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Hepatitis C Treatment in High Risk Patients: Implementation of a Successful Community Focused Program

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Section I: Acknowledgements

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Abstract

Background: The city of San Francisco boasts a high rate of hepatitis C infection (HCV) among IV drug users indicating the need for a hepatitis C treatment program. It is estimated that over two-thirds of people who are actively infected with HCV are IV drug users (EndHepCSF, 2017), and in 2017 the San Francisco Department of Public Health (SFDPH) estimated that there are 22,500 active people who inject drugs (PWID) in SF (SFDPH, 2017). With the presence of a wide population of IV drug users in SF there is an identified need for intervention to treat this high-risk patient population.

Methods: After identification of a significant population of HCV infected patients in a community clinic, the latest evidence for HCV treatment was used to develop and pilot a practical HCV treatment program using glecaprevir/pibrentasvir (Mavyret). The pilot was aimed at testing a protocol in primary care, utilizing evidence based strategies.

Results: A total of 6 patients were enrolled in the pilot. There was a successful response rate (100% SVR) among the treatment group, supporting the use of single drug treatment with observed therapy in high risk populations.

Conclusion: The results of the project demonstrated that a standardized hepatitis C treatment program is highly efficacious and can be delivered in primary care settings to patients who are high risk.

Keywords: HCV, PWID, barriers, adherence, treatment, recommendations, education, awareness, resources, increase rates.

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SECTION II: Introduction

Background/Knowledge

Hepatitis C virus (HCV) is the most common chronic blood-borne disease in the United States. HCV is a chronic RNA virus that causes progressive liver damage, and is the leading cause (Razavi et al., 2013) of liver cirrhosis, hepatocellular carcinoma (liver cancer), and liver transplantation (Manns, et al., 2017). Patients who are at higher risk of being infected are: people who inject drugs (PWID) (accounting for over half of the active HCV population), men who have sex with men (MSM), and baby boomers (EndHepCSF, 2017). Other high risk groups are people with prior injection use, people living with HIV, transgender women, and people with a history of incarceration (EndHepCSF, 2017). HCV is transmitted through contact with contaminated blood of an infected person. Modes of transmission are contact with infected needles (more common in the healthcare setting), tattoos or body piercings using non-sterile tools, current or past IV drug use (sharing needles), blood transfusions or organ transplants before 1992, and contaminated equipment and needles used for dialysis in the healthcare setting (Gilead, 2015). Symptoms of HCV include fever, fatigue, loss of appetite, nausea and vomiting, abdominal pain, dark urine, gray-colored bowel movements, joint pain and jaundice (yellow hue of skin). HCV symptoms may not appear for years, or even decades. Even though the patient may not feel sick, HCV can be silently doing harm (Gilead, 2015). HCV was once without a cure, but recognition that HCV is a treatable, curable, and a preventable disease, and that treatment can reduce healthcare costs of the comorbidities that are associated with HCV, such as liver cirrhosis and cancer, have changed this belief. Cured HCV is represented by a sustained virologic response (SVR) of the patient, measured 12 weeks after treatment completion (known as SVR12). Most recently the development of treatments has successfully demonstrated a cure

for this virus and the possibility of avoiding long term consequences. On a global level, between 64 and 103 million people are chronically infected with HCV (Manns, et al., 2017). In the U.S., HCV affects over 3 million people (Gilead, 2015), and has surpassed all other nationally notifiable infectious diseases combined as a cause of death in the U.S. (EndHepCSF, 2017). There is an estimated 12,000 people living with active HCV in SF (EndHepCSF, 2017), indicating there is a continuing need for HCV awareness, education, and treatment in communities.

HCV was discovered 30 years ago in 1989 by scientists at the Centers for Disease Control and Prevention (CDC), National Institutes of Health (NIH) and industry (CDC, 2014). In 1991, the Food and Drug Administration (FDA) approved the very first drug to treat HCV (CDC, 2014). Unfortunately, the initial treatment resulted in very few patients clearing the virus (CDC, 2014). Since 1991, a total of 16 antiretroviral medications (two of which have been removed from the market) have been developed (Spach & Kim, 2018), leaving 14 currently active HCV drugs on the market. The medications initially used to treat HCV were combinations of ribavirin and interferon and had many side effects, such as nausea and vomiting, weight loss, depression, insomnia, flu-like symptoms, diarrhea, headache, malaise, joint and muscle pain, and exhaustion (Wessels, 2018). Over the course of time, the medications to treat HCV have established a lower side effect profile, and have gone from combination drug treatments to single drug treatments, like Mavyret. Mavyret belongs to a new class of direct acting antivirals (DAA) for HCV, and is regarded as being very cost-effective, having the best tolerance and treatment adherence rates due to the low side-effect profile, and is able to treat all six genotypes. The newer treatment options are very promising, but also come at an incredibly high cost to the health care system. In February 2017, 29% of San Francisco Health Plan's (SFHP) pharmacy budget (representing only

0.2% of pharmacy claims) was used for Hepatitis C treatment (San Francisco Hepatitis C Task Force, 2017). Since HCV is a particularly outstanding health care problem in SF due to a higher population of high-risk patients (EndHepCSF, 2017).

Of the 3 million people in the U.S. who are actively infected with HCV, PWID make up 68% of that population (EndHepCSF, 2017). Since PWID makes up a very large percentage of the HCV population, it is important that this specific patient population be treated and not turned away from receiving care and treatment. In the past, this specific patient population had been turned aware from receiving HCV treatment due to patient fear of stigmatization by providers and society, provider fear that the patient would not complete treatment, and provider concerns that patients would reinfect themselves after being cured, indicating it would be a waste of resources to treat PWID (Grebely, Oser, Taylor & Dore, 2013). When this patient population is left untreated healthcare costs and demands increase in other ways due to hepatic and non-hepatic comorbidities, which include insulin resistance, cryoglobulinemia, dermatologic disease, renal disease, cardiovascular disease, and chronic fatigue (EndHepCSF, 2017). According to End Hep C SF (2017), the benefits of HCV treatment are a 90% risk reduction in liver transplant and liver-related mortality, a 70% decrease in liver cancer, and 50% of patients who have liver cirrhosis will have improvement in their fibrosis. The estimated costs of comorbidities in the US associated with HCV (liver cirrhosis, hepatocellular carcinoma, liver failure, and liver transplants) is $6.5 billion per year and will peak in 2024 to $9.1 billion (Razavi et al., 2013). Razavi et al. (2013) states it is possible to reduce HCV infection and, in turn, the costs of comorbidities associated with HCV through active management of this viral infection. The initiation of HCV treatment in PWID is overall more cost-effective and can prevent further liver-related mortality when treated in the early stages (EndHepCSF, 2017).

Various direct-acting antivirals (DAAs) have been approved by the FDA and are available on the market. DAAs target three proteins involved in the HCV life cycle: the NS3/4A protease, the NS5A protein, and the RNA-dependent RNA polymerase NS5B protein. A combination of two or three of these medications can cure HCV in >90% of patients, including patients who have been difficult to treat in the past (Manns, et al., 2017). In 2013, Sovaldi was one of the first new HCV drugs, also classified as a direct acting anti-viral, that was approved by the FDA. The listing price for Sovaldi was $84,000 for a 12-week treatment, but the price has since come down due to public health programs, like Medi-Cal, being able to negotiate the cost. In more recent years, the HCV drug Zepatier, costing $54,600 for a course of treatment, and Mavyret, costing $26,400, are similar to Solvadi, Harvoni, and Viekira Pak in that they have fewer side effects, work faster, and are more effective in curing HCV than the older HCV drug interferon (Bartolone, 2018). The total cost of Mavyret has been priced by AbbVie (the manufacturer of Mavyret) for $13,200 per month, or $26,400 per eight-week course of treatment for each patient (Shye, 2017).

Table 1

Drug Comparison Table

Brand Name	Generic Name	Genotype Treated	Side Effects	Cost for 8-week course therapy
Mavyret	Glecaprevir/pibrentasvir	1-6 (all genotypes)	Mild; fatigue, headaches, and pruritus in the first two weeks of starting treatment. Side effects resolved after the initial two weeks.	$26,400

Table 1

Drug Comparison Table

Brand Name	Generic Name	Genotype Treated	Side Effects	Cost for 8-week course therapy
Viekira Pak	Ombitasvir/paritaprevir/ritonavir plus dasabuvir	1	Mild; fatigue, headaches, nausea, pruritus, skin reactions, insomnia, and asthenia (loss of strength)	$83,320
Sovaldi	Sofosbuvir	1-4	Symptomatic bradycardia if taken with amiodarone; fatigue, headaches, nausea, fever, chills, arthralgia (joint pain), anemia, neutropenia; cannot be taken by pregnant or trying-to-be pregnant women	$77,760
Zepatier	Grazoprevir/elbasvir	1,4	Mild; fatigue, headaches, nauseas, insomnia, diarrhea.	$54,600
Harvoni	Ledispavir/sofosbuvir	1,4,5,6	Mild; fatigue, headache, nausea, diarrhea, insomnia	$63,000

Table 1

Problem Description

According to the U.S. Census conducted in 2015, 2.5% of all people living in SF have HCV (EndHepCSF, 2017). Among this percentage, 68% of the active cases are made up by people who inject drugs, 14% by men who have sex with men, and baby boomers make up the other 38% (EndHepCSF, 2017). The estimated percentage of people living with HCV in SF (2.5%) is significantly higher than the national percentage of 1.7% (EndHepCSF, 2017). It is not a surprise since that the burden of HCV disease is greater in SF since a higher proportion of the residents of the city are in the groups at highest risk for HCV. San Francisco has the highest liver cancer rate in the nation, most of which is attributed to high rates of Hepatitis B and C virus infections (San Francisco Hepatitis C Task Force, 2017).

Gap Analysis

A gap analysis was conducted in the city of San Francisco at a local community clinic that serves a significant population of PWID and are considered at higher risk for contracting HCV. A comparison of the current state to the desired future state was done in order to determine what was needed to achieve the prospective goal (Appendix C). According to McGown and Fried (2011), these high-risk populations often do not seek treatment for several reasons. Mentioned reasons include: poor awareness/education, lack of interest in seeking treatment since they are asymptomatic, lack of medical coverage, failure of the provider to screen the patient, patient non-adherence to the medication regimen, provider failure to refer the patient, limited specialist availability (patients who present with a more complicated clinical picture such as liver cirrhosis), patient fears and misunderstandings, stigmatization, substance abuse, transportation challenges, and communication difficulties (no cell phone and/or reliable address).

The most common concern seen in patients that hindered their interest in receiving HCV care and treatment was the side effects they could encounter with the medication. The next most common identified gap was patients did not feel they need to be treated for HCV if they were asymptomatic. These concerns were addressed during their primary care visits with the providers at to provide education that the newer HCV medications, such as Mavyret, have minimal to no side effects, and that even though they may feel healthy right now, the HCV is actively causing harm to their liver, and by the time symptoms are experienced damage has already been done.

Setting

BAART Programs for the treatment of opioid addiction and primary care are nationwide group of community health centers with a total of 29 locations (BAART, 2019). BAART Turk is a California Community Clinic and is a member of the San Francisco Community Clinic Consortium (SFCCC). Six of the BAART locations are in the San Francisco Bay Area (BAART, 2019). The populations served are people recovering from substance abuse and pursuing to achieve life-time recovery, and underserved populations (low-income and/or homeless residents of the surrounding area). BAART provides substance use counseling, the initiation, maintenance, and monitoring of methadone and buprenorphine administration, and low-cost primary care and preventive health services. Opioid use disorder treatment, and mental health and primary care services are offered in one convenient location at BAART on Turk Street (BAART Turk) (BAART, 2019). Of the 400-600 patients who are dosed daily for methadone, 115 of these patients are eligible to be treated for HCV. Currently, there are a total of 35 staff at BAART Turk. The staff consist of: one medical assistant who performs lab draws, takes patient vital signs, gives injections, rooms patients, and performs nebulizer and wound care treatments; three

registered nurses who dispense medications to patients; 14 substance abuse counselors; two nurse practitioners (NPs) and two physicians for provider appointments; two front desk receptionists to check-in patients; two counseling supervisors; one on-site clinic director; one mental health director; one psych NP; one mental health nurse; four interns either training to be mental health counselors or doing their one-year internship for a PsyD program; one administration assistant; and one security guard. The insurances that are accepted at BAART Turk are Anthem Blue Cross of California, Medi-Cal, private insurance (Anthem Blue Cross, Kaiser Permanente, Veterans, and other private insurance with pre-authorization), and TriWest (Health Net Federal Services), and San Francisco Health Plan (SFHP) (BAART, 2019).

BAART Turk Street Clinic is well positioned to contribute to the treatment and eradication of HCV in PWID. According to the San Francisco Department of Public Health (SFDPH) (2017), 31% of the 22,500 people who are active IV drug users in SF reside in the Tenderloin, making the location of this clinic in the heart of the Tenderloin very convenient and has proven to be highly effective in treating this patient population. BAART Turk has a large patient population who is at risk for having and transmitting HCV (EndHepCSF, 2016).

Majority of patients seen at BAART Turk are there to receive methadone treatment. The patients usually come in for their medication daily and it is distributed to them by the nursing staff. There are a total of two physicians and two nurse practitioners on site who see patients for both primary care and specialized methadone care. When BAART Turk did not have a HCV treatment protocol, they reached out to the San Francisco Health Plan (SFHP) and created a partnership to receive a grant for the treatment of infected individuals over the next two years. It was projected that the HCV grant would provide treatment to hundreds of high-risk patients by September 2018, and will achieve a cure for 85% of participating patients by the year 2020

(Kletter, 2018). The grant indicated that the antiretroviral Mavyret be used for the treatment of HCV at BAART Turk due to its low side-effect profile, ability to treat all genotypes, and low-cost compared to other HCV treatment medications on the market (Abbvie, 2018). Costs of Mavyret were covered by the grant. The stakeholders of the project are Dr. Deb Borne (chief organizer, lead physician), Dr. Brian Clear (project oversight as the medical director of BAART Turk), Cara Nalagan, NP (project coordinator, lead NP), and Annie Pedlar, NP student intern as the DNP author. The intervention is applicable to the patients at BAART due to the high-risk profile of patients with homelessness and IV drug abuse (IVDA). The implementation of the HCV treatment program at BAART Turk was authorized by the San Francisco Department of Public Health (SFDPH), SFHP, and by the medical director, Dr. Brian Clear, of BAART Turk. The collaboration between USF and BAART Turk was developed through a memorandum of understanding (MOU), and the project proposal, as stated in the statement of determination (Appendix A) was approved by committee chair, Dr. Prabjot (Jodie) Sandhu and my role as DNP author was authorized by Dr. Brian Clear, medical director of BAART Turk who has written a letter of support (Appendix B).

BAART would like to support efforts to target hard-to-reach populations, such as those who use IV drugs and/or with unstable housing, to improve treatment efficacy, and secondarily reduce rates of Hepatitis C transmission in SF. Since their patient population is high-risk for having and becoming infected with HCV, the implementation of a HCV treatment program would largely benefit the primary care and methadone patients seen at BAART.

Need for Evidence Based Intervention

Due to its strength in treating HCV regardless of genotype, accessibility, low side effects, and short treatment period, the treatment of HCV with Mavyret is highly recommended as a first-

line choice drug for high-risk populations. Given that Mavyret is highly efficient and effective, it is an ideal treatment model and the best drug choice for a HCV treatment plan or protocol in a community setting.

Search Process

A systematic search was conducted in June-September 2018 based on the PICO question: In patients with active hepatitis C virus (HCV), will treatment with the antiviral medication such as glecaprevir/pibrentasvir (Mavyret) compared to no treatment result in a cure rom HCV, demonstrated by attaining a sustained virologic response (SVR). Furthermore, investigation of best practices and research related to evaluate the cost of HCV drugs and access issues, and educational barriers to HCV treatment was also conducted. The keywords used in the search process included: *hepatitis C, Mavyret, SVR, SVR12, treatment, efficacy, effectiveness, IVDA (IV drug abusers), PWID (people who inject drugs), OAT (opioid agonist therapy), methadone, clinic, primary care setting, costs, San Francisco, benefits, risks, burden, barriers, access, and comorbidities.* CINAHL, PubMed, Cochrane, Scopus, and Google Scholar were the databases searched. A gray search of the literature was also conducted on Dynamed, UptoDate, Google, Medscape, and Epocrates. The search process yielded a total of 150 articles. Articles were selected for review if they met the inclusion criteria: current literature published between 2010 and 2018, articles written in English, subjects being treated for HCV with antivirals, subjects being treated for HCV with Mavyret. The articles that were excluded were ones not written in English and articles that were written before 2010. While there were no scholarly articles available which compared the various antiretrovirals available for HCV treatment, the SFHP selected Mavyret as the drug of choice for two specific reasons – first, its cost compared to other medications is significantly lower (see Background section above), and second, patient

adherence tended to be higher due to fewer side effects. A total of 10 qualified articles were then selected for final review. The evidence was rated using the Johns Hopkins Evidence Rating tool (Appendix J).

Review of the Evidence

The treatment options for HCV have dramatically progressed from poorly tolerated and moderately successful interferon-based therapies, to highly effective all-oral interferon-free drug regimens (Abutaleb, Kottilil, & Wilson, 2018). The available studies used for the literature review of Mavyret all support the fact that it is highly efficacious, and that due to its low side-effect profile it is tolerated well and ultimately the best choice for patients who are in opioid agonist therapy (OAT) and treated with methadone.

Mavyret Efficacy

Mavyret is the drug of choice in treating HCV patients at BAART Turk because it can treat any genotype of the HCV and has little to no side effects. Voelker (2018) reviews clinical trials, in which 2300 adult patients with HCV genotypes 1-6 showed that 92% who had received Mavyret for 8,12, or 16 weeks had no detectable virus in their blood work 12 weeks after treatment had ended (SVR12), indicating they were cured. The results of the study strongly support the use and effectiveness of Mavyret and suggest that this DAA should be used to treat all patients with HCV.

In a study done by Asselah, et al. (2018) called the SURVEYOR –II, after 8 weeks of treatment with Mavyret, there was an SVR12 produced in 98% of those infected with HCV genotype 2, and in 93% of the patients infected with genotypes 4,5, and 6; and after 12 weeks time an SVR12 was produced in 99.5% of genotype 2 patients and 99% in genotypes 4,5, and 6. A total of 568 patients took part in this multi-level study, two studies being open label, and

single-arm, and the other being a randomized, double-blind, placebo-controlled study. The findings of the studies suggest that the safety and efficacy of 8 and 12 weeks' treatment with Mavyret is highly effective, which supports the use of this drug to treat patients living with HCV.

A partially randomized, open-label, multicenter, phase 3 study trial conducted by Wyles, et al., (2017), assessed the efficacy of Mavyret in treating patients with HCV of genotype 3, and had prior treatment experience and/or compensated liver cirrhosis. This specific patient population is traditionally difficult to treat due to limited treatment options given the complexity of their HCV status. A total of 131 patients participated in the study. Of the treatment experienced patients without cirrhosis, an SVR12 was attained by 95% of patients treated with Mavyret for 12 or 16 weeks. The patients who had cirrhosis and were treatment-naïve achieved an SVR12 of 98% at 12 weeks, and 96% of the patients with prior treatment experience attained an SVR12 who were treated for 16 weeks. Based on these results, this patient population achieved high rates of SVR12 and supports the efficacy and safety of Mavyret (Wyles, et al., 2017).

The EXPEDITION-1 study by Forns, et al., (2017) is a phase three, single-arm, open-label, multicenter study at 40 sites in Canada, Belgium, Germany, Spain, South Africa, and the US. All patients were over 18 years of age, had chronic HCV with genotypes 1,2,4,5, or 6, compensated cirrhosis, and were either treatment-naïve or were treatment exposed to interferon and/or ribavirin and had a failed virologic response. A total of 146 patients were in the study, and an SVR12 of 99% was achieved at the end of the 12-week course treatment of Mavyret, indicating high efficacy rate of this medication (Forns, et al., 2017).

In the EXPEDITION-2 study, done by Rockstroh et al., (2018), 153 patients with HCV and either genotypes 1-6, and HIV coinfection were treated with Mavyret. Patients with

compensated liver cirrhosis (16 total) were also included. Some of the patients were treatment-naïve and others were treatment experienced with sofosbuvir, ribavirin, or interferon and antiretroviral naïve or on a stable antiretroviral regimen for their HIV. Treatment experienced genotype 3 patients were excluded. EXPEDITION-2 is a phase 3, multicenter, open-label study assessing the efficacy of Mavyret for 8 to 12 weeks. An SVR12 was achieved in 98% of 137 patients who were treated for 8 weeks. The results of this study have concluded that Mavyret treatment for 8 weeks in non-cirrhotic and 12 weeks in cirrhotic patients is highly effective and well-tolerated by patients with HCV and HIV coinfection (Rockstroh, et al., 2018).

The study named MAGELLAN-1 by Poordad, et al. (2017) focused on 50 HCV patients who were of genotype 1, no cirrhosis, and had prior virologic failure to HCV direct-acting antivirals (DAA). It is a phase-2, open-label study with three arms. Two arms were treated with just Mavyret of different doses (arms A and B), and the third arm was treated with Mavyret in addition to ribavirin (arm C). The SVR12 was at least 95% in arms A and B, and 86% in arm C. Based on these values, Mavyret was highly effective and well tolerated in patients with HCV genotype 1 infection who had prior virologic failure with other DAA therapies (Poordad, et al., 2017).

The CERTAIN-1 study done in Japan is a phase 3, open-label, multicenter study which assessed the safety and efficacy of Mavyret in 181 Japanese patients with HCV, genotype 1, with or without cirrhosis (Chayama, et al., 2017). The patients without cirrhosis were treated for 8 weeks, and the patients with cirrhosis were treated for 12 weeks. An SVR12 was attained by 128 of the 129 (99.2%) non-cirrhotic patients, and 52 of the 52 (100%) cirrhotic patients. The results of this study demonstrate a high efficacy and tolerance for Mavyret in these patients, indicating strong support for future patients to be treated for HCV with this drug (Chayama, et al., 2017).

In the SURVEYOR-I and SURVEYOR-II studies by Kwo, et al. (2017), HCV patients with genotypes 1-6 were treated with Mavyret for either 8 or 12 weeks. These patients had no cirrhosis, were treatment-naïve, or treatment exposed to interferon and ribavirin. The studies are open-label, multicenter, dose-ranging trials of 449 patients. For the 12-week treatment, SVR12 was attained in 97-100% of the patients, and 97-98% was achieved in the patients with the 8-week treatment. The results support the effectiveness of Mavyret in treating patients who have HCV with genotypes 1-6 and no cirrhosis as evidenced by the high rate of SVR12 (Kwo, et al., 2017).

Gane, et al. (2016), conducted two studies that were open-label and phase 2. Twenty-seven patients with chronic HCV with genotype 1, and 55 patients with genotype 3, and all had compensated liver cirrhosis. The majority of these patients were treatment-naïve (84%) and male (65%). A 12-week course of Mavyret was given to treatment-naïve patients, and a 16-week course was for those who had exposure to prior treatment. The overall result yielded a SVR12 of 96-100% between both arms of the study. The only adverse effects experienced were headache, fatigue, and nausea. All in all, Mavyret was well tolerated by the patients in this study and is recommended for future use in treating HCV (Gane, et al., 2016).

Barriers to HCV Treatment

An important aspect to determining successful treatment in HCV patients is to account for any potential barriers, especially in this high-risk population. Evaluating the barriers will help control the pitfalls of treatment and allow for a better exploration of the gaps perceived in providing care to HCV patients. The patients who have experienced barriers to access and treatment for HCV are typically ones that are past or present IV drug abusers.

Grebely, et al. (2008) distributed surveys to 188 HCV positive illicit drug users focusing on the barriers associated with IV drug users. It was discovered that the major reasons for not seeking HCV treatment were lack of information about HCV or knowledge that treatment was available (23%), the absence of symptoms (20%), and the perceived side effects of treatment (14%) (Grebely et al., 2008). In this study, it was observed there was a low uptake of HCV treatment, but a high willingness to receive therapy. Based on the findings it is recommended that there be an increased focus on improving education about the long-term consequences of untreated HCV and the availability of effective treatment to expand HCV treatment among illicit drug users (Grebely et al., 2008).

A systematic review conducted by Grebely, Oser, Taylor and Dore (2013) indicated that HCV treatment uptake among people who inject drugs (PWID) will not increase unless the barriers of HCV education, screening, evaluation, and treatment are addressed. Specific barriers identified and addressed in this review were: systems-level (lack of screening, treatment and evaluation guidelines), practitioner-level (withholding treatment because of perceptions about poor treatment adherence, ongoing substance abuse, relapse to substance abuse, risk of exacerbating comorbid psychiatric disease and potential risk of reinfection), and patient-level (poor knowledge of HCV and the long-term consequences on health, and inaccurate perceptions of HCV treatment side effects) (Grebely, Oser, Taylor & Dore, 2013). The studies reviewed have shown that accurate guidelines to treatment initiation, monitoring and evaluation, and enhanced patient and provider education can increase HCV treatment uptake.

The evidence strongly suggests that adherence to HCV treatment in patients who are being treated with opioid agonist therapy (OAT) and are recently active or currently active people who inject drugs (PWID) can be achieved, and that this patient population can achieve an

SVR (Grebely et al., 2016). According to Grebely, Oser, Taylor, and Dore (2013), a history of IV drug use (including recent drug use) does not compromise adherence or treatment completion or SVR, and that occasional drug use during treatment did not affect outcomes. Directly observed treatment promotes the most adherence in this patient population, and this approach should be utilized whenever possible (Schutz et al., 2018).

There is strong evidence indicating that if the above listed barriers are addressed that treatment uptake and overall success of HCV treatment will increase and less healthcare burdens will be seen.

Theoretical Framework

The theoretical frameworks that will guide the development and implementation of this project are the HBM (Health Belief Model) and EBM (evidence based model). Their theoretical and psychological models help guide health promotion and treatment of current and future healthcare issues. These two theoretical frameworks will provide the support to integrate change, provide changes in behavior for both patients and staff, and utilize evidence as a tool to promote a community based treatment model.

The Health Belief Model (HBM) was created in the 1950's by social psychologists Hochbaum, Rosenstock, and Kegels (1952) to help the U.S. Public Health Service determine why medical screening programs that they offered were not successful (Turner, Hunt, DiBrezzo, & Jones, 2004). The underlying thoughts of HBM is that behavior about and towards health stems from personal beliefs and perceptions about a disease and the approaches used to treat the disease (Glanz, Rimer, & Viswanath, 2002).

There are four perceptions that lead to the structures of the theory, which are: perceived susceptibility, perceived severity, perceived benefits, and perceived barriers. The HBM is based

on the idea that 1) people will make a health-related decision and take-action if they feel that a negative health condition can be avoided, like hepatitis C; 2) the person has an optimistic thought and expectation that by using such endorsed health action the person will be prevented from experiencing a situation that negatively affects their health; and 3) the person feels confident and comfortable enough to carry out the health action (Glanz & Rimer, 1997). Being able to understand the factors that affect behavior compliance can help healthcare providers influence positive health outcomes for the patients receiving care. The HBM will guide the project at BAART Turk to identify the perceived threats and barriers that patients may have and possibly encounter during treatment, and understand how to avoid these hindrances to promote that best patient and overall project result outcomes.

Sackett (2014) defines EBM as the "conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients". The EMB was created to develop and promote an "explicit and rational process for clinical decision making that deemphasized intuition and unsystematic clinical expertise while emphasizing the importance of incorporating the best research findings into clinical care" (Satterfield, et al., 2009). Creating individualized treatment regimens for diseases, like HCV, using this model will provide the patient the utmost effective and safe care. The foundation of the EBM model will guide providers to create individualized approaches for each patient to promote the most successful and effective response to the treatment regimen, including adherence to the medication regimen and time-sensitive therapeutic lab draws.

Ethical Considerations

HIPAA considerations required that all patient information was to be accessed through the online portals that were only accessible at BAART Turk. No patient names or identifiers

were used throughout this paper or in other documents that were seen and used outside of the HCV treatment program at BAART. IRB approval was not indicated for this project since it did not qualify as research. However, an SOD was completed because the project qualified as a practice change model.

Of the six values that are known as the principles of the Jesuits, 'women & men for and with others' (Creighton University, 2018) is reflected in this project. The focus of the project exhibits the value of providing community outreach and enhancing care for the poor and marginalized groups by encouraging 'care for the individual person' (Creighton University, 2018). As discussed earlier in the theoretical framework of the EBM, an individualized approach to patient care can promote adherence to and overall success in patient health outcomes.

The seventh provision of the ANA Code of Ethics is demonstrated in this project, which states "the nurse, in all roles and settings, advances the profession through research and scholarly inquiry, professional standards development, and the generation of both nursing and health policy" (American Nurses Association, 2015). Research and scholarly inquiry has allowed the DNP author to identify the need for a HCV treatment program for the high-risk patient population seen at BAART Turk, and has helped initiate a HCV treatment policy for the patients in the BAART Turk setting.

SECTION III: Methods

Specific Aims

The overall goal of the project is the reduction of HCV infection among positive patient population in SF at one community-based clinic as a model for a larger scale community-based treatment protocol across all BAART clinics. The specific target population was patients at BAART Turk who were living with active HCV and were mostly PWID. The implementation of

a HCV treatment program at BAART Turk was important because many of the patients that are seen there are high-risk for HCV, and screening, diagnosing, and treating are effective in this specific patient population.

The aim of the project was to have at least 80% of the identified hepatitis C virus (HCV) positive patients at BAART Turk Clinic enrolled and successfully complete treatment with the antiviral medication Mavyret by December 2019. Appropriate measures to document success were based on patient participation, toleration and use of Mavyret and SVR at 12 weeks.

Objectives

The primary objectives of this project were: a) to decrease rates of HCV infection using effective drug therapy, b) educate the patient population who was at high-risk for infection, and c) to prevent reinfection through education. According to Manns et al. (2017), as long as there is no availability of prophylactic vaccines for HCV, the treatment and control of the virus must be through prevention strategies (ie: sterile medical equipment in developing countries, no re-use of needles while using drugs), effective screening programs, and access to treatment for all. This project will use the following goals to guide successful implementation.

a) To educate 100% of the providers at BAART Turk on HCV and increase knowledge of HCV infection, including screening, assessment and treatment protocols by completing a post seminar survey with improved scores compared to the pre-education survey.

b) To design and implement an 8-week HCV treatment program utilizing the medication Mavyret for BAART Turk patients.

c) To achieve 100% uptake and success of the HCV treatment program at BAART Turk by all eligible HCV positive patients, as demonstrated by an attained SVR at 12 weeks.

d) To achieve 85% staff satisfaction with the implementation of the project at BAART Turk.

e) To achieve an overall 85% patient satisfaction with project effectiveness and implementation.

The collaboration and development of a HCV treatment program at BAART Turk Clinic was designed to create a low barrier, easy to treat workflow with San Francisco Health Plan (SFHP) that allowed easy approval and execution of treatment options for patients at BAART Turk Clinic.

Interventions

Developmental Phase

During the developmental phase of the project, focus was given on using the gathered data and evidence to create the educational materials for staff, providers, and patients. A PowerPoint was created by the DNP author for the counselors at this clinic to educate on what HCV is, the importance of HCV being treated, and how they as counselors could help support their clients in receiving care and being treated and cured from HCV. Along with the PowerPoint, educational pamphlets and flyers about HCV created by End Hep C SF were used as reference for the counselors.

The second phase of development involved creating the clinic algorithm for treatment (Appendix N). This included working with the medical director, lead physician, the lead NP, and the DNP author in designing a process for screening at risk patients, deeming them eligible, and recruiting them into a cohort model for treatment. The cohort design was selected, to ensure a more streamlined process of tracking and monitoring the patients as an introductory model.

The selection and preparation of the first cohort involved completing chart reviews to determine the eligibility of patients. The eligibility criteria were: the patient had to have active insurance through the SFHP, the patient could not be co-infected with active hepatitis B or HIV, the patient had to have confirmed HCV based on blood test results, and have no evidence of a compromised liver (liver cirrhosis). A total of several hundred chart reviews were done, and by way of using mail, phone calls and clinic visits six patients were recruited into the first cohort. It was important to conduct chart reviews to see which patients did and did not have an assigned primary care provider (PCP), which patients were due for a HCV screening, and which patients were active with BAART Turk, but have not seen a PCP for a considerable amount of time (one year or over) and were discovered to be HCV positive the last time they were seen. These patients were sent letters in the mail to help initiate the process of receiving HCV education and treatment. In order to efficiently follow all of this information, an excel spreadsheet was created to keep track of these patients.

A relationship between USBioServices and the clinic was established since the clinic was receiving the medication Mavyret from this pharmaceutical distributor. A conference call establishing a profile for the medical director, staff nurse practitioner, lead nurse, staff physician, and DNP author of the clinic was done so medications could be ordered for the HCV patients.

The DNP author met with the dean of the college of nursing of the University of San Francisco (USF) to propose the project idea and the goals and objectives, and to create a timeline.

Educational Phase

The educational sessions were the next step in the process. The DNP student led the educational sessions to the counselors, staff, and providers via PowerPoint presentation at the

site over a 1-hour period during their lunch break. Snacks and 25 print-outs of the PowerPoint slides (each packet being 10 pages) were printed for a total of 25 attendees. Immediately following the educational session, the knowledge attained and the teaching effectiveness of the DNP author was assessed by administering pre- and post-education surveys distributed to the counselors who would be working directly with the patients. Following the staff education phase, education was provided to the patients who were infected with HCV via the lead NP, lead physician, and medical director during medical appointments. Patient education about HCV was provided verbally during individual clinic visits (and reinforced at subsequent clinic visits) by the provider and by distribution of handouts given to the patient directly from the provider. The main points addressed were side effects of the medication and the importance of treatment adherence.

Implementation Phase

The algorithm created for the HCV treatment program (Appendix N) at BAART Turk helped identify patients that were qualified to receive HCV treatment. Patients were selected for blood lab work-up of HCV by determining if they were high-risk (IVDA, homeless, history of other forms of substance abuse). After this was done, the identified patients were notified via in-person appointments with one of the providers involved with the project that they were categorized as being high-risk for HCV, and that blood work was ordered to test for the presence of HCV. If the blood work came back as the patient being HCV positive the patient was made aware of their positive HCV status during a follow-up blood work appointment with the provider, and provided a pamphlet and verbally educated about what HCV is, notified that they qualify for a HCV treatment program being established at the clinic. The provider then assessed the patients interest in receiving treatment. If the patient agreed to treatment, further education

was provided about next steps including: blood work that needs to be obtained during and after treatment, the type of medication (Mavyret) they will be receiving and potential side effects associated with said medicine, DOT vs take-home therapy, frequency of taking the medicine, future check-ins with the provider, and other resources and references regarding HCV. After the patient received education about HCV and expressed interest in receiving treatment, a written consent was signed by the patient and kept in their patient profile chart at the clinic. The DNP author took into consideration all the information that was obtained from the patients, counselors, and staff at the clinic to establish the most effective, efficient, and clinically and financially feasible HCV treatment program possible.

To ensure the safety of patients, the patient's liver panel had to show no signs of a decompensated or compromised liver to qualify for treatment at BAART Turk. If the blood work showed signs of an inadequate liver function the patient was referred to the liver clinic at University of California San Francisco (UCSF) for further evaluation. If the patient was cleared to receive HCV treatment based on the results of the work-up done at USCF, their treatment was initiated and managed by UCSF so that closer monitoring of the patient's liver enzymes could be done.

Initially 20 patients were identified as being high-risk for HCV and were ordered to have blood work done. After the blood work was reviewed, a total of six patients qualified for and were recruited for HCV treatment. It was decided that a cohort model be followed to proceed with treatment of the identified patients for the ease of monitoring by providers. Consents to receiving treatment and obtaining blood work at 4-weeks into treatment (liver panel, viral load), 8-weeks at treatment completion (liver panel, viral load, SVR), and 12-weeks after treatment completion to screen for SVR were signed by each of the six patients in the cohort. The lead NP

was responsible for the review and monitoring of blood work throughout the course of each patient's treatment.

Each of the six patients in the cohort had six visits during their HCV treatment. The first visit consisted of the provider performing an in-person evaluation and ordering blood work to be done. The labs ordered were: complete blood count with differential (CBC with diff), complete metabolic panel (CMP), PT/INR, Hep C viral RNA genotype, Hep A antibody, total Hep B core antibody, total Hep B surface antigen with reflex, Hep B surface antibody, and HIV fourth generation. After the labs were processed and confirmed that the patient was HCV positive, the provider reviewed the labs with the patient and educated them about HCV, consequences if left untreated, and that there is a HCV treatment program now being offered at BAART Turk that is free of charge to them. Other topics discussed were possible side effects of the medication Mavyret and the importance of treatment adherence. Gaining patient consent to participate in the program was the final step of the initial visit.

The next visit was one week after the initial evaluation to start the medication. The first dose was directly distributed from the provider to the patient, and for the remainder of their treatment the patient was to receive their daily dose of medication from the dispensing nurse via DOT. A follow-up appointment one week after the first week of administration of the medication was scheduled with the provider to assess for medication side effects and treatment adherence. At four weeks into treatment blood work was done which consisted of: CMP, a HCV viral load (HCV VL), and a core antibody HBC viral DNA if the patient was HBV positive upon evaluation. At eight weeks, a HCV VL was drawn, and then 12-weeks after treatment completion a SVR 12 was drawn to determine a cure from HCV.

Table 2

Visit Number and Content of Each Visit

Visit Number	Visit #1	Visit #2: One week after visit #1	Visit #3: One week after visit #2	Visit #4: Four weeks into treatment	Visit #5: 8 weeks (completion of treatment course)	Visit #6: 12 weeks after treatment completion
Content of Each Visit	-In-person evaluation done by provider of pt -Blood work ordered (CBC w diff, CMP, PT/INR, Hep C viral RNA genotype, Hep A antibody, total Hep B core antibody, total Hep B surface antigen with reflex, Hep B surface antibody, HIV fourth generation) Education of HCV treatment program offered at BAART -Pt education provided about the	-Start medication (provider gives first dose in-person to pt)	-In-person provider appointment with pt to assess for side effects and treatment adherence	-Blood work ordered (CMP, HCV viral load)	-Blood work (HCV viral load)	-Blood work (SVR12 to determine cure from HCV)

	medication and its possible side effects, and importance of adhering to treatment and routine follow-up visits. -Obtaining written patient consent to start treatment					

Table 2

The DNP author kept track of the patients receiving HCV treatment using an Excel spreadsheet. The course of Mavyret was either 8 or 12 weeks (depending on the grade of liver cirrhosis of the patient), and blood work to detect the presence of a viral load was drawn at 4, 8, and 12 weeks, and again 12 weeks after treatment completion to see if they had attained a sustained virologic response, also called an SVR12. The lab values during and after treatment helped the clinic determine the effectiveness of the establishment of the HCV treatment program and what was working well and what changes needed to be made.

GANTT

A Gantt chart was created to provide a schedule to help plan, coordinate, assign, and track specific tasks required for the project (Appendix I). The Gantt outlines the development, implementation, and evaluation timeline for the project. The project spanned 10 months. Initiation of the project began with meeting with the stakeholders of the project, and then acquiring knowledge about the topic of the project (HCV) through online modules, connecting and meeting with expert panels on HCV, and having lectures with the staff MD of the clinic. After this part was completed, a teaching was provided by the DNP author to the counselors about HVC. During the time of the counselor teaching, the DNP author and the stakeholders established a relationship with USBioServices to set up a profile for ordering the Mavyret. The roll out date of the project was in September 2018. Blood work of the patients was obtained prior to the start of treatment, during treatment at 4 and 8 weeks, and then 12 weeks after the completion of treatment. Data collection via the use of Excel and Practice Fusion at the clinic were utilized to organize findings and results.

SWOT Analysis

A Strengths, Weaknesses, Opportunities, Threats (SWOT) analysis was performed to identify what could impact the forward progression of the HCV treatment program at the clinic (Appendix F). It allowed the DNP author to focus on the strengths of the project to minimize threats and to use opportunities to the best advantage.

One of the major strengths of the project was its ability to address the healthcare gap seen in San Francisco regarding the lack of access for high risk patients to receiving HCV treatment and cure from disease in their primary care setting. Other proposed strengths were: the use of medication that was proven to have little to no side effects (so it was easily tolerated by patients),

the distribution of the HCV medications via DOT (which promoted patient adherence to the medication regimen), and frequent contact between the lead NP, lead physician, and medical director with the patients during primary care appointments and when the patient came in for their DOT. Another strength of the project is the grant that was awarded to BAART Turk from the SFHP to create and implement a HCV treatment program. The establishment of the program promoted and provided low barrier access to HCV treatment among high-risk, hard to reach patient populations (IV drug users, homeless). Another strength lies in the reduction of transmission of HCV among high-risk patient populations.

The key weakness identified in this project was determining how to improve access to receiving HCV treatment. Other weaknesses were related to factors associated with patient compliance: obtaining timely and protocol driven blood work from patients to determine the status of their HCV and if any liver cirrhosis was present, the possibility of missing follow-up visits with PCP due to lack of transportation which created a lack of adherence to the medication regimen. The patient demographics (they were homeless and did not have an address or phone number to get into contact with) also created a barrier to medication adherence. Lastly, there were no patient incentives in the budget to encourage the patients to have their blood work drawn, attend follow-up appointments, or continue with the medication regimen, apart from the proposed idea of HCV cure.

The major opportunity that was presented by this project was the community outreach to HCV patients who had few treatment options toward a cure of HCV infection. Other opportunities were: the rate of HCV and the comorbidities associated with it would bring healthcare costs in San Francisco down, awareness of prevention and reinfection prevention methods were taught to the community, and chronic HCV initiatives were established at the

clinic. These opportunities create another place in the community where HCV patients can be treated, in turn improving access for this patient population.

The threats identified were: homeless patients were unable to be tracked/contacted, unable to identify all potentially qualifying patients due to discrepancies within the charting system, the medication shipment from USBioServices did not come in time or there was an issue with the delivery, the patient dropped out of being treated for HCV due to side effects or personal reasons, the patient moved away, the patient expired, the patient was no longer a methadone patient and did not want to come back to this clinic, and quality improvement projects were being rolled out at the time of the project which posed as a barrier to progressing forward.

Time and Cost Summary

The direct costs (Appendix G) were split into three categories which were 'staffing', 'training', and 'travel', and were based off a 52-week (one year) budget. The budget calculated for 'staffing' was based on the salaries and time of the DNP author, the project oversite (a physician), and the consulting public health physician. The budget calculated for 'training' consisted of the salary and time of the counselors, the site nurse practitioner support, and the supplies and resources used for the counselor training (printing of PowerPoint slides, pens, and refreshments). The budget calculated for 'travel' included mileage based off the IRS standard mileage rate (IRS, 2017), bridge tolls, and parking. The overall cost to implement this project at BAART Turk for six patients totaled $106, 473.27, which was covered by the grant from SFHP. The medication Mavyret was covered by the grant distributed by SFHP to initiate the HCV treatment program at BAART Turk, so this was not calculated into direct expenses.

According to End Hep C SF (2017), there are a total of 12,000 people in SF living with active HCV, and the median ages at death for people living with active HCV is 60 years, respectively (Carter, 2014). Based on an analysis done by Razavi et al. (2013), the total lifetime healthcare costs of individuals in the U.S. with advanced liver disease due to HCV is $6.5 billion per year, and the lifetime cost of an individual living with HCV is estimated to be $64,490 annually. The calculated ROI is 27.2 indicating that the project, through treatment with Mavyret, reduces the cost of successful treatment to 27.2% of the average cost of treatment over a patient's lifetime. This supports the premise that HCV treatment in the SF patient population will greatly decrease healthcare costs associated with this disease, and overall positively benefit the healthcare system.

Grant/Projected Costs

Through the SFHP the BAART Turk HCV Grant, a total of $60,000 will be funded annually to the clinic over a total of three years (September 2017 to September 2020) to cover staffing ($53,000), equipment ($2,000), and other anticipated costs ($5,000), which will accumulate to a total of $180,000 by September 2020. The clinic's target was to start out by treating 20 patients in the first cohort, and then eventually treat hundreds of high-risk patients by September 2018.

Approximately 20,000 patients die each year from HCV-related liver disease, which in 2013 surpassed the total number of deaths from 60 other diseases reported to the CDC. Some of these diseases include, tuberculosis, HIV, and pneumococcal disease (Alkhouri, Lawitz & Poordad (2017). According to Dartmouth Medical School (2018), more than 80% of HCV patients will develop chronic liver disease, 15-20% will develop cirrhosis in a 5-year period, and 25% may have cirrhosis by 10-20 years. Hepatitis C is responsible for one-third of all liver

transplants, and the cost of liver transplants for HCV alone costs the US healthcare system nearly $300 million annually. The average lifetime costs of HCV without liver transplant costs about $100,000 for each patient yearly. If 80% of the 4.5 million actively infected HCV patients develop chronic liver disease, the total lifetime cost for this group is around $360 billion dollars. And if the estimated survival of these patients is 40 years, the annual healthcare cost for the US population with chronic HCV is estimated to be as high as 9 million dollars (Dartmouth Medical School, 2018). With these staggering numbers, it is apparent that the US has a serious issue it needs to face when it comes to treating this patient population to lower healthcare costs (Appendix G). According to Alkhouri, Lawitz & Poordad (2017), recently approved regimens have helped close gaps in access to healthcare, and almost all HCV-infected patients can be cured. Future research is needed to develop a preventive vaccine, eliminate the risk of vertical transmission from mother-to-child, and to decrease the number of acute HCV infection cases.

Work Breakdown Structure/Stakeholders

A work breakdown structure was created by the DNP author (Appendix D) to provide an outline of the key deliverables of the project that were to be executed by the project team. The ultimate focus was to establish a HCV treatment program at BAART Turk Clinic. The first phase was to establish a relationship with the stakeholders, who were the medical director of BAART Turk, the lead physician, the lead NP, and the counselors of the patients. Phase two was for the DNP author and the lead NP at BAART to attain knowledge of HCV and meet with the appropriate HCV experts. Next was to provide an education training session to the counselors of the patients. Phase three consisted of developing a plan to move forward with the implementation of the project. Phase four was the actual carrying out and launching of the project.

Information Flow

A communication flow chart addressed the type of information that was communicated, who it was communicated to and with, how often it was communicated, and the method of communication that was used (Appendix H). The communication happened between the DNP chair, DNP committee, and the on-site staff NP, MD, and the medical director via email, in-person, and phone. Important matters were discussed were: project coordination and planning, the status of the project, changes in the project methods, reports of milestones, and variances. It was important to know what communication paths to follow to promote efficient and effective communication which allowed more organization.

Study of the Interventions

The DNP author analyzed the results of the three identified measures (see Section III: Objectives, page 23) in various ways. The knowledge of the counselors was assessed by comparing the in-person pre- and post-test survey results. The test consisted of a total of nine multiple choice questions (Appendix E). The same test was distributed before and after the teaching. The successful implementation of the protocol was assessed by the number of patients who were recruited and started treatment. Next, the number of patients who completed treatment were evaluated, which was all six patients who were recruited and started. Along with treatment completion, attained SVR was also evaluated through blood work. All six of the patients attained SVR indicating a cure from HCV.

Staff satisfaction of project implementation was evaluated through a personal survey and reflection of the project. Staff satisfaction surveys were created by the DNP author on SurveyMonkey and distributed to the five staff directly involved with the program via email. All

five of the staff completed the survey. There was a total of three questions on a Lichert scale that produced qualitative data (Appendix J).

After the completion of treatment, in-person patient satisfaction surveys were administered to the six patients who completed treatment during their provider follow-up visits. The survey consisted of a total of six questions including important topics, like medication side effects and if they would recommend the program to future patients. Five of the questions were on a Lichert scale that produced qualitative data, and one questions was 'yes' or 'no' (Appendix K).

Measures

The five identified outcome measures for this project were:

1. 90% of the participating providers at BAART will increase their knowledge related to HCV screening, assessment, treatment as evidenced by pre- and post-test surveys indicating scores of 90% and above. There will be a total of 9 questions asked and will demonstrate knowledge about HCV treatment protocols and side effects.
2. Ten BAART patients will be identified, screened, assessed, and started on HCV treatment with Mavyret based on the identified and initiated HCV treatment protocol at BAART Turk.
3. At least 50% of selected patients who received treatment for HCV will complete their medication course of Mavyret and have an attained SVR12.
4. 85% of the providers will express satisfaction with the design and implementation of the HCV treatment program.
5. 85% of the patients treated will express satisfaction with the overall effectiveness and implementation of the treatment program.

Analysis

With regard to provider education the targeted outcome was that 90% of participating providers would increase their knowledge related to HCV screening, assessment and treatment. Actual results demonstrated that 100% of providers increased their knowledge as defined above. I believe this is attributable to effective teaching methods, provider enthusiasm for the program, and 100% provider participation in the educational session.

With regard to the design and implementation of the HCV treatment program, the original target was to identify and serve 10 BAART Turk patients with Mavyret. Actual results included treatment of only six HCV positive patients, all of whom successfully completed the HCV treatment program and demonstrated attained SVR12. Fewer patients were eligible for treatment due to the presence of compromised liver function in otherwise eligible patients.

With regard to completion of treatment, the targeted outcome was 50% of selected patients would successfully complete treatment and demonstrate attained SVR12. Actual results demonstrated a 100% completion rate of all patients selected and enrolled in the program., and an attained SVR12. Success was attributed to frequent provider contact and low side effect profile of the medication.

With regard to the rate of provider satisfaction with the design and implementation of the program, the target was 85%. Actual results demonstrated 98% rate of satisfaction. The high satisfaction rate was attributed to the efficiency of the program design and delivery, and coverage of costs by funding from the grant.

With regard to patient satisfaction with program effectiveness and implementation, the original target was 85%. Actual results demonstrated 98% patient satisfaction rate, attributable to frequent provider contact and a strong patient support network within the healthcare setting.

Throughout this project, data was collected, organized, and analyzed in an Excel spreadsheet and analyzed using Excel tools, including bar graphs, yields, and descriptive analysis that was accessible to the DNP author and the appropriate stakeholders. Each intervention was analyzed and assessed using one or several of the above identified methods. Both qualitative and quantitative data were collected.

Evaluation

The cohort consisted of a total of six patients who were enrolled in and completed treatment in the HCV treatment program. A total of four staff were directly involved with the implementation of the program, which included the lead nurse, medical director of BAART Turk, lead physician, and lead NP.

Only the results of patients who had completed the entire course of treatment of Mavyret, and had completed all the required blood work before, during, and after treatment were assessed and analyzed. An SVR12 was attained by all patients diagnosed with HCV 12-weeks after treatment completion of Mavyret. A successful treatment outcome was an SVR12 where the HCV was undetectable for 12-weeks after the completion of treatment, indicating a cure from HCV (Porter, 2015).

The DNP author evaluated the results of the five identified objectives in various ways. With regard to provider education, materials that included in-person presentations, distribution of pamphlets and other printed education materials were provided. Provider knowledge was assessed by the creation and distribution of a printed post-teaching survey by the project leader.

Based on the results of the survey after they were physically collected and analyzed by the DNP author, the provider teaching was 100% effective.

In regard to the design and implementation of the HCV treatment program, there was completion of an electronic and printed algorithm that presented the layout and workflow of the HCV treatment program at BAART Turk. After several revisions of the work flow program structure, a final revision was achieved and was 100% effective in guiding providers through the HCV treatment program initiation, monitoring and evaluation of the identified HCV patients. This was evidenced by the unobstructed flow of patient progression through the program from start of taking the medication to ending with obtaining the SVR12, 12 weeks after treatment completion.

With regard to completion treatment, data was collected and analyzed based on the completion rates of the patients at BAART Turk who were treated for HCV. Once a patient had completed their HCV treatment regimen and had their blood drawn to determine the presence of an SVR 12, 12 weeks after treatment completion, it was determined that the HCV treatment program was successful and that the patient was cured from HCV. Out of the six patients who qualified for the HCV treatment program at BAART Turk, all six completed treatment, resulting in 100% efficacy and effectiveness of the program.

With regard to provider satisfaction, data from the obtained surveys showed that there was a high satisfaction rate based on the 98% achieved rate. The DNP author believes this is primarily attributable to the funding from the grant, and shows that grants are an efficient and effective way to initiate programs at clinics.

With regard to patient satisfaction, data from the obtained surveys showed there was a high satisfaction rate of 98%. The DNP author believes this is attributable to the frequent provider contact.

SECTION IV: Results

Overall, the implementation of the HCV treatment protocol at BAART Turk proved to be highly successful. Of the desired 20 enrolled patients, 6 were enrolled, remained compliant, and completed treatment with an attained SVR at 12 weeks. Staff and providers expressed a positive attitude towards the knowledge gained, and felt that the protocol was feasible and well driven.

Provider Knowledge

A total of 25 counselors were at the counselor training session conducted by the DNP author. The same pre- and post-test survey were distributed in-person to the counselors before and after the training to assess their knowledge on the topic of HCV. Survey results were directly collected in-person and analyzed by the DNP author. There was a score of 80% understanding of HCV before the teaching and a score of 100% after the teaching.

Patient Satisfaction

A total of six patients started and completed treatment and attained an SVR12. Based on the results of the anonymous patient satisfaction survey there was an overall very high patient satisfaction rate (99%). With the exception of one patient who scored a '4/5' regarding the survey question 'how satisfied were you with the medication itself?', to which he/she answered that patients need to be informed of the potential weight gain from the medication, the other survey questions scored by this patient, and all the other patients, registered a score of '5/5' on a total of six questions.

Staff Satisfaction

The results of the 'BAART staff satisfaction survey' (Appendix J), which was created and distributed by the DNP author through a SurveyMonkey, reflected a high staff satisfaction rate (98%). A total of five staff who were directly involved with the HCV treatment program consisted of three medication dispensing nurses and two providers. The total involved staff completed the survey. The survey consisted of a total of three questions, and all who took the survey rated their experience with the HCV treatment program as 'highly likely' or 'likely' that the HCV treatment program is sustainable, and that the program contributed to overall improvement of HCV patient outcomes. The last survey question was an open-ended answer that asked about any improvements and/or changes that could be made to the current HCV treatment program model at BAART that could make it better. One individual skipped the question and did not answer, but the other 4 answered. One response was to have someone from quality improvement focus on the project. Another was for BAART to be provided resources to enhance patient compliance with check-ups and provider visits (ie: a gift card incentive, bus or taxi voucher for transport to the outpatient liver clinic). One individual stated it would be appreciated if the providers clearly explain to the patients that they need to take all 3 pills of the HCV antiviral Mavyret at the time of dosing in front of the dispensing nurse. Apparently, patients were under the impression that they could take the Mavyret home with them and dose it themselves. The final shared thought was the dispensing staff would appreciate to be updated of the treatment results of patients (ie: attained SVR12) since they have no way of knowing if the treatment was successful or not, and if the patient is cured from HCV. All the responses are valid and provide excellent feedback on how the HCV treatment program can be improved from the medical provider standpoint.

The results of the patient and staff satisfaction surveys are indicative and supportive of the fact that HCV treatment is sustainable and feasible in the PWID population, and that other clinics interested in establishing and implementing a HCV treatment program into their setting should be encouraged and confident in doing so.

HCV Cure Rate

Of the six patients who started and finished their HCV treatment, six completed treatment and 100% achieved SVR, indicating a cure from HCV.

Barriers to Implementation

There were many barriers that were encountered in this project. The first was screening and identification of patients which were discovered during patient chart reviews. It was discovered that the monthly generated patient list from SFHP were not accurate, which prevented the clinic from determining who was an active patient and might qualify for treatment versus someone who was inactive, assigned to a different clinic, or had established themselves at a different clinic and therefore was disqualified from treatment at this clinic.

There were some patients who were assigned to Anthem Blue Cross and Medi-Cal, and these do not generate monthly lists, so it was challenging to determine if patients were active with their insurance and receiving healthcare or not. In this same group, some patients were unaware that they were assigned to this clinic and ended up establishing their care at a different clinic. It took a substantial amount of time to figure this out after spending a lot of time and effort investigating and tracking down patients and where they were receiving care.

Another issue was the clinic was rolling out a quality improvement (QI) program that interfered with the progression of the project. The time and resources that were being used towards the HCV treatment program were put to a halt until the QI project was completed.

While multiple stakeholders were working as a collaborative team and conducting patient chart reviews, it was very important to create a key/legend to avoid confusion. This is not done originally, so work that had already been done was done again, and in turn this created inefficiency and loss of progression of the project.

The second issue was patients were not motivated to initiate or adhere to their treatment regimen. This included: not coming to follow-up appointments, not having time-sensitive blood drawn at Quest Diagnostics or at the clinic, not adhering to the medication regimen via DOT (direct observational therapy) or take-home, and/or the patient was a past methadone patient and did not want to return to this clinic for personal reasons. The budget for the HCV treatment program did not include incentives for the patients, like gift cards to Target, Safeway, or CVS, which would have tremendously helped with adherence to the HCV treatment. Patient incentives would have been very helpful since previous clinics who have established HCV treatment programs had incentives in their budget and said it was highly effective.

It was challenging to determine if the patient had, had labs drawn or not, and which lab values were the most recent. For example, the San Francisco Department of Public Health (SFDPH) and the patient care system used at the clinic were on different databases and did not share information. The patient occasionally had HCV labs drawn at a hospital, but since the two systems between SFDPH and the clinic did not communicate, it was impossible to determine when and if labs were drawn, and it would take time and effort to have access to these records (obtaining a release of information (ROI) from the hospital).

Another issue was the medication shipment would occasionally arrive late or the shipment would not come at all. Two-weeks' worth of Mavyret was sent in each shipment for

each patient. It was learned to avoid failure of mediation delivery and receipt by making sure the request for the medication was put in as early as possible.

Wirfs (2018) states the hepatitis B virus (HBV) could become reactivated during or after treatment with Mavyret. It was important to test all patients for HBV infection by measuring the HBsAg and anti-HBc prior to initiating therapy with Mavyret (Wirfs, 2018). After this was checked, it was wise and beneficial for the patient to receive both an HAV and HBV vaccine. Unfortunately, pharmacies like CVS and Walgreens, do not carry either vaccine unless ordered specifically for a patient. The DPH grant at the clinic covered only HAV vaccine, not HBV. This was another barrier that interfered with treatment adherence.

Lack of insurance to cover Mavyret, which in turn limited patient access to receiving and adhering to the treatment regimen, interfered with treatment progression. For example, Medicare did not cover Mavyret, it only covered Harvoni. Other factors that limited patient access were the patient did not have a car, did not have money for bus fare, lived too far to walk to appointments, or other issues that impeded their access, such as being homeless.

Limitations

The limitations identified include some patients being ineligible for initiation of HCV treatment at BAART due to the status of their liver function; shipments of the HCV medication would sometimes not be delivered on time resulting in failure of dosing the patient on the desired day and time; patients did not have access to transportation to attend appointments for dosing of the HCV medication, to follow-up with the provider, have labs drawn, which overall resulted in delay of treatment; and there were times when the patient was not able to make it to BAART Turk during their open hours to have labs drawn, so they would have to go to a different clinic that was less convenient to travel to.

Based on the identified limitations discovered during the creation, implementation, results and findings of this project, it is recommended that patient incentives (i.e., gift cards, taxi vouchers, bus passes) to enhance and encourage treatment adherence (i.e., to have labs drawn, dosing of HCV medication) be included in the project budget, and that a back-up supply of the HCV medication be available in case a delivery does not come on time. In the absence of an existing HCV treatment protocol, the project HCV treatment guidelines were created at BAART Turk, and they excluded patients who had poor liver function. Hopefully as HCV treatment advances, future patients who do have decompensated liver function will be eligible for the immediate initiation of HCV treatment at BAART.

SECTION V: Discussion

Summary

Of the key findings in this project, the major one identified was the fact that high-risk patients, particularly ones who are PWID, can be effectively treated and cured of HCV. The number of PWID who are assessed and treated for HCV is increasing and it is important that access be provided for this patient population because maximizing treatment for PWID can be an effective preventative measure for decreasing transmission and mortality associated with long term consequences of HCV. Reflecting back on the available literary evidence and positive outcomes of the project, it is evident that high-risk patient populations (PWID) who have HCV can be effectively treated and cured of HCV, and that this patient group should not be excluded from receiving treatment. The knowledge of the identified HCV positive patients was assessed by verbal confirmation that they understood there was access to and availability of HCV treatment at the clinic.

Along with the 100% treatment adherence and the one patient who revealed in their patient satisfaction survey that they had the undesirable side effect of weight gain, the majority of the patients were highly satisfied with the treatment program and their personal experiences, despite some of the challenges, such as lack of transportation and incentives and inconvenient clinic hours. The project effectively demonstrated that HCV treatment for high-risk patient populations can be truly successful and allow them to achieve cure as defined by attained SVR, and additionally, this project overcame many of the previously identified obstacles to successful HCV treatment, including difficulty with treatment adherence due to lack of patient education and knowledge, significant side effects, and lack of access to HCV treatment programs in geographic areas prone to high risk of infection.

Based on the results and findings of the patient and staff survey results, and the 100% outcome of completion of HCV treatment and attained SVR, it can be confidently recommended that the creation and implementation of HCV treatment programs in clinics that are primary care homes for high-risk patient populations is highly feasible, efficacious and can be successful.

Conclusion

It is widely known that there is a lack of access to and availability of HCV treatment for high-risk populations in the San Francisco community. The implementation of the HCV treatment program at this clinic will continue to be very beneficial by reducing healthcare costs associated with HCV and its comorbidities in San Francisco. The program can also serve as a model for other clinics in the Bay Area for effective treatment of HCV. The project demonstrates the successful establishment of a HCV treatment protocol that is sustainable, progressive, and is clearly efficacious in the care and treatment of HCV in this high-risk population, leading to a decreased burden to society and overall healthcare expenditures.

SECTION VI: Other Information

Funding

Besides the BAART Turk HCV Grant funding supplied by the SFHP, there was no other identified need for outside funding for this project. The DNP author did not receive any compensation for time spent traveling, planning, implementing, or evaluating the project. There were some minor out of pocket costs absorbed by the DNP author, which are reflected in the budget overview.

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SECTION VIII: Appendices

Appendix A: Statement of Non-Research Determination Form

DNP Statement of Non-Research Determination Form

Student Name: Annie Pedlar

Title of Project: HCV Treatment Program at BAART Turk Clinic

Brief Description of Project: Establishing and implementing a HCV treatment program at BAART Turk Clinic in San Francisco, CA.

A) Aim Statement: The overall goal is to screen, assess, and treat HCV positive patients at BAART, to decrease rates of HCV infection using effective drug therapy, educating the patient population who is at high-risk for infection, and preventing reinfection through education.

Objective 1: To educate 100% of the providers at BAART Turk on HCV and increase knowledge of HCV infection, including screening, assessment and treatment protocols by completing a post seminar survey with improved scores compared to the pre-education survey.

Objective 2: To design and implement an 8-week HCV treatment program utilizing the medication Mavyret for BAART Turk patients.

Objective 3: To achieve 100% uptake and success of the HCV treatment program at BAART Turk by all eligible HCV positive patients, as demonstrated by an attained SVR at 12 weeks.

Objective 4: To achieve 85% staff satisfaction with the implementation of the project at BAART Turk.
Objective 5: To achieve an overall 85% patient satisfaction with project effectiveness and implementation.

B) Description of Intervention:

1) Research to determine need for HCV treatment program in SF.

2) Perform patient chart reviews to see who is eligible and appropriate for treatment.

3) Provide patient education to the patients and the patient's counselors regarding the HCV treatment program and what to expect (benefits of treatment, possible side effects that may be experienced, resources for HCV information,

prevention of reinfection, availability of provider support).

4) Oversee the initiation, constant monitoring during treatment, and the completion of HCV treatment with proper blood work.

5) SVR12 determines if patient cured from HCV.

C) How will this intervention change practice? Currently, there is no established HCV treatment program at BAART Turk. Treating these patients will positively impact the BAART Turk clinic and the overall healthcare system in a tremendous way by preventing and reducing health complications/comorbidities that may be associated with damage to the body due to HCV.

D) Outcome measurements:

Outcome 1: 90% of the participating providers at BAART will increase their knowledge related to HCV screening, assessment, treatment as evidenced by pre- and post-test surveys indicating scores of 90% and above. There will be a total of 9 questions asked and will demonstrate knowledge about HCV treatment protocols and side effects.
Outcome 2: Ten BAART patients will be identified, screened, assessed, and started on HCV treatment with Mavyret based on the identified and initiated HCV treatment protocol at BAART Turk.

Outcome 3: At least 50% of selected patients who received treatment for HCV will complete their medication course of Mavyret and have an attained SVR12.

Outcome 4: 85% of the providers will express satisfaction with the design and implementation of the HCV treatment program.

Outcome 5: 85% of the patients treated will express satisfaction with the overall effectiveness and implementation of the treatment program.

To qualify as an Evidence-based Change in Practice Project, rather than a Research Project, the criteria outlined in federal guidelines will be used:
(http://answers.hhs.gov/ohrp/categories/1569)

☒ This project meets the guidelines for an Evidence-based Change in Practice Project as outlined in the Project Checklist (attached). Student may proceed with implementation.

☐This project involves research with human subjects and must be submitted for IRB approval

before project activity can commence.

Comments:

EVIDENCE-BASED CHANGE OF PRACTICE PROJECT CHECKLIST *

Instructions: Answer YES or NO to each of the following statements:

Project Title:	**YES**	**NO**
The aim of the project is to improve the process or delivery of care with established/ accepted standards, or to implement evidence-based change. There is no intention of using the data for research purposes.	**X**	
The specific aim is to improve performance on a specific service or program and **is a part of usual care**. ALL participants will receive standard of care.	**X**	
The project is **NOT** designed to follow a research design, e.g., hypothesis testing or group comparison, randomization, control groups, prospective comparison groups, cross-sectional, case control). The project does **NOT** follow a protocol that overrides clinical decision-making.		**X**
The project involves implementation of established and tested quality standards and/or systematic monitoring, assessment or evaluation of the organization to ensure that existing quality standards are being met. The project does **NOT** develop paradigms or untested methods or new untested standards.	**X**	
The project involves implementation of care practices and interventions that are consensus-based or evidence-based. The project does **NOT** seek to test an intervention that is beyond current science and experience.	**X**	
The project is conducted by staff where the project will take place and involves staff who are working at an agency that has an agreement with USF SONHP.	**X**	
The project has **NO** funding from federal agencies or research-focused organizations and is not receiving funding for implementation research.	**X**	
The agency or clinical practice unit agrees that this is a project that will be implemented to improve the process or delivery of care, i.e., **not** a personal research project that is dependent upon the voluntary participation of colleagues, students and/ or patients.	**X**	
If there is an intent to, or possibility of publishing your work, you and supervising faculty and the agency oversight committee are comfortable with the following statement in your methods section: *"This project was undertaken as an Evidence-based change of practice project at X hospital or agency and as such was not formally supervised by the Institutional Review Board."*	**X**	

ANSWER KEY: If the answer to **ALL** of these items is yes, the project can be considered an Evidence-based activity that does NOT meet the definition of research. **IRB review is not required. Keep a copy of this checklist in your files.** If the answer to ANY of these questions is **NO**, you must submit for IRB approval.

*Adapted with permission of Elizabeth L. Hohmann, MD, Director and Chair, Partners Human Research Committee, Partners Health System, Boston, MA.

STUDENT NAME (Please print): Annie Pedlar

Signature of Student: _Annie Pedlar____DATE: 7/1/2018__

SUPERVISING FACULTY MEMBER (CHAIR) NAME (Please print):
Jodie Sandhu

Signature of Supervising Faculty Member (Chair):
DATE

Appendix B: Approval Letter

August 15, 2018

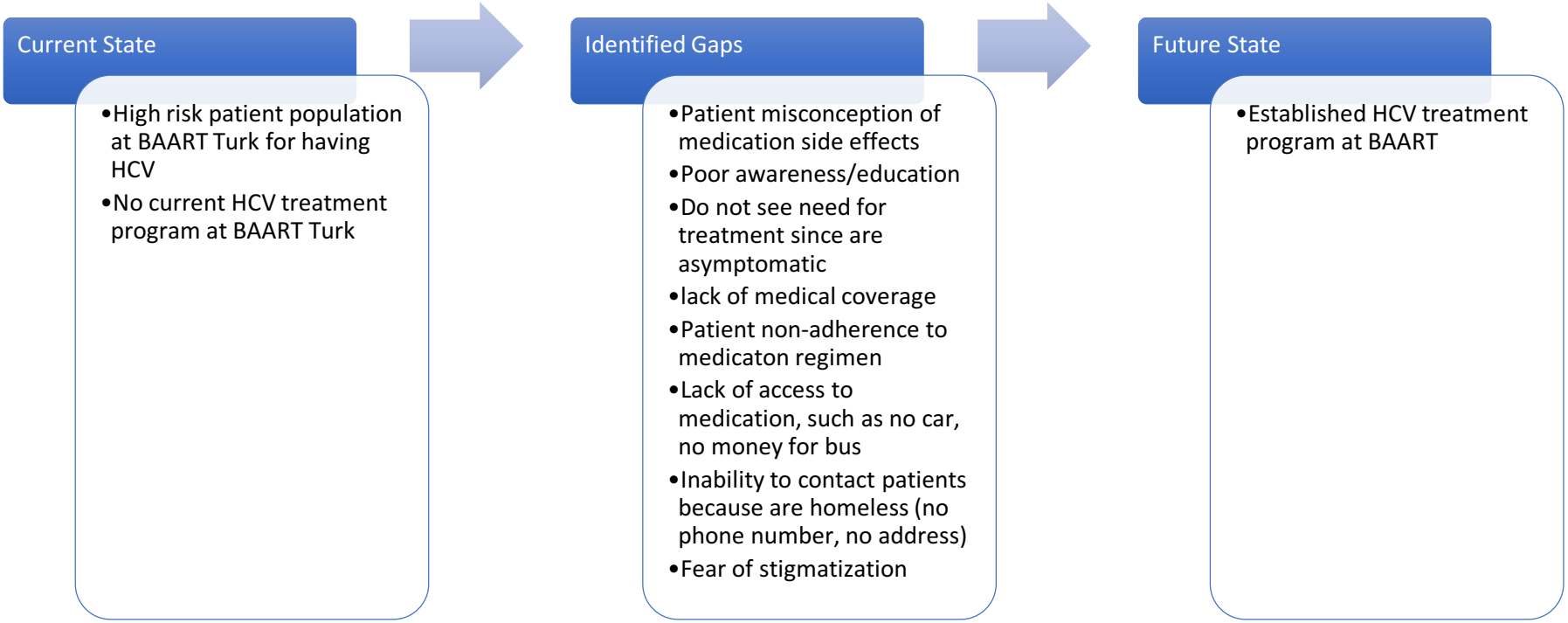
To whom it may concern:

This letter is being written at the request of Ms. Annie Pedlar, FNP/DNP intern, to support her DNP project implementation here at BAART Programs Turk St. On behalf of our program, I support Annie Pedlar in her DNP project to implement and grow a hepatitis C treatment program here at BAART Turk St in coordination with and under direction of Cara Nalagan, FNP, and Dr. Deborah Borne, MD, from January 2018 through May 2019. Please feel free to contact me with any questions or concerns regarding this statement of support.

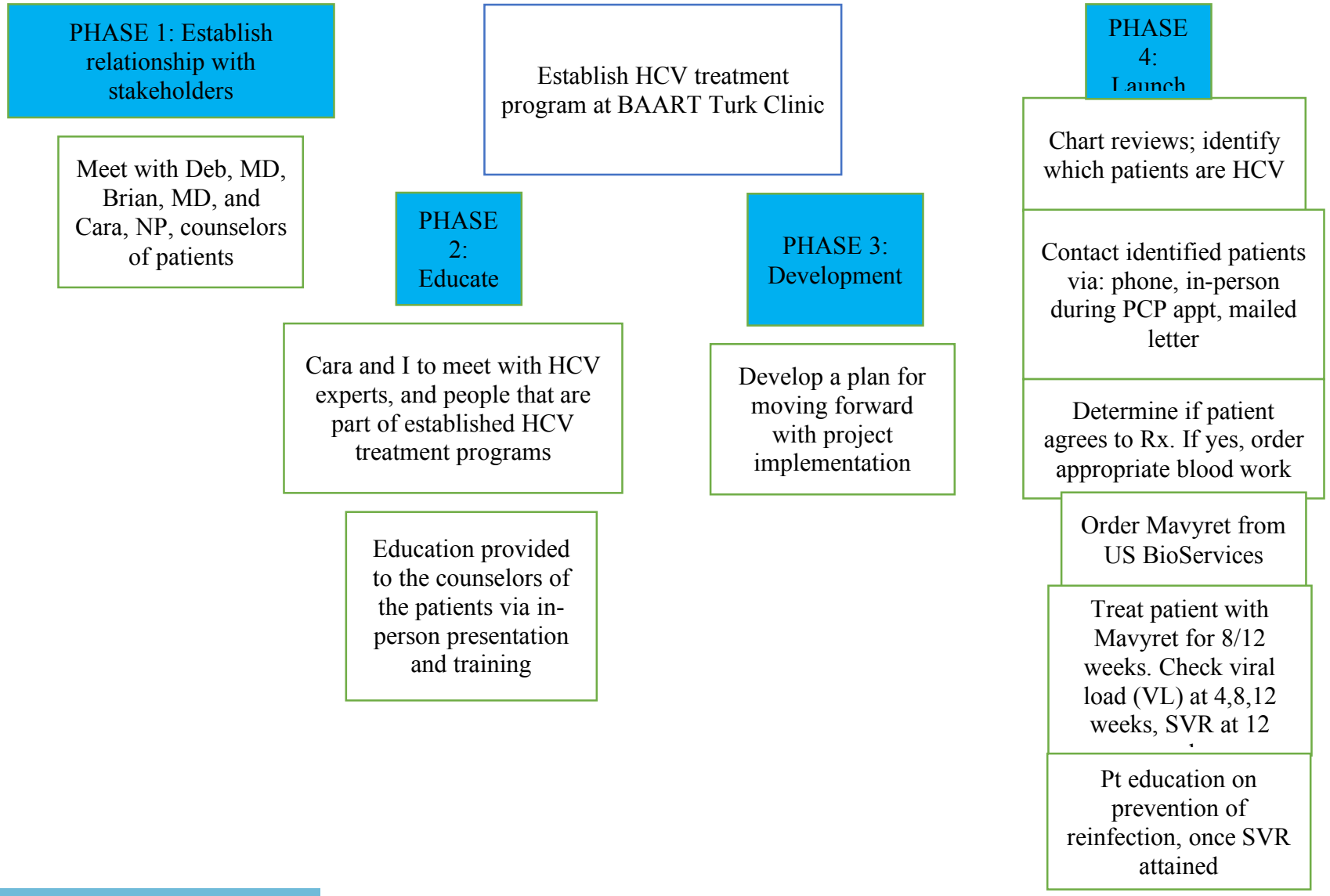
Respectfully,

Brian Clear, MD
Medical Director

Appendix C: Gap Analysis



Appendix D: Work Breakdown Structure



Appendix E: Pre- and Post-Test Survey for Counselor Educational Session

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Hep C Pre- and Post-Evaluation

1) What is hepatitis C?
   a. It is a bacterial infection of the liver
   b. It is a viral infection of the liver
   c. It is the same as Hepatitis A and B
   d. It is the same as HIV

2) How do we confirm that someone is Hep C positive?
   a. Sputum sample
   b. Urine sample
   c. Blood work
   d. Skin biopsy

3) What is the most common 'mode of transmission' of Hep C?
   a. Sexual intercourse
   b. Breastfeeding
   c. Needle sharing
   d. Someone who is infected and coughs on someone else (droplet)

4) Here at BAART Turk, we will be treating clients living with Hep C with a medication called Mavyret. How long does the medication regimen last?
   a. 3 weeks
   b. 3 months
   c. 8-12 weeks
   d. 12-16 weeks

5) What are common side effects of Mavyret (select all that apply)?
   a. Headache
   b. Nausea
   c. Dry cough
   d. Fatigue
   e. Constipation
   f. Diarrhea

Appendix E: Pre- and Post-Test Survey for Counselor Educational Session (cont.)

6) To determine if Hep C has been cured after the completion of treatment, we do a blood test to check if there is a ___?
   a. Hep C Antibody (Ab)
   b. Hep B Ab
   c. Sustained Virologic Response (SVR)
   d. White blood cell count

7) How can clients receive their Hep C medication (select all that apply)?
   a. DOT or window dosing
   b. Through an outside pharmacy
   c. It can be delivered directly to the client's residence
   d. Take-home

8) Which BAART Turk patients will we treat for Hep C?
   a. All patients who test positive for Hep C
   b. Patients who have a primary care provider outside of BAART Turk
   c. Patients who do not have a primary care provider
   d. Patients who have a primary care provider at BAART Turk

9) What are complications of untreated Hep C (select all that apply)?
   a. Diabetes
   b. Liver cancer
   c. Ascites
   d. Liver failure
   e. Obesity

Appendix F: SWOT Analysis

STRENGTHS	**WEAKNESSES**
• Good cause- brings awareness and highlights the healthcare gap seen in San Francisco regarding the lack of access for high risk patients to receiving HCV treatment in the primary care setting. • Mavyret has few to no SE (should be tolerated well by all pt's) • Window dosing (DOT very beneficial) • Staff NP, staff MD, and medical director have direct contact with patients during PCP visits	• Identifying the insurance of each pt • Identifying patients who are HCV+ and VL+ • Obtaining blood work from patients (hard stick, not going to Quest, arriving at BAART too late in day and blood cannot be drawn by RN) • Lack of transportation to PCP visits and to have labs drawn • Pt demographics (homeless, no phone number or address) • Adherence to Rx • No incentives in budget
OPPORTUNITIES • Out-reach to the HCV community who have limited or no access to healthcare • Reduction in liver disease in SF • Reduction in HCV rates by curing • Awareness of HCV in community (prevention methods) • Establish chronic disease initiatives at BAART Turk	**THREATS** (things that cannot be controlled) • Homeless patients are unable to be contacted. • Not identifying all possible patients • Only SFHP creates monthly list of active patients…Anthem Blue Cross Medical and Medical do not generate such lists. How are we to contact these patients who may be eligible for Rx? • Medication does not come in time, difficulty in having meds received • Patient drops out of Rx due to SE, personal reasons • Pt moves away • Pt expires • Pt is no longer receiving methadone and does not want to return to BAART • QI panel management rolled out at BAART

Appendix G: Budget and Impact Analysis

Description	Amounts/Calculation	Total
STAFFING		
Project management	= $65/hour x 135 hours	$8,775.00
Project Oversite	= $120/hour x 10 hours/week	$62,400.00
Consulting Physician	= $120/hour x 5 hours/week	$31,200.00
TOTAL STAFFING		$102,375.00
TRAINING		
Counselor Participants	= $30/hour x 30 people x 1 hour	$900.00
Site NP Support	= $80/hour x 9 hours	$720.00
Printing	In kind from BAART	$0.00
Pens	$2 per box (x 1 box)	$2.00
Refreshments	$20 (baked goods)	$20.00
TOTAL TRAINING		$1,642.00
TRAVEL		
Mileage	40.8 miles/week x IRS rate 54.5 cents	$1,156.27
Tolls	$7/week x 52 weeks	$364.00
Parking	$18/day x 52 weeks	$936.00
TOTAL TRAVEL		$2,456.27
TOTAL PROJECT BUDGET		**$106,473.27**

Cost to US Healthcare System of HCV Infection	
Annual Cost of Advanced Liver Disease Caused By HCV	$6.5 billion
Average Lifetime Cost Per Individual Infected With HCV	$64,490
Estimated Number of Individuals with HCV in SF	12,000
Estimated Lifetime Cost of HCV in SF	$774 million

Returns on Cost of BAART HCV Implementation Project	
Projected Annual Cost of Treating HCV in SF	$13 million
Projected Annual Savings of BAART HCV Project Intervention	20% or $2.6 million
Annual Cost of BAART HCV Project	$106, 473
ROI of BAART HCV Project	**$24.42**

Appendix H: Communication Flow

INFORMATION	AUDIENCE	TIME	METHODS OF COMMUNICATION
DNP Project Status	DNP Chair MD at BAART NP at BAART DNP Student	Weekly	Email In-person meetings Phone
Changes/Revisions of DNP Project	DNP Chair MD at BAART NP at BAART DNP Student	Weekly Continuous	Email In-person meetings Phone
Barriers/Issues/Resolutions with DNP Project	DNP Chair MD at BAART NP at BAART DNP Student	Weekly Continuous	Email In-person meetings Phone
Milestones to DNP Project	DNP Chair MD at BAART NP at BAART DNP Student	Continuous	Email In-person meetings Phone

Appendix I: GANTT Chart

Project GANTT		
	2018	**2019**
Task/description		
Meet with stakeholders	Jan 2018	
Complete literature review, analyze available evidence, meet with appropriate HCV experts	Jan-Feb 2018	
Conduct chart reviews and identify patients who qualify for treatment	March-June 2018	
Provide education session to counselors	April 2018	
Implementation of HCV treatment program at BAART	June 2018	
Data collection and analysis	October 2018	Jan-Feb 2019
Dissemination of project results		Feb 2019
Complete written DNP Project		May 2019

Appendix J: BAART Staff Satisfaction Survey

Thank you in advance for completing this survey! I value your honest thoughts, feelings, and experiences regarding the implementation of the Hepatitis C Treatment Program at BAART Turk.

Please use the numeric scale 1-5, '1' being 'very unlikely' and '5' being 'very likely' to rate your experience.

1) How **sustainable and feasible** do you feel the current model (policies and procedures) of the Hepatitis C Treatment program is at BAART?

1 2 3 4 5

If less than '3', please state why:

2) How likely did the Hepatitis C Treatment Program at BAART contribute to its **overall improvement of Hepatitis C patients**?

1 2 3 4 5

If less than '3', please state why:

3) How likely is it that **improvements and/or changes** could be made to the current Hepatitis C Treatment Program model at BAART to make it better?

1 2 3 4 5

If less than '5', please state why:

Appendix K: BAART Patient Satisfaction Survey

Thank you in advance for completing this survey! We value your thoughts, feelings, and experiences, and want to provide you the best care.

Please use the numeric scale 1-5, '1' being 'highly dissatisfied' and '5' being 'highly satisfied' to rate your experience with the hepatitis C treatment program at BAART Turk.

1) Were you **satisfied** with the medical provider care and counseling you received?

1 2 3 4 5

2) How **satisfied** did you feel about the ease of obtaining and receiving your hepatitis C treatment medications?

1 2 3 4 5

3) How **satisfied** were you with the cost of treatment?

1 2 3 4 5

4) How **satisfied** were you with the medication itself? (For example, did you experience any side effects that made it challenging for you to adhere to the treatment regimen?)

1 2 3 4 5

5) Did you overall feel **satisfied** about the result of your hepatitis C treatment?

1 2 3 4 5

6) Based on your **satisfaction** with the hepatitis C treatment program at BAART Turk, would you recommend this program to others?

Yes No

Appendix L: Counselor Training PowerPoint Slides

4/23/19

UNIVERSITY OF SAN FRANCISCO
CHANGE THE WORLD FROM HERE

Hepatitis C Education

BAART Turk

April 2018

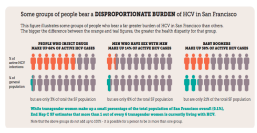
Cara Nalagan, FNP-C, and Annie Pedlar, DNP-FNP
Student Intern

Objectives

- Understand Hepatitis C (Hep C) basics
- List Hep C treatment process from start to finish
- Review how we (counselor and medical provider) will work together to:
  -Get BAART clients treated for Hep C
  -Support process
- Learn client teaching points to prevent infection and/or re-infection of Hep C

What is Hepatitis C?

- Hepatitis C is a virus (Hep C) that affects the liver and causes inflammation
  -Hep C is transmitted through blood (e.g. sharing needles)
- Hep C affects over 3 million people in the U.S. (Hep C Hope, 2015)
- In SF, there are an estimated 12,000 people who live with undiagnosed and untreated Hep C (End Hep C SF, 2017)
- Many of the people who are infected do not even know it!



There is no vaccine for HCV, but the good news is it can be treated and cured!

Who is at Risk for Hep C?

Being born between the years of 1945-1965 (Baby boomer)
Men who have sex with men (MSM)
People living with HIV
Transgender women
People with a history of incarceration

How is it Transmitted?

Current or past IV drug use (most common mode of transmission)

Contact with infected blood or needles (tooth brush, razor, nail clippers)

Tattoos or body piercings using non-sterile tools

Blood transfusion or organ transplants before 1992

How is Hep C NOT Spread?

Coughing
Sneezing
Sharing food or water
Eating utensils
Breastfeeding
Hugging
Kissing
Holding hands

Why are We NOT Aware We Have Hep C?

- For many, Hep C symptoms do not appear for years or even decades.
- Many of us do not get tested because…

✓We do not know we are at risk
✓There is no vaccine for Hep C like there is for Hep A and B, therefore Hep C is off our radar.
✓If your client is unable to be tested here, they can go to Glide to have a fingerstick blood test done to see if they have Hep C.

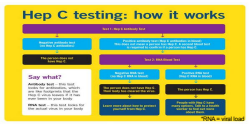
What are the Symptoms of Hep C?

- By the time symptoms appear, liver damage may have already occurred.
- After a long period of no treatment of Hep C, the person can go into liver failure and/or develop liver cancer, which is very difficult to reverse and treat, and ascites (fluid build-up in abdomen).
- **Symptoms include**: fever, fatigue, loss of appetite, nausea/vomiting, abdominal pain, dark urine, gray-colored bowel movements, joint pain, jaundice (yellowing of eyes and skin), dry or itchy skin, sleep disturbances, depression, "brain fog".

Hep C Treatment Process

4/23/19

SCREENING



World Hepatitis C Alliance, May 2014: 20% of patients clear the virus on their own!

Has the Client Been SCREENED?

- Yes, the client has been screened with the appropriate Hep C blood test and has been diagnosed as Hep C positive.
- If a blood test has not been completed, it is really important that the Hep C blood test be done so that we can initiate treatment evaluation for the client.

Does the Client Want TREATMENT?

If the client wants and agrees to treatment of their Hep C, it needs to be determined who their insurance is and where their primary care home is.

What if my Client has Hep C but Does Not Have Primary Care Here at BAART Turk?

➢**Client has primary care home…**

Primary care home at outside clinic: Tom Waddell, Curry Senior Center, SFGH, etc.

-Notify BAART Turk NPs
-ROI signature to communicate w/client's outside PCP
-NP to write referral letter for Hep C treatment for client's PCP & offer DOT of Hep C medication

➢**Client does NOT have primary care home…**

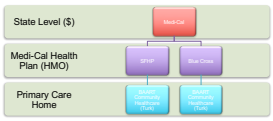
No primary care home

No health insurance
- Contact Medi-Cal
- If none, enroll for San Francisco Health Plan
- Client to elect BAART Community Healthcare (Turk) as primary care home
- Client to enroll for primary care at BAART Turk with Lucy at Front Desk

➢**Client does NOT have primary care home…CONTINUED**

Has Medi-Cal, but no primary care home
- Confirm which health plan client has: Anthem Blue Cross or San Francisco Health Plan?
- Client to elect BAART Community Healthcare (Turk) as primary care home.
- Client to enroll for primary care at BAART Turk with Lucy at Front Desk

Health Insurance Coverage



SFHP Enrollment Services

Phone number is: (415)777-9992 OR (888)558-5858
Hours: Monday-Friday 8:30 AM-5:30 PM
There is also an email option available

Assessment Questions Prior to Treatment Evaluation

- Prior Hep C treatment experience?
- Current medications?
- Does the client have liver cirrhosis?

4/23/19

Lab Testing

- Prior to starting Hep C treatment: blood tests are needed to confirm diagnosis of Hep C, and to check for liver function and other viral co-infections (Hep A & B, HIV) for treatment evaluation.

This has proven to be most challenging

- Blood drawn at:

✓ BAART medical department

or

✓Quest Diagnostics Lab

Taking the MEDICINE

- At BAART Turk, we will be treating clients with a medication called Mavyret, which treats the 6 genotypes of Hep C.
- It is to be taken once daily (3 pills at one time), for every day for 8-12 weeks.

Medication Side Effects

- There are very little side effects, the most common are headache and fatigue (Epocrates, 2018)
- Other potential side effects include: nausea and diarrhea (Epocrates, 2018)
- Side effects disappear within the first 2 weeks after the medication is started

Importance of ADHERENCE to Medication Regimen

- Adherence to the medication regimen is KEY: Cure is achieved in >95% of patients with 8-12 weeks of medication therapy.
- The best way to promote adherence is by direct observed therapy (DOT) or "window dosing" when the client is also receiving their daily methadone dose.
- Clients w/methadone take-homes can receive Mavyret as take-homes, max: 2 weeks' worth at a time.
- SUPPORT/ENCOURAGE CLIENTS TO DOSE DAILY

Checking for Cure: Follow-up Blood Test During Treatment

- Repeat blood test to check Hep C viral load:
- At week 4 of treatment
- At end of treatment (week 8 or 12)

Checking for Cure: SVR

6 months after treatment completion:

- Blood test for sustained virologic response (SVR) confirms CURE
- The client will always have a positive blood test result for the Hep C antibody (Ab), but the viral load (VL or RNA) will be undetectable.

Infection/Re-infection Prevention

- After successful treatment of Hep C, it is possible to become re-infected!
- It is very important that we, as the clients' support system, provide education & resources about safe behavior to reduce the risk of Hep C transmission and re-infection.

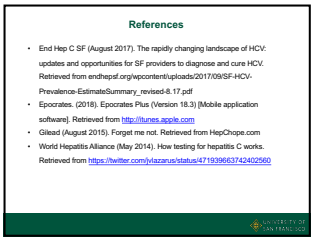
Infection/Re-infection Prevention

- According to End Hep C SF (2017), "you can protect yourself and others from getting hepatitis C by getting tested, talking about your status, and injecting safely". All of these actions can reduce your risk of contracting or passing the virus on to others.
- *See pamphlets*

THANK YOU!

QUESTIONS?

4/23/19



References

- End Hep C SF (August 2017). The rapidly changing landscape of HCV: updates and opportunities for SF providers to diagnose and cure HCV. Retrieved from endhepsf.org/wpcontent/uploads/2017/09/SF-HCV-Prevalence-EstimateSummary_revised-8.17.pdf
- Epocrates. (2018). Epocrates Plus (Version 18.3) [Mobile application software]. Retrieved from http://itunes.apple.com
- Gilead (August 2015). Forget me not. Retrieved from HepChope.com
- World Hepatitis Alliance (May 2014). How testing for hepatitis C works. Retrieved from https://twitter.com/jvlazarus/status/471939663742402560

Appendix M: HCV Treatment Protocols

Last update: 3/1/2017

Protocols for Direct Acting Antiviral HCV Treatment

Ordering Protocol

To promote appropriate and cost-effective use of HCV treatment medications across the San Francisco Health Network, prescribers will complete all steps of the following ordering protocol:

1. Assessment of treatment readiness

2. Review of baseline (pre-treatment) labs
   - Hepatitis C Genotype
   - Hepatitis C RNA viral load
   - CBC
   - Liver panel
   - Serum Creatinine, GFR
   - INR
   - Hepatitis A serology
   - Hepatitis B serologies including HBsAg, HBcore Ab, HBsAb. (Individuals with evidence of active or prior HBV infection i.e. HBsAg positive or core Ab positive may be at increased risk of HBV reactivation with HCV treatment and consultation for appropriate management is recommended. Please see AASLD/IDSA guidelines and FDA warning for more information.)
   - HIV serology

3. Assessment of disease state
   - Degree of fibrosis or cirrhosis (including any evidence of decompensation)
   - Prior treatment history

4. Selection of HCV treatment regimen (with documentation of drug, dose, route, frequency and treatment duration) is performed utilizing:
   - Evidence-based selection such as:
     i. AASLD-IDSA guidelines (www.hcvguidelines.org)
     ii. Consultation with a specialist (Hepatology or Infectious Disease)
     iii. Consultation with Primary Care-based HCV Treatment eReferral
   - Using the lowest cost alternative by referencing:
     i. San Francisco Health Plan formulary for Medi-Cal patients with SFHP
     ii. Anthem Blue Cross formulary for MediCal patients with Anthem Blue Cross
     iii. Preferred formulary agents for other insurance payers as known

5. Identification of drug-drug interactions and modification of regimen as medically indicated

6. Counseling of patients on potential side effects of the selected HCV treatment regimen

7. Plan for follow-up including
   - Clinic or phone visit after starting HCV treatment
   - Lab monitoring (see monitoring protocol)

Monitoring Protocol

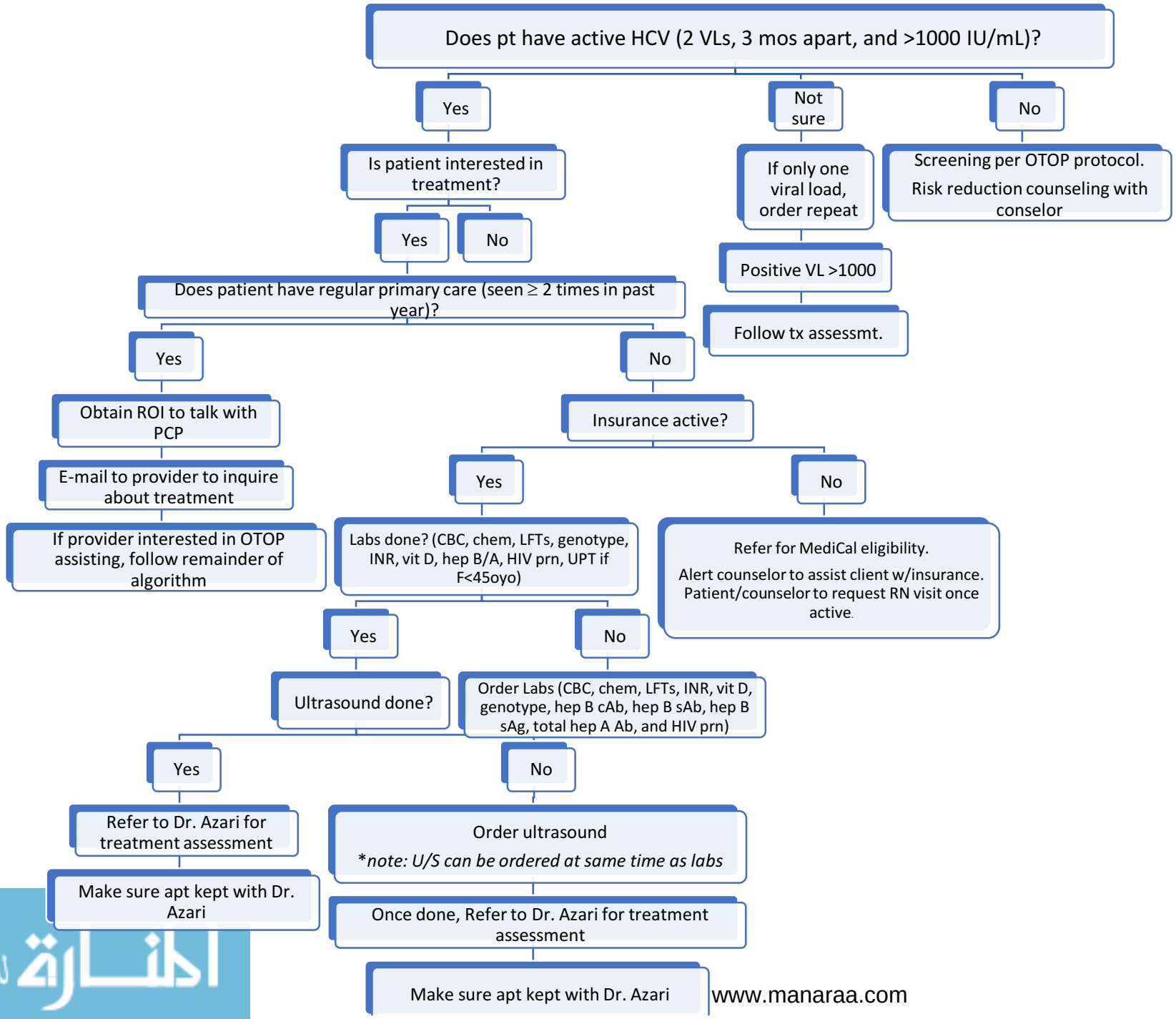
To ensure safety and efficacy of HCV treatment across the San Francisco Health Network, the monitoring protocol below is followed for all patients on HCV treatment at minimum:

1. Obtain and review the following labs at minimum (note that those patients with active or prior HBV or other medical conditions likely need more frequent monitoring):
    - Baseline labs (per Ordering Protocol)
    - Treatment week 4
        i. Hepatitis C RNA viral load
        ii. Liver panel
        iii. Serum Creatinine, GFR
    - 12 weeks post-treatment
        i. Hepatitis C RNA viral load

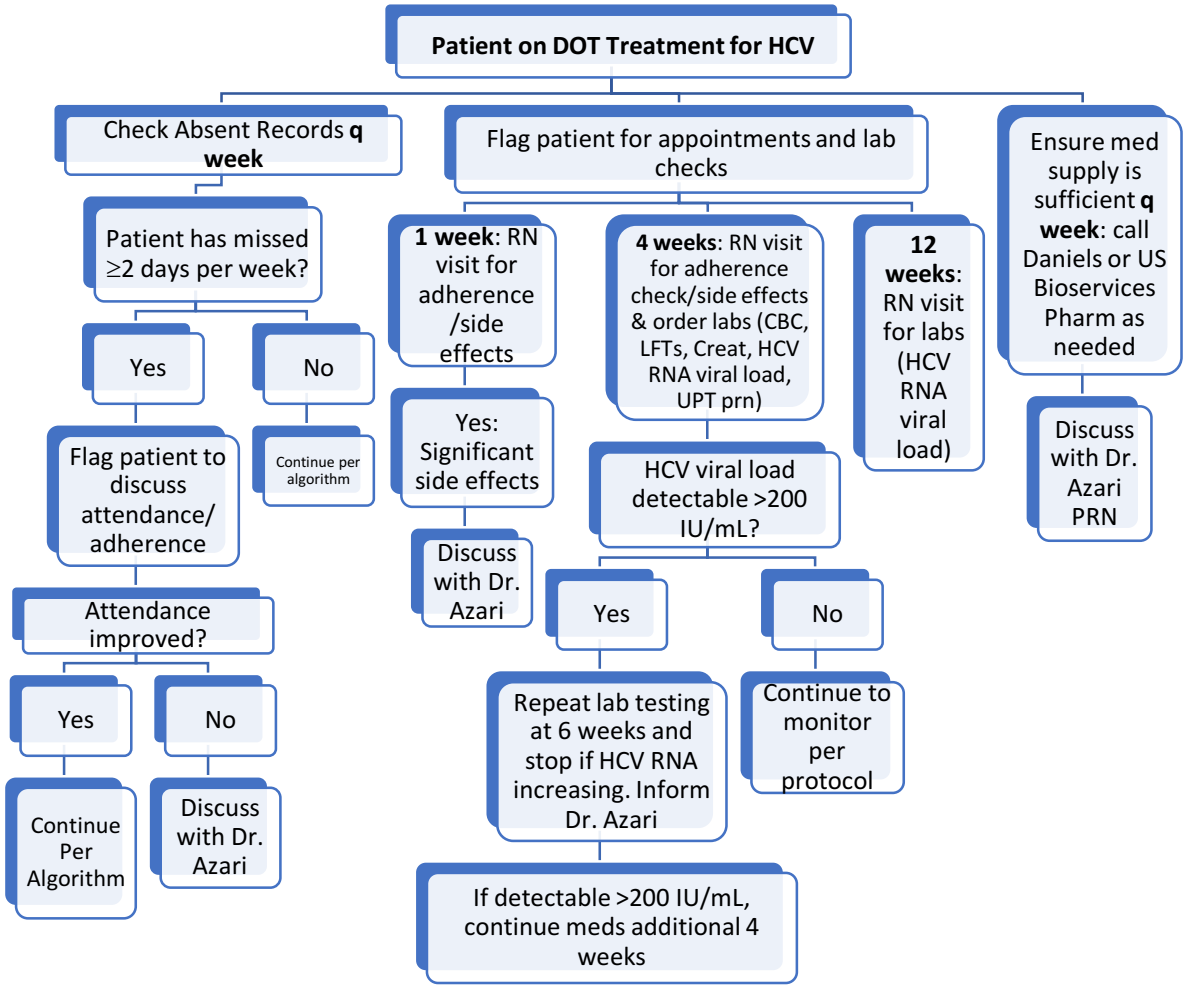
2. Follow-up in person or by phone call to assess adherence and tolerance of HCV medications including:
    - Medication reconciliation
    - Adherence monitoring
    - Side effects (with plan to address if applicable)
    - Refill coordination

3. Assessment and counseling regarding risk factors for HCV reinfection

RN Algorithm: Patient Assessment for Treatment



RN Algorithm: Patients Active on Treatment



Appendix N: Evidence Table

Citation	Conceptual Framework	Design/Method	Sample/Setting	Variables Studied and their Definitions	Measurement	Findings	Appraisal
Asselah, T., Kowdley, K.V., Zadeikis, N., Wang, S., Hassanein, T., Horsmans, Y.,…Mensa, F.J. (2017).	N/A	Three-part study, two studies being open label, and single-arm, and the other being a randomized, double-blind, placebo-controlled study	Total of 568 patients with HCV genotype 2,4,5, or 6 infection without cirrhosis in 3 separate phase trials.	IV: Chronic HCV with either genotype 2,4,5, or 6, absence of liver cirrhosis, may or may not have been treated with antivirals prior. DV: SVR12 at 8 weeks' and 12 weeks' time.	SVR12 after 8 weeks' and 12 weeks' treatment	At 8 weeks, SVR12 98% for HCV genotype 2, and 93% for HCV genotypes 4,5, and 6. At 12 weeks, SVR12 99.5% for genotype 2, and 99% for genotypes 4,5, and 6.	Level I, B Weaknesses: no age specified of patient's, unsure how many patients had been treated for HCV prior to this course, unsure how many patients had compensated liver cirrhosis, unable to determine history of HBV, no ratio of sex and age listed. Strengths: sufficient sample size of 568, strong study design (RCT, double-blind, placebo-controlled), treated genotypes 2,4,5, and 6, no adverse events from Mavyret.
Wyles, D., Poordad, F., Wang, S., Alric, L., Felizarta, F., Kwo, P.Y.,…Lee, S. (2017). Glecaprevir/ pibrentasvir for hepatitis C virus genotype 3 patients with cirrhosis and/or prior treatment	N/A	Partially randomized, open-label, multicenter, phase 3 study	131 patients with HCV genotype 3 with prior treatment experience and/or liver cirrhosis.	IV: HCV genotype 3, prior treatment experience, treatment-naïve, liver cirrhosis. DV: SVR12	SVR12 of 12 or 16-week treatment regimen	In treatment experienced patients without cirrhosis, an SVR12 was attained by 95% of patients treated with Mavyret for 12 or 16 weeks. The patients who had cirrhosis and were treatment-naïve achieved an SVR12 of	Level II, B Weakness: Conflict of interest, some of the authors receive grants from AbbVie, the makers of Mavyret, age of p tot specified, unknown how advanced liver cirrhosis is, unknown reasons why prior medicaiton regimens for treating HCV did not work (patient non-adherent)., unable to determine history of HBV. Strengths: Multicenter, no adverse events from Mavyret,

experience: A partially randomized phase 3 clinical trial. *Hepatology, 67*(2), 514-523. Doi: https://doi.org/10.1002/hep.29541						98% at 12 weeks, and 96% of the patients with prior treatment experience attained an SVR12 who were treated for 16 weeks.	
Rockstroh, J.K, Lacombe, K., Viana, R.M., Orkin, C., Wyles, D., Luetkemeyer, A.,…Sulkowski, M. (2018). Efficacy and safety of glecaprevir/pibrentasvir in patients coinfected with hepatitis C virus and human immunodeficiency virus type I: The EXPEDITION-2 Study. *Clinical Infectious Diseases.* Retrieved	N/A	Phase 3, multicenter, open-label study	153 patients, 16 with cirrhosis, HCV/HIV coinfection, genotypes 1-6, treatment-naïve or experienced, cirrhosis present or not.	IV: HIV and/ or not taking antiretrovirals, HCV genotypes 1-6, treatment-naïve or experienced, liver cirrhosis present or not. DV: SVR12	SVR12	SVR12 rate 98% with no virologic failures in 137 patients treated for 8 weeks. 4 patients had adverse events, not due to Mavyret.	Level II, B Weaknesses: Not clear on why of the 153 patients 137 were treated, unclear as to how cirrhotic the patients were, no age range, male:female ratio, unable to determine history of HBV. Strengths: Multicenter, excluded genotype 3 patients with experience of treatment since could unfairly sway results, good sample size, treated genotypes 1-6.

from https://watermark.silverchair.com/ciy220.pdf?token=AQECAHi208BE49Ooan9kkhW_Ercy7Dm3ZL_9Cf3qfKAc485ysgAAAbEwggGtBgkqhkiG9w0BBwagggGeMIIBmgIBADCCAZMGCSqGSIb3DQEHATAeBglghkgBZQMEAS4wEQQMsat_nwnnB98hGF7CAgEQgIIBZO0WMpWvXHz3NwBgb3xIcB-6MVAAK-alnJMg_-Xl3KrxJLcLnz3Axx6t66f21g8Y9ZJVGdyr_PgIEDAgOnju37jBZr7cJT3yl5Wr83e4XJY4eQdYEhgY1F6SmJKC6HxY-g08my3Fj_3YUbJJI_ndYtWOlAGIKNCvhaoydNlqAYFWDZ3BmOM3ZGf-HnfiiFmjXRPM5nRcq60vJoQdLoOc2tjJ_jDLkCs8xkeCIYNEebVpJcdYHCF0ZXGS

oZZlSox-rqgG4tOmwuaKViH1YCRjFVAqLzcGGpeS7n98b4dEWT8w7k9Ydud6vyvF_G3T5DRsPqlveoBdEAPWWay19vhRvJL5UgOo7cA9Ptu44wKQxCDN13bbm5DakeGebgG4MnvmwscB-gWOgevpPDIzE3nzwFaUOARGcz3rtfpCtX5PiwnEDTuGiQGltwAleNBuiK6YN41x5NX0_qEq9SDUo5e_ilBJoJhe

Poordad, F., Felizarta, F., Asatryan, A., Sulkowski, M.S., Reindollar, R.W., Landis, C.S.,…Mensa, F.J. (2017). Glecaprevir and pibrentasvir for 12 weeks for hepatitis C virus genotype 1	N/A	Phase 2, open-label study with 3 arms	50 patients with HCV, genotype 1, history of DAA virologic failure.	IV: HCV, genotype 1, history DAA with virologic failure. DV: SVR12	SVR12	Of the 3 arms, arm A had an SVR12 of 98%, arm B had 95%, and arm C had 86%. Results were indicative that Mavyret is highly effective in type 1 genotype patients with a history of	Level II, B Weaknesses: only genotype 1 treated, small study of 50 patients, age not specified, history of HBV not indicated, male:female ratio unknown. Strengths: no adverse events caused by Mavyret or ribavirin

infection and prior direct-acting antiviral treatment. *Hepatology, 66*(2), 389-397. doi: 10.1002/hep.29081						DAA virologic failure.	
Chayama, K., Suzuki, F., Kawakami, Y., Sato, K., Atarashia, T., Naganuma, A.,…Kumada, H. (2017). Efficacy and safety of glecaprevir/ pibrentsavir in Japanese patients with chronic genptype 1 hepatitis C virus infection with and without cirrhosis. *Journal of Gastroenterology, 53*(4), 557-565. doi: 10.1007/s00535-017-1391-5	N/A	Phase 3, open-label, multicenter study with 2 arms	Total of 181 patients with HCV genotype 1, with or without cirrhosis.	IV: HCV, genotype 1, presence or absence of liver cirrhosis. DV: SVR12	SVR12 after the 8 weeks' and 12 weeks' treatment completion.	SVR12 in 99.2% of non-cirrhotic patients, and 100% in cirrhotic patients after course of Mavyret.	Level II, B Weaknesses: only genotype I, undetermined if history of HBV, unable to determine if treatment-naïve or experienced, no age range, no male:female ratio listed. Strengths: No virologic failures observed, no adverse events from Mavyret, multicenter, sufficient sample size.

Kwo, P.Y., Poordad, F., Asatryan, A., Wang, S., Wyles, D.L., Hassanein, T.,…Mensa, F.J. Glecaprevir and pibrentasvir yield high response rates in patients with HCV genotype 1-6 without cirrhosis. *Journal of Hepatology, 67*(2), 263-271. doi: 10.1016/j.hep.2017.03.039	N/A	2 studies; phase II, open-label, multicenter, dose-ranging trials	Total of 449 patients, chronic HCV with genotypes 1-6, no cirrhosis. Treatment-naïve or prior exposure to interferon and ribavirin.	IV: chronic HCV, genotypes 1-6, treatment-naïve, previous treatment exposure to interferon and ribavirin. DV: SVR12	SVR12 after 8 and 12 weeks' treatment	SVR12 attained in 97-100% of 8-weeks' treatment, and 97-98% in 12-weeks' treatment. High SVR12 response rate achieved.	Level II, B Weaknesses: unable to determine if history of HBV, adverse events from medication present (unclear as to what caused AE), no age range listed. Strengths: multicenter, all 6 genotypes, dose-ranging, large sample size.
Forns, X., Lee, S.S., Valdes, J., Lens, S., Ghalib, R., Aguilar, H.,…Mensa, F.J. (2017). Glecaprevir plus pibrentasvir for chronic hepatitis C virus genotype 1,2,4,5, or 6 infection in adults with compensate	N/A	Single-arm, open-label, multicenter phase 3 study	Total of 146 patients, 18 or older, chronic HCV with genotypes 1,2,4,5, or 6, treatment- naïve or treatment exposure, compensated cirrhosis.	IV: chronic HCV with genotypes 1,2,4,5, or 6, compensated cirrhosis, treatment-naïve or previous exposure, age over 18. DV: SVR12	SVR12 after 12 weeks' treatment	SVR12 attained in 99% of patients after taking 12-week course of Mavyret. Favorable safety profile and high SVR12 response rate.	Level II, B Weaknesses: Potential conflict of interest since study was funded by AbbVie, the manufacturer of Mavyret, genotype 3 excluded, unclear if history of HBV, male:female ratio not listed. Strengths: age range listed, all patients treated for 12 weeks.

d cirrhosis (EXPEDITION -1): a single-arm, open-label, multicenter phase 3 trial. *Lancet Infectious Disease, 17*(10), 1062-1068. doi: 10.1016/S1473-3099(17)30496-6							
Gane, E., Poordad, F., Wang, S., Asatryan, A., Kwo, P.Y., Lalezari, J.,…Mensa, F.J. (2016). High efficacy of ABT-493 and ABT-530 treatment in patients with HCV genotype 1 or 3 infection and compensated cirrhosis. *Gastroenterology, 151*(4), 651-659. doi: 10.1053/j.ga	N/A	2 open-label phase 2 studies	27 patients with genotype 1 and 55 patients with genotype 3, majority treatment-naïve (84%) and male (65%).	IV: Chronic HCV with either genotype 1 and 3, compensated cirrhosis, treatment-naïve, treatment experienced, sex. DV: SVR12	SVR12	SVR12 among genotype 1 was 96% and among the genotype 3 patients an SVR12 of 96%. High SVR12 response rate, between 96-100%.	Level II, B Weaknesses: study exclusive to genotype 1 and 3, history of HBV unknown, treatment between 12 and 16 weeks (variability). Strengths: sufficient sample size, multicenter, listed sex ratio, listed percentage who are treatment-naïve, all patients had compensated liver cirrhosis.

stro.2016.07.020							
Berg, T (2018). First real-world data on safety and effectiveness of glecaprevir/pibrentasvir for the treatment of patients with chronic hepatitis C virus infection: data from the German hepatitis C registry. *Pharmacy & Therapeutics, 43*(6), 362-366. Retrieved from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5969214/	N/A	Phase-3 clinical trial	Total of 638 patients (68% male, median age 47 years), treatment naïve (90%) without cirrhosis (93%). Treated for 8-weeks (92%) with Mavyret.	IV: Chronic HCV with genotype 1-6, compensated cirrhosis, non-compensated cirrhosis, sex, age, treatment-experienced, treatment-naïve. DV: SVR12	SVR12 after 8-weeks treatment	The SVR12 after an interim analysis of a modified intention-to-treat population excluding non-virological failures was 100% (49 of49) confirming the high cure rates of 98% in other phase 3 trial studies.	Level II, B Weakness: treatment-experienced patients treated with what antiviral, unclear as to why patients who were treatment-experienced were being treated again, unclear as to which genotypes were treated. Per the conclusion of the study, there is lack of data in the difficult-to-treat genotype 3 patients, results drawn from a smaller section of the study (49 patients), no age range listed, not stated why some patients were treated for 12-weeks vs 8-weeks. Strengths: large sample size of the initial study (638), male and female patients, average age provided, percentage of treatment-naïve, without cirrhosis, and how many patients treated for 8-weeks.
D'Ambrosio, R. Real-life effectiveness and safety of glecaprevir/pibrentasvir among 723 patients with chronic HCV: The navigator-II study. *Pharmacy & Therapeutics, 43*(6), 362-366. Retrieved from https://www.ncbi.nlm.nih.gov/	N/A	Phase-2 clinical trial	Total of 723 patients; interim results of 347 patients. Patients treated for either 12 or 16 weeks.	IV: chronic HCV, treated with Mavyret, sex, age. DV: SVR4 and no presence of viral load (VL) at end of treatment, indicating that HCV is undetectable.	SVR4 after 12- or 16-weeks treatment with Mavyret. VL at end of treatment.	The interim results indicate that the effectiveness and safety profile of Mavyret are excellent across a range of different patient types.	Level II, B Weaknesses: Unsure of which genotypes were treated, age range not listed, does not label if the patients treated were treatment-naïve or not, no clear result if an SVR12 was ever attained, does not identify results of fibrosis scores (did some patients have compensated liver, decompensated liver?). Strengths: large sample size (723), interim size large (347), mean age listed, percentage of male patients listed.

pmc/articles/PMC5969214/
Dartmouth Medical School (2018). Hepatitis C: An epidemic for everyone. Retrieved from http://www.epidemic.org/thefacts/theEpidemic/USHealthCareCosts