the reported barriers by healthcare professionals in this this PIP is patients who have an IVDU history may not be forthcoming. Providing sensitive care to PWID, to reduce fear and stigma associated with a positive HCV should occur (Shehata, Austin, Ha, & Timmerman, 2018). Educating health care professionals to use concepts and interviewing techniques which address patient barriers to HCV screening and foster meaningful, non-judgmental discussions is recommended. Furthermore, the assurance of access to medical and preventative health services which are responsive and sensitive to the needs and vulnerabilities of PWID is crucial to improve HCV screening uptake.

Another solution to the identified HCV screening barriers would be to provide education specific to each health care professional's role. The roles of nursing and providers are different regarding the HCV screening process, so HCV screening discussions with patients are likely

variable. For an example, at the participating facility the providers are responsible for physically ordering HCV screening. Conversely, the nursing staff are responsible for identifying whether a patient is a candidate for HCV screening based on age and risk factors. Targeted education for the roles of each member on the health care team could support enhanced awareness, knowledge and confidence in HCV screening guidelines, and foster discussions with patients.

By focusing on and addressing barriers identified from the survey results, promotion of optimal adherence to HCV screening guidelines may occur. The most significant barriers identified in this project were a lack of time and knowledge deficit which needs to be addressed to support further optimization of HCV screening rates. The lack of time was a persistent barrier that the participants identified, which is also consistent with the reported barriers in the literature. One solution to solving the barrier of lack of time to discuss preventative needs, would be providing additional time during clinic visits to discuss preventative health care needs which could enhance HCV screening rates.

To further enhance HCV screening rates, publishing and presenting screening rates to staff may be helpful. Reports published in a manner that would promote continued awareness of the need for quality screening rates benchmarks. Monthly HCV screening rate data could be presented as an individualized and or a combined facility report displayed on a dashboard or a visual display board. Other aspects which may support an increase on HCV screening rates could a continued emphasis on patient education discussion points, the use of EMR alerts when a patient is due for HCV screening, information technology collaboration, and clinic workflow effectiveness (Trihn & Turner, 2018; Al-Hihi et al., 2017; Belperio et al., 2017).

For additional evaluation of knowledge, attitude, and behavior change, future research focusing on the change of health care professionals' behavior following education intervention is

recommended and supported by numerous studies. Other considerations for future research that were not addressed in this project include ongoing HCV screening barriers related to the facility, health care policy, cost related to testing and treatment for HCV, and the stigma related to the PWID population and HCV risk and screening. From a public and population health standpoint, HCV awareness campaigns and screening recommendations may promote an uptake of community and individual awareness regarding screening.

Dissemination

For further dissemination of the PIP findings beyond this paper, a poster presentation will be conducted in May 2021 at North Dakota State University. The findings of this project may also be disseminated to health care communities and the public through publication in a journal.

Strengths and Limitations

Throughout this project strengths and limitations were identified. Prior to and separate from this project, the participating facility had an additional coinciding practice improvement project to optimize HCV screening rates which focused on rooming changes and EMR workflow interventions. The HCV education of health care professionals and the HCV screening rates in this PIP were likely enhanced by the participating facility's other coinciding PIP interventions. Although the additional support was likely helpful in this PIP's success, the confounding support from the coinciding PIP created a limitation. Due to the cofounding support, one could not mutually and exclusively identify the extent of the educational session and academic detailing intervention components impacts on overall HCV screening rates for this PIP. Regardless of the cofounding variables, the education session was identified by participants as a leading factor at 40.9% for enhancing their HCV screening. Another possible confounding limitation was the facility's prior implementation of an educational session intervention regarding PWID

identification and documentation. Given the participant's recent education regarding PWID, the PWID pre- and post-intervention HCV screening rates for this PIP may have been influenced. Due to the prior education, one could not mutually and exclusively identify the extent of the educational session and academic detailing intervention components for this PIP PWID screening rates. Furthermore, the data collection of HCV screening rates in the PWID cohort was time extensive, therefore would not likely be sustainable due to the required length of time it took to track and identify the PWID population.

Limitations which were specific to the survey included the response rates of the surveys. For the initial survey 48.6% of participants responded and 37.1% responded to the two-month abbreviated follow-up survey. The surveys were not tested for external validity and reliability. The small sample size of the surveys created difficulties in determining any significant statistical meaning of the data sets. The participant demographics of the two survey groups varied regarding the of type of participant, and their years of experience between the two surveys distributed, which impacts the overall validity of the results. There were no responses for physician, physician assistant, or other in the two-month follow-up post educational session survey. The pre- and post-education session knowledge questions four, five, six, seven, eight, and nine contained in the initial post educational session survey were not homogenous and varied to some degree. The structuring of questions in the surveys could have been presented more effectively for optimal statistical analysis to occur. For example, question 13, in the post educational session survey a separate selection for "comments" section occurred instead of this format the "comments" section should have been integrated within the Likert Scale. A strength of this project was an emphasis on a topic pertinent for all primary care health care professionals.

Application to the Nurse Practitioner Role

Primary care nurse practitioners have the opportunity to promote quality care with the use of evidence-based guidelines. The role of a primary care provider is comprehensive, holistic, and often involves a variety of aspects that impacts patient's health and wellness. Preventative care discussions and recommendations are a common component of the care nurse practitioners provide. The delivery of quality care and the promotion of optimal outcomes for patients are essential throughout the nurse practitioner profession. In a clinical setting, quality care can be optimized by identifying needed practice improvement projects.

Throughout the literature, quality care and desired change were commonly supported by multidisciplinary approaches as ideal interventions. Due to the simplicity and efficacy of curative therapies for HCV primary care providers in the future may have an enhanced opportunity to treat patients with a diagnosis of HCV. Given the likelihood of treating patients who have HCV, nurse practitioners will need to be knowledgeable and confident in the HCV screening guidelines and initiate the patient discussion regarding HCV screening.

Conclusion

The significance of this project is the contribution of evidence-based quality practice accompanied by research, that was utilized to identify the need for HCV screening optimization. This demonstrated enhancement of health care professionals' HCV education regarding screening guidelines. A multidisciplinary approach was utilized throughout this project as evidenced by purposeful collaboration and proficient communication amongst the various health care professionals in supporting the intervention plan. A number of ongoing needs, continued areas for improvement, and future recommendations were also identified throughout this project. This project represents the role advancement in which the DNP professional is responsible to

model and uphold. Furthermore, this project contributed to the evidence-based research and application of the DNP professional role which fosters the improvement in patient healthcare quality and equality.

This project's significance and application within the healthcare community has the potential to increase patients' opportunity for HCV screening and increases a health care professionals' knowledge and confidence regarding HCV screening guidelines. To reduce the prevalence of HCV in the future, the first step for allowing linkage to care and effective treatments is by increasing a patient's opportunities to be screened for HCV. Although this project was completed at a local level, this project has community and public health implications for addressing the goals of eliminating viral hepatitis as a public health threat in the United States by the year 2030.

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APPENDIX A. POST EDUCATIONAL SESSION SURVEY

1. What is your gender?
    - Male
    - Female
2. What is your background?
    - Physician
    - Nurse Practitioner
    - Physician Assistant
    - Pharmacist
    - Nurse
    - Medical Assistant
    - Nursing Assistant
    - Other_____
3. How many years have you been in your profession?
    - 1-3 years
    - 4-6 years
    - 7-9 years
    - 10-12 years
    - > 12 years
4. Prior to the education session, I had sufficient knowledge on HCV screening guidelines.
    - Strongly agree (5)
    - Somewhat agree (4)
    - Neutral (3)
    - Somewhat disagree (2)
    - Strongly disagree (1)
5. After the education session my knowledge was enhanced on HCV screening guidelines.
    - Strongly agree (5)
    - Somewhat agree (4)
    - Neutral (3)
    - Somewhat disagree (2)
    - Strongly disagree (1)
6. Prior to the education session, I knew the benefits of screening for HCV.
    - Strongly agree (5)
    - Somewhat agree (4)
    - Neutral (3)
    - Somewhat disagree (2)
    - Strongly disagree (1)
7. After the education session my awareness increased of the benefits of screening for HCV.
    - Strongly agree (5)
    - Somewhat agree (4)
    - Neutral (3)
    - Somewhat disagree (2)
    - Strongly disagree (1)

8. Prior to the education session, I felt confident discussing HCV screening recommendations with patients.
    - Strongly agree (5)
    - Somewhat agree (4)
    - Neutral (3)
    - Somewhat disagree (2)
    - Strongly disagree (1)
9. After the education session, I will increase hepatitis C screening discussions with patients.
    - Strongly agree (5)
    - Somewhat agree (4)
    - Neutral (3)
    - Somewhat disagree (2)
    - Strongly disagree (1)
10. Prior to the educational session, rate your confidence level in identifying an abnormal laboratory value for HCV?
    - Very confident (5)
    - Confident (4)
    - Neutral (3)
    - A little Confident (2)
    - Not confident (1)
11. After the educational session, rate your confidence level in identifying an abnormal laboratory value for HCV?
    - Very confident (5)
    - Confident (4)
    - Neutral (3)
    - A little Confident (2)
    - Not confident (1)
12. What are the top three barriers that may keep you from screening for HCV?
    - Lack of time
    - Lack of resources
    - Knowledge deficit
    - Difficulties of ordering testing for HCV
    - Other, specify_____
13. The information provided in the educational session was relevant to my practice.
    - Strongly agree (5)
    - Somewhat agree (4)
    - Neutral (3)
    - Somewhat disagree (2)
    - Strongly disagree (1)

    Comments:

APPENDIX B. TWO MONTH FOLLOW-UP POST EDUCATIONAL SESSION

SURVEY

1. What is your gender?
    - Male
    - Female
2. What is your background?
    - Physician
    - Nurse Practitioner
    - Physician Assistant
    - Pharmacist
    - Nurse
    - Medical Assistant
    - Nursing Assistant
    - Other_____
3. How many years have you been in your profession?
    - 1-3 years
    - 4-6 years
    - 7-9 years
    - 10-12 years
    - > 12 years
4. Compared to prior to the education session, I have sufficient knowledge on HCV screening guidelines.
    - Strongly agree (5)
    - Somewhat agree (4)
    - Neutral (3)
    - Somewhat disagree (2)
    - Strongly disagree (1)
5. Compared to prior to the education session, I have enhanced my knowledge of benefits in screening for HCV.
    - Strongly agree (5)
    - Somewhat agree (4)
    - Neutral (3)
    - Somewhat disagree (2)
    - Strongly disagree (1)
6. What made the biggest difference in enhancing hepatitis C screening recommendations? (select all the apply)
    - Electronic medical record
    - Educational session
    - Workflow changes
    - Academic detailing components (following up on workflow process changes)
    - Other_____

APPENDIX C. EMAIL INVITATION

Department of Nursing
NDSU Dept. 2670
Fargo, ND 58108-6050
701-231-7395

Improving Hepatitis C Screening Rates

My name is Katie Thompson, and I am a DNP student at North Dakota State University. I am conducting a quality improvement project to improve hepatitis C screening rates in a primary care clinic setting. By participating in my project, it is my hope that health care professionals' will have the resources, knowledge, and enhanced comfort to provide evidence-based hepatitis C screening recommendations to patients.

As a health care professional, you are invited to participate in my quality improvement project and attend an in-service educational session regarding hepatitis C screening. Your participation is completely voluntary, and you may withdraw from the seminar at any time with no penalty to you.

There is minimal risk to participants. Risks of the project could include, loss of confidentiality and loss of autonomy, as the in-service will occur with all participants in the same room. By participating in the project, you may benefit by receiving education related to hepatitis C thus improving personal knowledge of hepatitis C screening recommendations; improving comfort levels in addressing HCV screening; and potentially enhance quality care.

At the end of the hepatitis C educational in-service, I will solicit your feedback on the in-service as well as obtain demographic information. It should take about 5 minutes to complete the post-in-service questions. Another survey will be conducted two months after the in-service. This study is anonymous. That means that no one, not even members of the practice improvement project team, will know that the information you give comes from you.

If you have any questions about this project, please contact me at katie.j.thompson@ndus.edu, or contact my advisor Adam Hohman at adam.hohman@ndus.edu

You have rights as a research participant. If you have questions about your rights or complaints about this research, you may talk to the research or contact the NDSU Human Research Protection Program at 701.231.8995, toll-free at 1-855-800-6717, or by email at ndsu.irb@ndsu.edu.

Thank you for your time and taking part in this practice improvement project,
Katie Thompson, DNP-S
Email: katie.j.thompson@ndus.edu,
Cell: 701-367-1851

APPENDIX D. IRB APPROVAL

NDSU NORTH DAKOTA STATE UNIVERSITY

September 17, 2019

Dr. Adam Hohman
School of Nursing

Re: IRB Determination of Exempt Human Subjects Research:
Protocol #PH20061, "Improving Hepatitis C Screening Rates in a Primary Care Setting"

Co-investigator(s) and research team: Katie Thompson
Date of Exempt Determination: 9/17/2019 Expiration Date: 9/16/2022
Study site(s): Family Health Care
Sponsor: n/a

The above referenced human subjects research project has been determined exempt (category # 2(ii)) in accordance with federal regulations (Code of Federal Regulations, Title 45, Part 46, Protection of Human Subjects). This determination is based on the revised protocol submission (received 9/13/2019).

Please also note the following:
• If you wish to continue the research after the expiration, submit a request for recertification several weeks prior to the expiration.
• The study must be conducted as described in the approved protocol. Changes to this protocol must be approved prior to initiating, unless the changes are necessary to eliminate an immediate hazard to subjects.
• Notify the IRB promptly of any adverse events, complaints, or unanticipated problems involving risks to subjects or others related to this project.
• Report any significant new findings that may affect the risks and benefits to the participants and the IRB.

Research records may be subject to a random or directed audit at any time to verify compliance with IRB standard operating procedures.

Thank you for your cooperation with NDSU IRB procedures. Best wishes for a successful study.
Sincerely,

Kristy Shirley

Kristy Shirley, CIP, Research Compliance Administrator

For more information regarding IRB Office submissions and guidelines, please consult https://www.ndsu.edu/research/for_researchers/research_integrity_and_compliance/institutional_review_board_irb/. This Institution has an approved FederalWide Assurance with the Department of Health and Human Services: FWA00002439.

INSTITUTIONAL REVIEW BOARD
NDSU Dept 4000 | PO Box 6050 | Fargo ND 58108-6050 | 701.231.8995 | Fax 701.231.8098 | ndsu.edu/irb
Shipping address: Research 1, 1735 NDSU Research Park Drive, Fargo ND 58102

APPENDIX E. HEPATITIS C SCREENING PRESENTATION

OPTIMIZING HEPATITIS C SCREENING RATES

- Avish Nagpal, MD Infectious Disease
- Katie Thompson, DNP-S
- Amber Slevin, PharmD, BCACP

Objectives

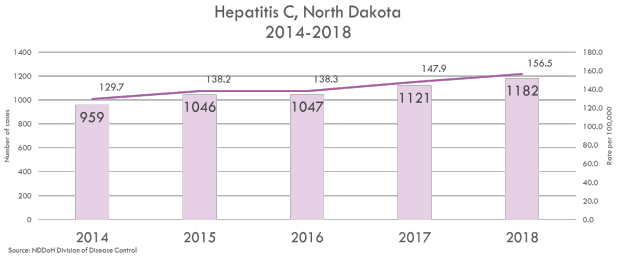
1. Describe the burden of Hepatitis C
2. Explain the transmission of HCV
3. Review HCV screening guidelines
4. Discuss new work flow design

Significance of Hepatitis C

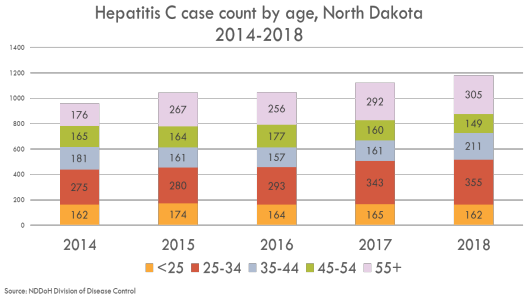
- Most common blood borne pathogen in US
- Prevalence: ~ 3 million infections
- Long term complications
  - *Cirrhosis*
  - *Hepatocellular carcinoma*
- Reduces life expectancy by 2 decades

(CDC, 2019)

ND Hepatitis C Cases Have Increased 23% in the Past 5 years from 2014 to 2018



Greatest Increases in New Diagnoses is Among Young Adults and Baby Boomers



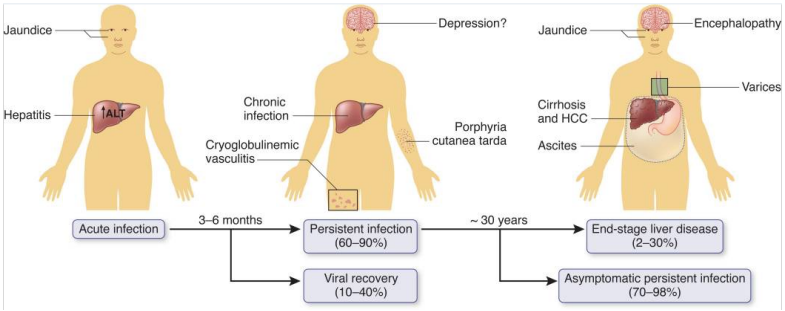
Transmission

- Percutaneous exposure
  - *Sharing injection equipment*
    - Needles and syringes
    - Intensity and duration of exposure increase the probability of exposure
      - *However there is transmission risk associated with even one instance of injection drug use*
  - *Blood transfusion*
    - Hemophiliacs
    - Prior to implementation of strict screening methods in 1992

(CDC, 2019)

Natural History

- Acute infection is mostly asymptomatic
- IP: weeks
- HCV RNA positive before liver enzymes are elevated
- Spontaneous clearance: 15% - 45%
  - *Younger age*
  - *Women*
  - *Certain genetic polymorphism (rs12979860)*
  - *Typically within 6 – 12 months*



Thomas DL. Nat Med 2013; 19(7): 850-58

Clinical Manifestation of Chronic HCV

- Chronic infection -> Fibrosis -> Cirrhosis
- 15% - 20% develop cirrhosis over 20 years
- Factors accelerating fibrosis
  - *HBV or HIV co-infection*
  - *Alcohol use*
  - *Fatty liver*
- Risk of HCC due to untreated HCV related cirrhosis as high as 3% per year

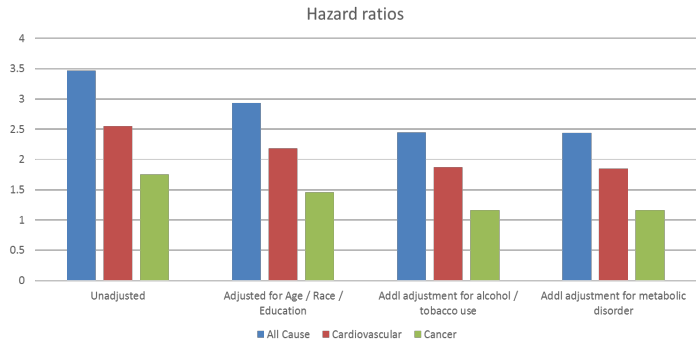
(CDC, 2019)

Clinical Manifestations of Chronic HCV

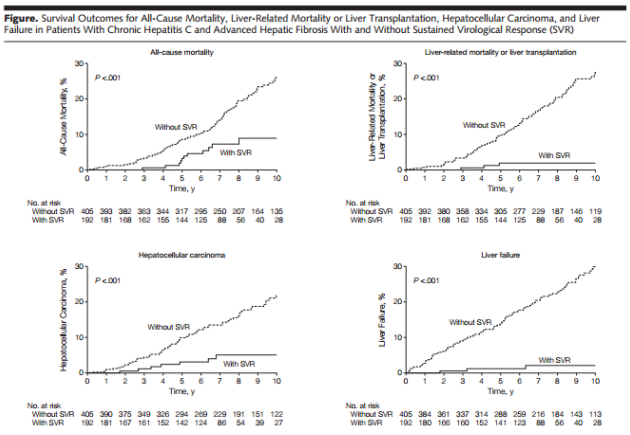
- Largely asymptomatic
- ALT abnormal in 80%
- Extra hepatic manifestations

Cryoglobulinemic vasculitis Raynaud's phenomena Sicca Syndrome	Arthralgias / arthritis Fatigue
MPGN Membranous nephropathy	Lichen planus Porphyria cutanea tarda
Monoclonal gammopathy Non Hodgkin's Lymphoma	Diabetes Mellitus Hypo or Hyperthyroidism

HCV and Mortality



Lazo et al. Clin Gastroenterol Hepatol 2017: 15(12):1957-64



van der Meer et al. JAMA 2012; 308(24):2584-93

Treatments are Effective

- Newer well tolerated drugs
- Cure rates in excess of 90%
- SVR12 considered evidence of cure
  - *correlates with significant decrease in life threatening complications and overall mortality*

Van der Meer et al. JAMA 2012; 308(24):2584-93

Screening

- Defined risk populations
- Asymptomatic
- Long latent period
- Inexpensive serological tests
- Curative treatments
- Reduction in morbidity and mortality

Who to Screen?

- History of risk exposure
  - *Once*
  - *Includes baby boomers (Born 1945 – 1965)*
    - Prevalence 7 – 11%
- Ongoing risk
  - *Yearly*
  - *MSM with HIV*
  - *PWID*

Hepatitis C: Screening. USPSTF. (2013).
Aberg et al. Clin Inf Dis 2014; 58(1):1-10

Recommendations for One-time HCV Testing

RECOMMENDED

One-time HCV testing is recommended for persons born between 1945 and 1965,* without prior ascertainment of risk.

Other persons should be screened for risk factors for HCV infection, and one-time testing should be performed for all persons with behaviors, exposures, and conditions associated with an increased risk of HCV infection.

1. **Risk behaviors**
   - Injection-drug use (current or ever, including those who injected once)
   - Intranasal illicit drug use
2. **Risk exposures**
   - Persons on long-term hemodialysis (ever)
   - Persons with percutaneous/parenteral exposures in an unregulated setting
   - Healthcare, emergency medical, and public safety workers after needlesticks, sharps, or mucosal exposures to HCV-infected blood
   - Children born to HCV-infected women
   - Prior recipients of transfusions or organ transplants, including persons who:
     - Were notified that they received blood from a donor who later tested positive for HCV infection
     - Received a transfusion of blood or blood components, or underwent an organ transplant before July 1992
     - Received clotting factor concentrates produced before 1987
   - Persons who were ever incarcerated
3. **Other considerations**
   - HIV infection
   - Sexually active persons about to start pre-exposure prophylaxis (PrePⁱ) for HIV
   - Unexplained chronic liver disease and/or chronic hepatitis including elevated alanine aminotransferase levels
   - Solid organ donors (deceased and living)

(AASLD, 2018)

HCV Risk Associated with Injection Drug Use

- Injection Drug Use:
  - *Over 65% of new HCV Cases*
- Among People Who Inject Drugs (PWID)
  - *60%-90% Have HCV after 5 Years*
  - *Median Time to HCV Transmission is 3 Years*
  - *Each Year 20-30% of PWID Acquire HCV*

(NDDOH, 2018)

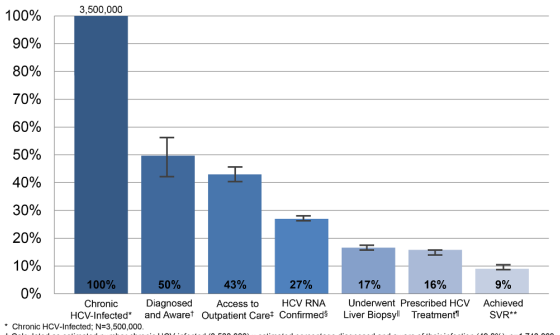
HCV Risk Associated with Baby Boomers

- Age group born 1945-1965 are 5 times more likely to be infected with HCV
- 75% people with hepatitis C were born in this cohort
  - *Reason is not completely understood*
  - *Most baby boomers are believed to have become infected in the 1960s through the 1980s when transmission of hepatitis C was highest*
    - Widespread screening nation's blood supply began in 1992
      - *HCV virus could spread via blood transfusions and organ transplant procedures*
    - Rise of recreational drug use from 1960s - 1980s

(CDC, 2019)

Hepatitis C Care Cascade

- Hepatitis C screening is one of the major gaps in optimizing Hepatitis C care cascade
- Data in chart from 2003-2013, not reflective of improved SVR12 rates with new medications



* Chronic HCV-Infected; N=3,500,000.
† Calculated as estimated number chronic HCV-infected (3,500,000) x estimated percentage diagnosed and aware of their infection (49.8%); n=1,743,000.
‡ Calculated as estimated number diagnosed and aware (1,743,000) x estimated percentage with access to outpatient care (86.9%); n=1,514,667.
§ Calculated as estimated number with access to outpatient care (1,514,667) x estimated percentage HCV RNA confirmed (62.9%); n=952,726.
‖ Calculated as estimated number with access to outpatient care (1,514,667) x estimated percentage who underwent liver biopsy (38.4%); n=581,632.
¶ Calculated as estimated number with access to outpatient care (1,514,667) x estimated percentage prescribed HCV treatment (36.7%); n=555,883.
** Calculated as estimated number prescribed HCV treatment (555,883) x estimated percentage who achieved SVR (58.8%); n=326,859.
Note: Only non-VA studies are included in the above HCV treatment cascade.

(Yehia, Schran, Umscheid, &Lo Re, 2014)

Current Screening Rates

- Retrospective chart review October 2017 to October 2018
- Current HCV completion screening rate for baby boomers is 26%
- Current HCV completion screening rate for people who inject drugs (PWID) is 66%
  - *However, PWID not well documented in electronic health record (EHR)*
  - *Of 592 who had documented use of drugs with injection potential, 406 (68.5%) did not have route of use documented in problem list, rooming form, or encounter notes*
  - *New, explicit question regarding IVDU added to EHR rooming form in April 2019*

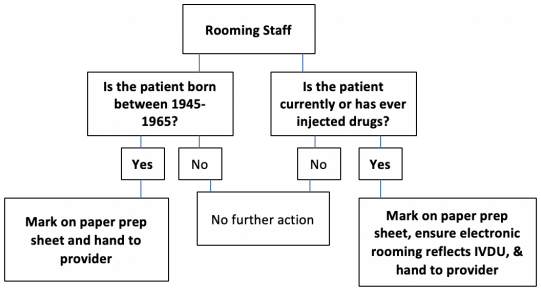
How can we impact this?

- Collaboration with nursing staff and providers to improve screening efforts have been successful in literature and at this site
  - Rooming nurse + provider collaboration
- Primary goal: enhance screening rates for two key populations (PWID and baby boomer)
- Secondary goal: continue to assess and document intravenous drug use
- DNP student introduction

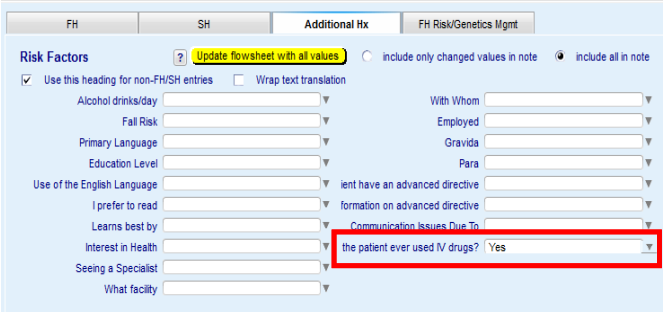
Work Flow Changes - Rooming Staff

- Rooming staff to identify presence of two key HCV screening indications during chart prep/rooming process
  - *Check box to be added to paper rooming form.*
- Patients who have a **history of former or current injection drug use** (even one instance)
  - *Up to date drug screening specific to intravenous injection (past or current) is needed during rooming process in order to ensure the most up to date information informs the HCV screening recommendation and plan*
- Patients in the **baby boomer population** (between 1945-1965)
- Handoff to provider

Rooming Staff Work Flow



Centricity IVDU Documentation

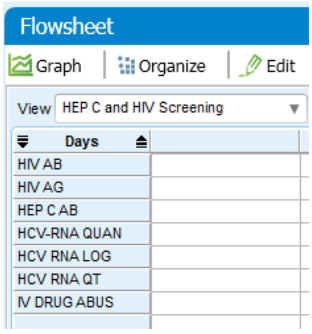


Work Flow Changes - Providers

- Review handoff from rooming staff
- If HCV screening indication present, provider to review chart for completion of HCV screening
  - *If current or recent history of IVDU – consider adding this dx to problem list*
- Review labs in "Documents" or utilize flowsheet titled "Hep C & HIV Screening"
  - *Screening labs: presence of Hepatitis C Antibody and/or Hepatitis C RNA quant results indicates screening is complete*

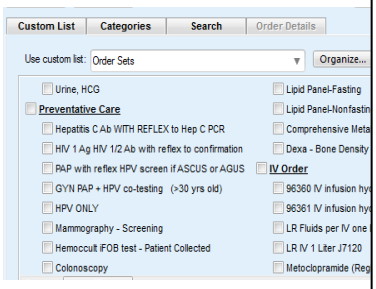
Hep C (& HIV) Screening Flowsheet

- Note: only contains labs from 2018 or after

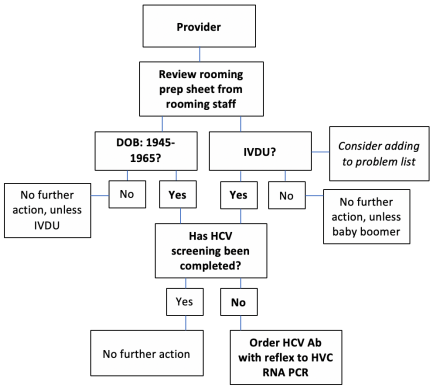


Work Flow Changes - Providers

- Provider to discuss recommended HCV screening with patients as indicated
- Order HCV Ab with reflex to HCV RNA PCR
  - *Added to the new Preventative Care order set*
- Positive results, refer to HCV clinic



Provider Work Flow

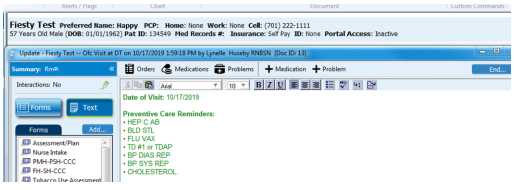


Hepatitis C Screening: Additional Notes

- **Patient reports previous negative HCV Ab** and do not have an indication for repeat testing? Results should be obtained and abstracted into chart.
  - *Send to clinical manager to abstract*
- **Patient reports previous positive HCV Ab**? Provider could choose to:
  - *Obtain these results with ROI*
    - Unless other patient information is needed, recommended requesting HCV labs only to streamline review of outside records
  - *Repeat testing with 'HCV Ab with reflex to HCV RNA PCR'*
  - *Order HCV RNA quant*
- **Labs already done before appointment?** Place future lab order to be done at time of next appointment.

Additional Support

- Hep C added to preventative care reminders for Baby Boomer Population



- Pharmacy students to augment new Hepatitis C screening work flow (when on rotation) via prospective chart review and create pop up alerts if screening indication found but no previous screening done

Academic Detailing

- Entails practice facilitation with a regular, tailored follow-up
- Studies have indicated academic detailing can help facilitate process changes
- In order to support optimizing HCV rates we need your input
  - *What has been working well*
  - *Noted barriers*
  - *Process updates*

(Alagoz, Chih, Hitchcock, Brown, & Quanbeck 2018)

Example Scripting

Talking to Patients about Hepatitis C Testing

You may wish to present the hepatitis C test as simply one in a set of routine tests conducted to assess general health. The following script was designed to help facilitate a discussion about hepatitis C testing.

sample conversation

Indicate the rationale for the test	*The Centers for Disease Control and Prevention (CDC) now recommends that people your age be tested for hepatitis C.* *OR* *Hepatitis C is a virus that can cause gradual, progressive liver damage. People can have the infection for many years – even decades – without knowing it. Many people have no symptoms, so getting a blood test is the only way to know if you have hepatitis C.*
Reassure patient about the value of the HCV test	*The antibody test will help you find out if you have been exposed to the virus at any time in your life.*
Obtain consent	*If it is all right with you, I would like to test you for hepatitis C today.*

(CDC, 2019)

Example Scripting

sample conversation

Provide results	*I have your test result.*
If antibody test result and HCV RNA tests are both positive	*Your hepatitis C test results were positive. You have hepatitis C.*

If the patient is upset or scared about the test result, you may want to convey a positive message of hope about hepatitis C.

sample conversation

Convey a positive message	♦ *Many people with hepatitis C remain healthy throughout their lives.* ♦ *There are treatments available that can cure hepatitis C for many people.* ♦ *There is a lot you can do to keep yourself healthy.* ♦ *You can find out if you have liver damage.* ♦ *You can start doing things to take care of your liver and prevent more damage.* ♦ *You can prevent transmitting the virus to others.*

(CDC, 2019)

Survey

https://ndstate.co1.qualtrics.com/jfe/form/SV_4PgjyrlxJPzFENf

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APPENDIX F. ACADEMIC DETAILING CHECKLIST

Date: Location: Time spent:

- Environmental scan:
- ID the workflow process:
    - Flowsheet available:
    - Handoff with paper form:
- Rooming form utilized:

Questions:

- How is the process going?
- Barriers?
- Suggestions?
- In need of any resources (pamphlets, guidelines, etc.)?
- Follow-up items?

Number of staff surveyed:

Providers:

Rooming Staff:

APPENDIX G. PWID HCV SCREENING DATA

Table G1

Pre- and Post-Intervention PWID Population Disaggregated by Demographics

Gender	Patients Seen Pre-Intervention Period Only	Patients Seen Post-Intervention Period Only	Patients Seen In Both Periods	Total
Female	135	90	117	342
Male	172	100	128	400
Total	307	190	245	742
Chi-Square Test Probability				0.621
Age	Patients Seen Pre-Intervention Period Only	Patients Seen Post-Intervention Period Only	Patients Seen In Both Periods	Total
Less than 30	70	56	36	162
30-39	107	69	82	158
40-49	70	38	52	160
50-59	42	21	55	118
60 and Above	18	6	20	42
Total	307	190	245	742
Chi-Square Test Probability				0.001
Ethnicity	Patients Seen Pre-Intervention Period Only	Patients Seen Post-Intervention Period Only	Patients Seen In Both Periods	Total
Hispanic	17	12	17	46
All Other Ethnicities	290	178	228	696
Total	307	190	245	742
Chi-Square Test Probability				0.792

Table G2

Cumulative HCV Screening Outcomes Among PWID Population Disaggregated by Demographics

Gender	Not Screened	Screened	Total
Female	138	204	342
Male	156	244	400
Total	294	448	742
Chi-Square Test Probability			0.708
Age	Not Screened	Screened	Total
Less than 30	65	97	162
30-39	105	153	258
40-49	68	92	160
50-59	36	82	118
60 and Above	20	24	44
Total	294	448	742
Chi-Square Test Probability		12	0.247
Ethnicity	Not Screened	Screened	Total
Hispanic	22	24	714
All Other Ethnicities	272	424	696
Total	294	448	742
Chi-Square Test Probability			0.24

APPENDIX H. BABY BOOMER HCV SCREENING DATA

Table H1

HCV Screening Pre- and Post-Intervention Baby Boomer Disaggregated by Demographics

Gender	Patient Seen Pre-Intervention Period Only	Patient Seen Post-Intervention Period Only	Patient Seen in Both Periods	Total
Female	209	132	36	377
Male	207	91	39	33
Total	416	223	75	714
Chi-Square Test Probability				0.066
Age	Patient Seen Pre-Intervention Period Only	Patient Seen Post-Intervention Period Only	Patient Seen in Both Periods	Total
Less than 60	232	118	42	392
60-69	64	31	11	106
70 and Above	120	74	22	216
Total	416	223	75	714
Chi-Square Test Probability				0.848
Ethnicity	Patient Seen Pre-Intervention Period Only	Patient Seen Post-Intervention Period Only	Patient Seen in Both Periods	Total
Hispanic	28	17	5	50
All Other Ethnicities	388	206	70	664
Total	416	223	75	714
Chi-Square Test Probability				0.908

Table H2

Cumulative HCV Screening Baby Boomer Seen Between Disaggregated by Demographic Variables

Gender	Not Screened	Screened	Total
Female	226	151	377
Male	193	144	337
Total	419	295	714
Chi-Square Test Probability			0.468
Age	Not Screened	Screened	Total
Less than 60	222	170	392
60-69	68	38	106
70 and Above	129	87	216
Total	419	295	714
Chi-Square Test Probability			0.353
Ethnicity	Not Screened	Screened	Total
Hispanic	38	12	50
All Other Ethnicities	381	283	664
Total	419	295	714
Chi-Square Test Probability			0.010

APPENDIX I. ACADEMIC DETAILING FINDINGS

Table I1

Academic Detailing Findings

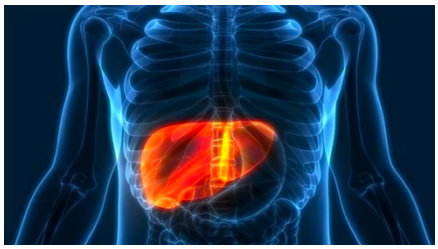
Location A	11/15/19	1/7/20
Time Spent	50 minutes	45 minutes
Rooming Form Used	Yes	Yes
Questions	No	No
Concerns	No	No
Barriers	Time	None identified
Staff Assessed		
Providers	7	5
Rooming Staff	4	2
Total	11	7
Location B	**11/19/19**	**1/7/20**
Time Spent	35 minutes	20 minutes
Rooming Form Used	Yes	Yes
Questions	No	No
Concerns	No	No
Barriers	Unsure how to document refusals. Patient's not always truthful about IVDU.	None identified
Staff Assessed		
Providers	4	5
Rooming Staff	4	2
Total	8	7
Location C	**11/21/19**	
Time Spent	30 minutes	
Rooming Form Used	Yes	
Questions	No	
Concerns	No	
Barriers	None identified	
Staff Assessed		
Providers	1	
Rooming Staff	2	
Total	3	

APPENDIX J. EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

IMPROVING HEPATITIS C SCREEENING RATES IN A PRIMARY CARE SETTING

- Approximately 2.4 million adults in the U.S. are living with a current Hepatitis C Virus (HCV) infection. HCV is the most common blood borne infection in the U.S. today.
- HCV is a viral infection that causes liver inflammation, which can lead to serious liver damage, long term health complications and death.
- New HCV infections are most common in persons who inject drugs (PWID) and chronic infection is most common in the baby boomer (birth year 1945-1965) cohort.
- Despite strong screening recommendations for HCV in place, many eligible patients do not undergo screening as nationally screening rates are low at approximately 12.8%.
- There are highly effective treatment options if an HCV infection is identified.
- To reduce the prevalence of HCV in the future, the first step for allowing linkage to care and effective treatments to occur is by increasing a patient's opportunities to be screened for HCV, in which primary care providers have a critical role.



Project Purpose

- Determine if education through the use of an educational session, followed by academic detailing components amongst health care professionals at a primary care clinic organization in the Midwest influenced HCV screening rates in the PWID and baby boomer cohorts.
- Another aim was to determine if providing education for health care professionals throughout the clinic setting, influenced comfort level and knowledge regarding HCV screening guidelines.

Project Design

- A total of two one-hour educational sessions were presented face to face to health care professionals at a Midwest primary care facility in PowerPoint format with topic experts on hepatitis C.
- Pre- and post-educational implementation HCV screening rates were computed by the facility.
- Voluntary surveys were used to evaluate an expected outcome of increased knowledge, comfort on HCV and screening guidelines after the education occurred.
- Academic detailing components were conducted to follow-up and help support health care professionals.

Project Objectives

- Enhance health care professionals' perceived HCV knowledge and comfort level in addressing HCV screening recommendations within six months of implementation.
- Identify persons who inject drugs (PWIDs) who seek care at the clinic to enhance HCV screening opportunities for those individuals within six months of implementation.
- Increase HCV screening rates for patients in the baby boomer cohort (birth year 1945-1965) at a primary care clinic within six months of implementation.

Results

- All health care professionals reported an increase in knowledge and comfort with HCV screening guidelines after the educational sessions.
- HCV screening opportunities for the PWID cohort increased from 59.6% to 65.1%, which was a 5.5% increase, as well as an increased identification of IVDU status.
- HCV screening rate for the baby boomer cohort increased from 35.0% to 51.0%, which was a 16.0% increase.

Recommendations

- This project was implemented prior to the universal HCV screening guidelines were published. Replicating this project with adherence to the newly published March 2020 HCV screening guidelines from the USPSTF should occur.
- Continued education to health care professionals regarding concepts and interviewing techniques which address patient barriers to HCV screening and foster meaningful, non-judgmental discussions specific to the PWID cohort.
- Providing additional time during clinic visits to discuss preventative health care needs could enhance HCV screening rates.
- Continued emphasis on patient education discussion points, the use of EMR alerts when a patient is due for HCV screening, information technology collaboration, and clinic workflow effectiveness are additional recommendations.