



**Elimination of Hepatitis C Virus
Among People Living with HIV in San Francisco**

**Research Results, Recommendations, and
Micro-Elimination Implementation Plan**

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A Message from End Hep C SF

To the Reader:

On behalf of the Coordinating Committee of End Hep C SF, we are thrilled to share our plan to eliminate HCV among San Franciscans living with HIV. We believe it is possible to accomplish micro-elimination by 2023, given the current estimated numbers of people with HIV/HCV coinfection and successes to date in HCV diagnosis, linkage to care, and cure, leveraging innovative models of engagement.

Micro-elimination of HCV among San Franciscans living with HIV is an essential step on the pathway to broader elimination of HCV in San Francisco. We will learn from the successes and challenges in carrying out this plan and will apply them to the entire population of San Franciscans who have yet to benefit from the HCV cure.

End Hep C SF is grateful for our partnership with both the HIV Community Planning Council and the Getting to Zero initiative for the expert feedback and support they provided. We also thank the broader community of people impacted by HIV and/or HCV.

We look forward to continuing these partnerships in our work to #EndHepCSF!



Letter of Endorsement

Getting to Zero is a collective impact initiative working to get to zero new HIV infections, zero AIDS-related deaths, and zero HIV-related stigma in San Francisco. The San Francisco HIV Community Planning Council (HCPC) is dedicated to creating the ideal health care system for people living with HIV/AIDS throughout San Francisco, Marin, and San Mateo counties.

San Francisco has much to be proud of in our systems of prevention and care for people in our community who are living with or at risk of HIV/AIDS. The quality of care and dedication of San Francisco's providers has allowed us to make great strides, including strong initial focus on treating people who are co-infected with HIV and Hepatitis C virus. In turn, we have brought an early and committed focus to Hep C treatment overall, working together to address stigmas and barriers to treatment for all San Franciscans.

Because of our progress, we know that fully addressing HIV and HCV co-infection is not only possible, but feasible in the foreseeable future. At the same time, there are gaps we must address to fulfill our commitment to highest-quality care. In particular, **fully meeting the needs of people who are co-infected with HIV and HCV is a concerning gap in the quality of our system of care.**

At the time of this letter, San Francisco has not yet dedicated the will, commitment, and resources required to ensure that all people with HIV and HCV co-infection, regardless of their circumstances, are supported to receive HCV treatment. Nor have we adequately committed to the very real possibility of eliminating HCV amongst PLWH – a potentially life-changing positive outcomes for not only those who are co-infected today, but for those at risk of HCV infection in the future.

The following plan presents a timely and urgent opportunity to change that, by implementing three key strategies in support of a goal to **reduce Hepatitis C among PLWH in San Francisco by 90% by the year 2023, and ensure prompt identification and rapid treatment of any new HCV cases occurring in PLWH:**

- Develop the data capacity necessary to use HCV and HIV surveillance data to identify PLWH in need of treatment and link them to care.
- Work with providers not currently engaged with the city's efforts to increase testing, treatment, and support for PLWH who have HCV in all care settings.
- Increase support for people from the communities with highest barriers to treatment, ensuring that they can access treatment and cure their HCV.

We must now support the work that End Hep C SF has dedicated to developing the proposed initiative to eliminate HCV amongst people who are co-infected. HCPC and Getting to Zero strongly endorse this plan, and are committed to serving as partners in its implementation. We call upon the City and County of San Francisco to join us in partnering with End Hep C SF to eliminate HCV from the community of people living with HIV/AIDS.

Getting to Zero and HIV Community Planning Council

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Executive Summary

Hepatitis C virus (HCV) infection poses a major public health threat in San Francisco, where an estimated 12,000 people are living with HCV infection. Through San Francisco's End Hep C SF collective impact effort, a multi-sector partnership is committed to a vision of a San Francisco in which HCV is no longer a public health threat, and HCV-related health inequities have been eliminated.

For people living with HIV/AIDS (PLWH), HCV is a major cause of morbidity and mortality. HCV treatment is standard of care for PLWH; San Francisco has long been a leader in the prevention, care, and treatment of HIV, and is now positioned to eliminate HCV among PLWH.

The plan outlined below for micro-elimination supports the following overarching goal:

By the year 2023, reduce Hepatitis C among PLWH in San Francisco by 90% and ensure prompt identification and rapid treatment of any new HCV cases occurring in PLWH

In order to achieve this goal, an estimated 500-1,000 people living with HIV/HCV co-infection will need to be linked to HCV care and provided treatment. This effort to treat the majority of PLWH with untreated HCV must be paired with ongoing active surveillance to quickly identify and respond to new infections, in-migration, and reinfection.

Planning Process

The plan was developed through (1) a review of literature on relevant best practices; (2) examination of two HCV/HIV micro-elimination programs currently underway in New York City and Philadelphia; (3) qualitative research on local experts' and stakeholders' perspectives on San Francisco's relevant assets, opportunities, and potential challenges for micro-elimination; (4) a review of local data on barriers to treatment for people receiving care within the San Francisco Health Network, and (5) plan development and input discussions with End Hep C SF staff, committee and stakeholder partners, including the HIV Community Planning Council, the Getting To Zero Steering Committee, and DPH staff and leadership involved in HIV and HCV surveillance programs.

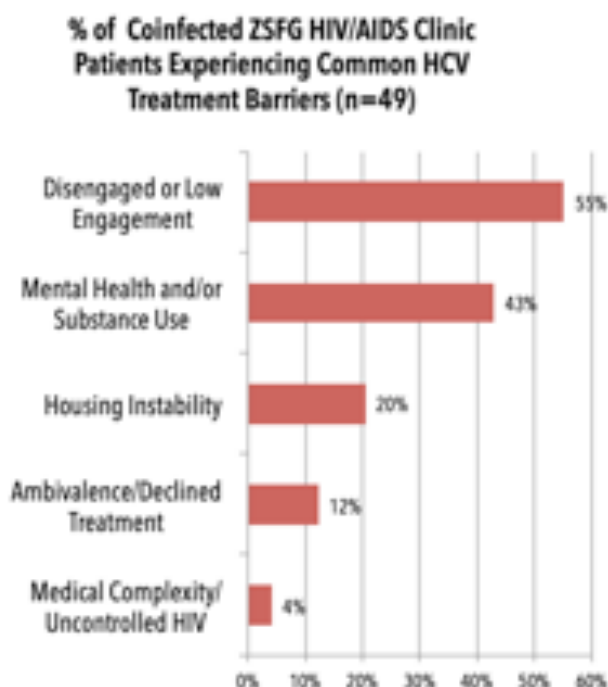
Local Insights on Current Capacity and Needs in San Francisco

San Francisco has a strong foundation upon which to build an effort towards HCV elimination in the community of PLWH:

- The city has developed and expanded its systems for diagnosis, linkage to care, and treatment of people with HCV in recent years, with multiple best practices in moderately widespread use. These include increased availability of HCV testing, treatment access, and community education, as well as growing capacity for use of data to inform HCV response and engagement with a cross-sector group of key providers.
- Of particular note, San Francisco's HCV efforts have included a priority focus on reaching and effectively serving populations with the highest barriers to treatment and cure.
- Existing capacity and experience in the HIV system of care, the collective impact model in use through End Hep C SF, and internal competencies in epidemiology and surveillance provide a foundation that can support the project's success.

Local stakeholders identified several key gaps in current systems and capacity that offer opportunities to improve HCV/HIV coinfection response:

- Capacity gaps in HCV epidemiology and surveillance reporting limit processes that would be needed for micro-elimination.
- Centralized resources and systems of care coordination for people with higher levels of need across providers and systems are limited.
- While HCV treatment is generally highly accessible to PLWH in San Francisco, there are gaps in the accessibility of treatment initiation during incarceration, and for people who may be best served by accessing care in alternative settings (beyond primary or specialist care settings).
- Within the San Francisco Health Network, PLWH with the highest barriers to HCV care and cure often have co-occurring medical and mental health diagnoses, and are experiencing housing instability and other socioeconomic challenges. A preliminary review of available data on treatment status and the known barriers to engaging in treatment and cure for people with untreated HIV/HCV coinfection found that the most common primary barriers to HCV treatment identified by providers were disengagement or low engagement in care (29%) and barriers associated with mental health or substance use (28%). A further review of multiple barriers identified for people receiving care at Zuckerberg San Francisco General Hospital's HIV/AIDS clinic found that low engagement, mental health and/or substance use, and housing instability were the most common barriers to HCV treatment.
- For PLWH receiving care in settings outside of the San Francisco Health Network, there are opportunities to bridge current gaps in engagement with providers and facilities around elimination efforts. Provider needs are likely to vary between settings.



Stakeholders and experts also identified specific opportunities to build upon strengths and address these gaps through the micro-elimination effort:

- With anticipated upcoming new state requirements that negative test results be reportable upon request (potentially including RNA-negative test results), the possibility of meaningful data-informed HCV response will be greatly augmented.
- San Francisco's comprehensive and sophisticated HIV surveillance infrastructure presents an opportunity that can be leveraged for the HCV/HIV microelimination project.
- Care coordination systems can be strengthened, such as increased navigation support for PLWH and HCV coinfection, re-engagement efforts focused on people lost to care to engage them in HCV treatment, and coordinated efforts to track people who access care with multiple providers and programs.
- PLWH with the highest barriers to treatment and cure can be supported through strategies to extend treatment access, such as increased navigation support, co-location of treatment at needle exchange and opiate agonist therapy programs, and temporary housing assistance.

Local perspectives on the opportunities for HCV/HIV micro-elimination align well with best practices identified through a review of literature:

- **Surveillance and Monitoring under a Data to Care model:** epidemiologic data will be used to specifically focus outreach, linkage and treatment efforts to areas of highest need in combination with a “care cascade” that tracks progress through each step of engagement, treatment, and follow-up testing.
- **Case finding** to identify undiagnosed people with HCV through screening and testing, and tracking of previously diagnosed patients who are lost to care. This requires promotion of testing and treatment, especially for high-risk groups, such as regular periodic testing for men who have sex with men (MSM) who are HCV/HIV co-infected and people who inject drugs (PWID), as well as follow-up testing to identify reinfection after cure.
- **Linkage to Care and Treatment through** multiple strategies, especially for those lost to care or in need of the highest levels of support during treatment. These include unrestricted treatment access, integrated care for PWID, re-engagement for people who have been lost to care, and treatment through non-traditional, innovative approaches.

Implementation Plan

The project plan is designed around three major efforts and increased underlying capacity that, taken together, offer a feasible approach to achieving micro-elimination by 2022. While each effort is comprised of a set of distinct activities, the three areas are highly interdependent and multiply the impact of work carried out under the other components.



Major Micro-Elimination Activities:

HCV SURVEILLANCE AND DATA MANAGEMENT PROCESSES

- Implement **HIV/HCV data analysis to leverage existing data and capacity** in HIV and HCV surveillance teams at SFDPH in order to **implement a Data to Care model**.
- **Build HCV surveillance capacity** and data quality, elevating the prioritization of accurate HCV data associated with the initiative.
- **Provide data tools and assistance to all providers**, within and beyond the SFHN, developing data exchange partnerships over time.

PROVIDER COLLABORATION AND TECHNICAL ASSISTANCE

- Using the resulting data generated by surveillance data analysis, **identify priority care settings/providers and engage in needs assessment and partnership development** to provide technical assistance supporting micro-elimination.
- Determine highest-leverage programmatic supports and **develop programs to support providers and facilities beyond DPH’s clinic network**.

INCREASE SUPPORT FOR COMMUNITIES WITH HIGHEST BARRIERS TO TREATMENT AND CURE

- **Extend awareness, prevention, and testing efforts** to increase reach to communities of PLWH affected by HCV and address reinfection risk for those completing treatment.
- Increase navigation support and case finding for people who are not in care, **providing on-site navigator staffing dedicated to HCV treatment at high-priority care provision settings and care investigators to locate people who are not in care**.
- **Address gaps in support and accessibility of HCV care for PLWH with barriers to treatment and cure**, ensuring treatment initiation and completion is accessible, through access to mobile treatment and treatment in non-traditional settings, access to temporary housing during HCV treatment, and development of re-engagement programs to locate and reach PLWH and HCV coinfection who are lost to care.

Recommended Benchmarks for HCV/HIV Micro-Elimination

Estimated No. of people living with HIV/HCV (viremic) coinfection	Treatment and Cure Annual Targets*				Reduction
	2019	2020 (Y1)	2021 (Y2) - 2022 (Y3)		
500-1000* (including 216 identified in SFHN care)	20%	+ 25%	+ 45%	=	90%

**Annual treatment targets and numeric goals should be revisited once data analysis work has been advanced sufficiently to consider the true numbers and characteristics of the target population for the initiative.*

TIMELINE OF MAJOR ACTIVITIES

	2019	2020 (Y1)	2021 (Y2) - 2022 (Y3)
Data Management and Quality	Complete preliminary HCV/HIV data analysis, generating Data to Care list , document process & procedure.	Conduct semi-annual (or more frequent) data analysis updates.	
		Adapt data processes and HIV/HCV collaboration to align w/implementations of PHNIX and EPIC .	
	Develop prevalence estimation model for HCV/HIV coinfection in San Francisco; apply model to predict and assess elimination timeline and assist in HCV surveillance data quality improvements.	Begin tracking and reporting on HCV elimination among PLWH as a standard metric of quality in the SF annual HIV epidemiology report.	
	Active surveillance (through existing HIV chart review process) to address HCV data gaps until negative RNA reporting has been implemented; update providers and health systems with metrics on remaining untreated PLWH with HCV using Data to Care models.	Maximize use of mandated negative test reporting upon request (specifically, RNA negative results) , enabling adequate HCV data quality for a Data to Care model.	
	Offer immediate core tools, and TA to all providers (within and beyond SFHN): develop and offer HCV dashboards and patient lists .	In conjunction with technical assistance engagement, offer data exchange and feedback loops with priority providers.	
Provider Engagement (Non-SFHN)		Based on data analysis, identify highest-priority care settings/facilities ; update and adjust priority provider/facility lists semi-annually.	
		Engage priority providers in needs assessment for technical assistance/support (non-SFHN clinics).	Conduct additional needs assessment as appropriate for newly prioritized non-SFHN providers.
		Offer immediate academic detailing, provider education to priority providers in conjunction with needs assessment.	Tailored to needs assessment results, provide additional direct TA/programs to providers , i.e. data management to target treatment, academic detailing, practice transformation, linkage to existing/external HCV services and support for patients.
Support for Communities with Highest Needs	Increase HCV education and public awareness of coinfection treatment, encourage adoption of elimination goal among PLWH advocate and stakeholder communities.	Expand prevention & testing to reach PLWH and monoinfected high-risk groups w/overlap who may be identified via surveillance data, i.e. PWID, MSM (additional testing sites, peer outreach, awareness & education).	
	Pilot embedded navigator placement on-site at one priority high-prevalence facility .	Embedded navigator rotations (2) at additional high prevalence, priority locations (may include Tom Waddell Urban Health Clinic, Jail Health Services).	Embedded navigator rotations (3): 2 at additional priority facilities; and 1 with mobile testing/treatment unit.
		Expand mobile testing and treatment to hotspots identified via surveillance data, offering street medicine treatment for people without housing and residing in shelter or navigations centers. Integrate associated navigator role to support linkage and treatment navigation post-mobile treatment initiation.	
		Pilot temporary housing for PLWH during HCV treatment for unhoused individuals in partnership w/existing housing and treatment centers.	Based on results from pilot, prioritize temporary housing for PLWH during HCV treatment for unhoused individuals.
			Begin investigator intervention , modeled after C-YA! investigators, for people lost to care and/or highly disengaged.
		Assess opportunities and address gaps in funding for HCV treatment.	Assess and respond to gaps associated with reinfection , if needed, based on registry data.
Resources	2019: \$217,960	2020 (Y1): \$560,921	2021 (Y2): \$655,921, 2022 (Y3): \$565,921
*See Appendix III for budget detail on recommended resource requirements			

Introduction

A Timely Opportunity for San Francisco: Elimination of Hepatitis C Virus Among People Living with HIV and AIDS

Despite significant advances in treatment in recent years, Hepatitis C virus (HCV) infection poses a major public health threat in San Francisco, where an estimated 12,000 people are living with HCV infection. **HCV is a significant driver of morbidity, liver cancer, and death.** [1, 2]

People living with HIV (PLWH) have been disproportionately impacted by HCV. Globally, PLWH are six times more likely to have HCV than are those without. In addition, HIV-HCV coinfection is particularly high among certain groups such as men who have sex with men (MSM) and people who inject drugs (PWID) [3]. For PLWH who have HCV, co-infection can accelerate HCV disease and lead to more fibrosis, regardless of whether they receive effective treatment for HIV. In the age of antiretroviral therapy, **HCV is a major cause of morbidity and mortality in PLWH.** [3, 4]

The arrival of direct-acting antiviral (DAA) therapies in 2014 has transformed HCV care. Well-tolerated, oral treatment for 2-3 months with cure rates of greater than 95% is now possible for nearly all people with HCV, including PLWH. We now have the tools to greatly reduce HCV-related morbidity and mortality, to break the cycle of forward transmission through treatment as prevention, and to ultimately eliminate HCV in San Francisco. Robust data support the benefit of HCV treatment regardless of the extent of liver fibrosis, and universal HCV treatment is recommended by AASLD/IDSA guidelines, including in PLWH for whom HCV treatment is a priority. **However, despite citywide efforts to increase HCV treatment uptake, there are an estimated 500 to 1,000 San Franciscans who are coinfecting with HIV/HCV and have not yet received HCV treatment, many of whom lack housing and/or have substantial barriers to care including mental illness and substance use.**

San Francisco has long been a leader in the prevention, care, and treatment of HIV, and is currently committed to and making progress on an ambitious goal of 90% reduction in new HIV infections and HIV-related deaths as part of the “Getting to Zero” initiative. San Francisco’s well-developed HIV system of care and rapid uptake of best-practice responses to HCV make this goal of HCV elimination feasible. To achieve micro-elimination, however, the city will need to activate the array of public and private partners whose participation will be essential and invest new resources targeted to ensuring HCV treatment for PLWH.

Launched in 2016, End Hep C SF is a multi-sector collective impact initiative committed to a vision of a San Francisco in which HCV is no longer a public health threat, and HCV-related health inequities have been eliminated. This initiative has mobilized a broad-reaching array of public, nonprofit, and private partners collaborating towards a common vision of a San Francisco in which hepatitis C (HCV) is no longer a public health threat, and where HCV-related health inequities have been eliminated. With End Hep C SF’s commitment to elimination of HCV, **San Francisco is working to ensure that treatment and cure are accessible to all and address the disparities that have hindered HCV diagnosis and access to care.**

In order to address the gap in our city’s care of PLWH with HCV coinfection, End HCV SF has undertaken a planning effort to determine how San Francisco can move to eliminate HCV among PLWH. This approach is referred to as “micro-elimination”: a targeted effort to eliminate a disease among a specific subpopulation. In addition to the substantive benefits to PLWH and HCV co-infection and public health in San Francisco, the initiative will further provide lessons that can be applied to the goal of eliminating HCV for all San Franciscans.

The plan outlined below for micro-elimination supports the following overarching goal:

By the year 2023, reduce Hepatitis C among PLWH in San Francisco by 90% and ensure prompt identification and rapid treatment of any new HCV cases occurring in PLWH

HIV/HCV Co-Infection and Treatment Need in San Francisco

There are 15,952 San Franciscans living with HIV or AIDS as of the city's last annual HIV surveillance report. While a precise figure for the total number of people co-infected with HCV and HIV is not available at present, an informed estimate of the expected number of people in need of treatment has been extrapolated from available data for purposes of developing this plan. **It is important to note that these estimates are based on limited available data and common-sense logic, and are not intended to present a formal coinfection prevalence estimate.** Rather, we intend to simply assess, in broad strokes, the approximate likely size of the target population for the micro-elimination effort, in order to ensure that the project action plan is reasonably scoped. The need to advance data quality and availability on coinfection and determine the target population more precisely is, in fact, one of the challenges this plan proposes to address.

Data on HIV prevalence in San Francisco and HIV/HCV co-infection within the San Francisco Health Network (SFHN, DPH's network of safety-net clinics) provided a reasonable source from which to begin an estimate of HCV/HIV coinfection. We took into account some reasonable assumptions regarding levels of co-infection and treatment for PLWH receiving treatment in varying care settings. Among people receiving care through the SF Health Network, preliminary analysis indicates that approximately 18% of those living with HIV have tested HCV antibody positive. Of these, the rate of active HCV infection is estimated at 31.5% as follows:

- # of HIV+ Active SFHN Patients: 3,831
- # HIV+ Active HCV Ab+ SFHN Patients: 684 (17.9%)
- # HIV+ Active HCV Ab+ SFHN Patients w/ detectable HCV RNA: 216 (31.5%)

It is reasonable to assume that the coinfection rate amongst people who receive care through the SF Health Network may be higher than that of the general HIV+ population, given the higher concentration of people with additional HCV risk factors in the City's network of safety-net clinics. A recent multi-city analysis of coinfection based on surveillance data presented an estimated coinfection rate amongst all PLWH in San Francisco of 11.2% [5]; accounting for the higher coinfection rate indicated by SFHN data, this could imply approximately a 9% coinfection rate for the population of HIV+ people getting care outside of the SFHN, or approximately an additional 1,000-1,100 people, for a total of approximately 1,700 people with HCV/HIV coinfection in San Francisco.

Amongst people in SFHN care who are HCV/HIV coinfected, however, more than two-thirds have been treated or have experienced spontaneous HCV clearance, with only 31.5% of people receiving care through the SFHN who are HIV+/HCV Ab+ remaining viremic and untreated. However, without data on treatment rates in other care settings, it is impossible to project the number of people who may be in need of treatment. If treatment rates beyond the SFHN proved to be similar, the target population for this initiative would likely be approximately 500 people; assuming that treatment rates may be lower in some of the varied care settings, we therefore recommend that the target population for the project should be assumed to fall in the range of 500-1,000 people.

In practical terms, this means that eliminating HCV among PLWH is not only feasible; it is clearly achievable within a modest timeframe of several years.

More accurate data are needed to further inform this target and indeed, establishing capacity for accurate data collection, analysis, and monitoring is an essential first step for the HCV/HIV micro-elimination project. However, given the available estimates, we do not anticipate that improved data will substantially change the overall scale

of the population of PLWH needing HCV treatment. Rather, it will provide crucial information to allow targeting of micro-elimination resources effectively and tracking progress.

The health impact of micro-elimination for San Franciscans currently living with HCV/HIV coinfection is substantive. In addition to positive physical health outcomes and reduced morbidity and mortality, many people who are cured of HCV report neuropsychological benefits such as clarity of thought processes, renewed energy, and improved mood and quality of life as well as increased engagement in health care. [26, 27] These can translate into improved quality of life and engagement in self-care, including HIV treatment. Treatment for people living with HCV/HIV coinfection further supports the overall health of people in San Francisco as well, by reducing the risk of forward transmission of HCV.

The proposed HCV/HIV micro-elimination project has a further potential benefit for San Francisco. By focusing on the specific needs of one priority group of people for whom HCV treatment can be provided, the project has strong potential to test and demonstrate the most effective approach to addressing HCV in other populations. In turn, the necessary increases in capacity to track HCV and provide appropriate prevention and treatment response for PLWH will increase the potential for success of the longer-term effort to eliminate HCV for all people who live in San Francisco.

Planning Process Description & Sources

The recommendations and implementation plan outlined in this report rely upon input and data gathered through a planning process conducted between October 2018 and March 2019.

Principal sources consulted in the development of the plan include:

- Review of current literature on micro-elimination strategies and best practices in HCV treatment, with an emphasis on HCV-HIV co-infection elimination efforts and treatment practices focused on communities with high barriers to treatment and cure.
- Examination of two promising co-infection micro-elimination efforts currently underway (New York City's *Project Succeed*, and Philadelphia's *C-YA!*): review of published and conference-presented reports on each initiative's design and results and key informant interviews with staff involved with both projects.
- Consultation with local experts, practitioners, and stakeholders in HCV and HCV-HIV co-infection treatment efforts to identify San Francisco's perceived assets, challenges, existing responses and gaps relevant to a potential micro-elimination effort. A complete list of participants who provided input via key informant interviews and group input discussions is included in Appendix II.
- Preliminary evaluation of barriers to treatment for subsets of co-infected individuals in San Francisco. Data was collected via chart review for clients with HIV-HCV co-infection who have engaged in treatment at Zuckerberg San Francisco General's HIV/AIDS HCV coinfection clinic and the San Francisco Health Network, (SFHN, San Francisco's network of safety-net clinics run by the SF Department of Public Health). Chart reviews were conducted by staff at the San Francisco Department of Public Health (SFDPH) and the coinfection clinic to identify and categorize known barriers to HCV treatment initiation and/or completion based on available information in client charts.
- Implementation plan development sessions and discussions conducted with End Hep C SF staff, committee and stakeholder partners including the HIV Community Planning Council, the Getting To Zero Steering Committee, and DPH staff and leadership involved in HIV and HCV surveillance programs.

Local Insights: Current Capacity and Needs in San Francisco

In order to develop a plan for HCV micro-elimination that builds upon existing strengths while considering needs and areas of opportunity or risk, interviews were conducted with local stakeholders with expertise in treatment and support for people with co-infection and/or systems of care and response to HCV. The complete list of participants in interviews and input discussions is included in Appendix II.

A preliminary review of available data from the San Francisco Health Network (SFHN, San Francisco's network of SFDPH-run safety-net clinics) was also conducted to estimate anticipated levels of co-infection prevalence, based on known prevalence of HIV in San Francisco and reasonable assumptions regarding co-infection and treatment levels, and to examine the barriers to treatment faced by people receiving care through the SFHN who have not yet been treated. SFHN providers report that, given efforts in recent years to accelerate HCV treatment in the network, the remaining people who are untreated are among those with higher barriers to treatment, engagement, and cure, a priority population for the micro-elimination effort.

Local Perspective: Strengths And Limitations In Capacity For Elimination Of HCV Among PLWH

San Francisco has a strong foundation upon which to build for HCV elimination in the community of PLWH. Of note, local strengths and resources align closely with multiple key factors that elimination modeling indicates are required for successful micro-elimination amongst PLWH. [6]

These include the progress San Francisco has made in increasing regular HCV testing of high-risk populations, broad access to HCV treatment including innovative delivery models outside of traditional primary care, and harm reduction and other behavioral interventions to prevent infection/reinfection. Within the SFHN, targeted HCV micro-elimination efforts have proven successful, providing a local example that can inform a broader-scale initiative. As an example, HCV micro-elimination work at the ZSFG HIV clinic has led to >90% reduction in HCV cases from 2014 to 2019, a decrease in estimated prevalence from 27% to 2.4%. In addition, San Francisco has long been at the forefront of response to the HIV epidemic, with two strong cross-sector and community leadership groups that are positioned to support and accelerate a micro-elimination effort: the *San Francisco Eligible Metropolitan Area (EMA) HIV Community Planning Council*, and *Getting to Zero SF*.

Key informants identified gaps and opportunities to better engage PLWH in HCV treatment, and they saw concrete, actionable opportunities to address these gaps. Their perspectives are based on observation and direct experience in recent efforts to treat HCV among the proposed target population.

Key Strengths And Existing Foundations For The Project

San Francisco has developed and expanded its systems for response to and treatment of people with HCV in recent years, with multiple best practices in moderately widespread use.

- Within the public health system, HCV testing and treatment access have been promoted and prioritized, implementing current best practices such as wider-spread availability of HCV testing, treatment access through primary care providers, and community education to address stigma and antiquated perceptions of treatment. 2017 saw a reported 28% citywide increase of HCV treatment since 2016, and community-based HCV treatment rose by 52%.

- Development of San Francisco’s HCV response has included growth and learning in key foundational competencies that are required for a Data to Care model, such as increased linkage to care efforts, research efforts to inform understanding of data applications for prevalence estimation, hot spot analysis to target expanded services, and growth of peer navigation services.
- Engagement with private and nonprofit care providers has shown early promise; a pilot effort providing academic detailing to providers has generated positive practice improvement results such as expanded treatment access in clinic settings, and improved use of practice data to identify untreated people living with HCV and link them to on-site care. End Hep C SF has gained useful insights into the particular challenges in these settings, and there are early indications of the most effective approaches to build public-private partnership around HCV response, potentially supporting the proposed HCV/HIV micro-elimination project.

San Francisco’s HCV efforts have included a priority focus on reaching and effectively serving populations with highest barriers to treatment and cure.

- Addressing inequities and issues of access to care forms one of the central tenets of San Francisco’s HCV response, with corresponding investment in best practices such as harm reduction-oriented prevention, community-based testing and treatment, and barrier removal strategies such as peer support, navigation services, and public education efforts.
- While providers working within the SFHN report that the remaining people with co-infection who are not yet treated may have the most substantive barriers to treatment, many of those who have been successfully engaged in treatment through recent efforts are among those typically considered “hardest to serve” in the field, e.g. people with medically complex needs, co-occurring mental health and/or substance use addiction diagnoses, and social and personal circumstances that impede engagement in care. Successful strategies such as removing prerequisites to treatment, offering navigation and other direct support for patients, and developing provider practices of respectful and sustained relationships with people they care for have proven effective and can form a basis for extending treatment efforts to those not yet cured of HCV. Providers also noted the particular importance of innovative treatment models that have been initiated, such as co-locating HCV testing and treatment access with syringe access, drug treatment programs, and other non-traditional sites that remove barriers to engagement.

Existing capacity in the HIV system of care, the End Hep C SF collective impact model, and internal competencies in epidemiology and surveillance provide a foundation that can support the project’s success.

- End Hep C SF’s operational model and practices demonstrate an authentic collective impact approach, with broad engagement across public, community, and private sector partners. Collaborative efforts are well underway that align with a micro-elimination model. This provides an existing foundation that can be immediately activated around the micro-elimination effort, significantly advancing the project’s ability to produce results in a timely fashion.
- San Francisco’s HIV services and response system is a model of best practice in multiple aspects of HIV care and support, providing a context within which raising HCV coinfection response can build upon existing capacity and expertise. Capacity associated with current best practices already in use, such as the existing data to care model utilized by LINCS (Linkage, Integration, Navigation and Comprehensive Services) has strong potential to support accelerated and successful implementation of core activities associated with HCV elimination. In addition, key leadership bodies and community leaders in HIV care such as *Getting to Zero SF* and the *HIV Community Planning Council*, as well as critical internal stakeholders at DPH, are motivated to improve outcomes related to HCV treatment for co-infected San Franciscans in order to meet current standards of care on par with other aspects of the HIV care system.

- SFDPH’s Applied Research, Community Health Epidemiology, and Surveillance (ARCHES) team has relevant past experience with (and appetite for) internal collaboration around cross-disease integrated efforts, as well as collaboration between epidemiology and programs.

Unmet Needs And Opportunities

Key insights emerging from the perspectives of local providers and stakeholders include both systemic issues and opportunities, as well as specific insights related to the unmet needs of communities with highest barriers to engaging in care and treatment, as well as recommendations for how to best provide needed support.

HCV epidemiology and surveillance reporting processes currently have gaps in the capacity needed to support the project.

UNMET NEEDS

- To date, HCV surveillance has relied primarily upon lab test reporting, limited to positive test results. The absence of a mandate for negative test result reporting has limited the validity of the current registry, as there is no efficient population-level data source from which to identify PLWH who have been successfully treated HCV or whose infection has resolved. While an anticipated change in reporting mandated at the state level will address this issue and enable significantly improved surveillance, there is a need to prepare for these upcoming changes and address gaps in current data.
- Resources and staffing for HCV surveillance are limited. Combined staffing for viral hepatitis surveillance (including both hepatitis B and C) is 3.5 FTE (program director, one epidemiologist, and two community health worker staff (1.5 FTE) who conduct data entry and support sampling follow-up data collection (enhanced surveillance). Without additional capacity, it is improbable that the HCV surveillance team would be able to assume the expanded activities required for the project.
- DPH’s electronic data tools are undergoing upgrades and transitions to new systems (EPIC for electronic medical records and PHINX, the Population Health Division’s Information System). With numerous priorities to address in the system upgrades, requirements for customization to ensure HCV-specific variables support streamlined querying for surveillance purposes may not be addressed in the initial transition. Until system transitions are completed, it is difficult to ascertain to what degree the new systems may support querying for more efficient chart abstraction and electronic data transfer for entry of lab reporting.

OPPORTUNITIES

- With the anticipated upcoming new state mandate requiring expanded test reporting to include negative results upon request, the potential for meaningful data-informed HCV response will be greatly augmented. San Francisco’s HCV surveillance systems will, however, require development to ensure readiness for implementation of the new reporting processes, and there is a need to sustain local collaboration with the state to ensure timely implementation.
- The comprehensive and sophisticated HIV surveillance infrastructure presents an opportunity that can be leveraged for the HCV/HIV micro-elimination project in multiple ways. HIV surveillance staff report the ability to carry out HIV/HCV data analysis using HIV surveillance data and sources from the HCV registry in order to enable a Data to Care model throughout the project. In addition, HIV surveillance staff conducts active surveillance via provider engagement and chart review and has capacity to provide active surveillance support during the initial phase of the project until HCV surveillance staffing and systems can be further developed.

Centralized resources and care coordination systems for people with higher needs across providers and San Francisco public health systems are limited.

UNMET NEEDS

- Clients may be expected to get care at one location (assigned primary care clinic), but are not accessing care or are irregularly engaged. While there are some limited systemic integrations (such as ability for Jail Health Services providers to view patient records in the SFHN), most relevant information systems are entirely siloed, providing only inefficient means for providers to gain awareness that their client may be accessing care through alternate settings or programs.
- Absence of coordinated and centralized data and tracking leaves missed opportunities to treat people who may not be highly engaged with their primary or specialty care provider, but are accessing alternate clinics or programs.
- Supports for patient engagement, such as the HCV navigators or the LINC navigation team, have proven highly effective. Community providers see strong potential to amplify the impact of this model and ensure linkage for people who have not yet successfully been linked to care. In particular, providers see a need for capacity to connect people with navigation through on-site, immediate warm handoffs as opportunities to engage people present themselves.

OPPORTUNITIES

- In order to maximize the effectiveness of navigation services and supports, providers and stakeholders suggest that an on-site rotation of navigators to provide immediate engagement with people getting care in locations with a high burden of HIV/HCV co-infected clients would be ideal. This would bridge the gap between moments of opportunity when people are in clinic and the next follow-through steps to pursue treatment, preventing “fall-off” between stages of the care cascade.
- Providers see significant potential for a centralized repository to assist in better tracking and assessing treatment opportunities for coinfecting San Franciscans. Interviewees suggested collective work to track PLWH who are coinfecting with HCV across different service points/providers, with a central point of communication through DPH to coordinate when a patient is accessing care and services in an alternate program/setting from their primary or specialty care clinic.
- For people lost to care, or not successfully engaged, informants believe that an investigator model similar to that in use in Philadelphia would be ideal. This would enable locating people who have disengaged from care and confirmation of their treatment status, as well as a proactive intervention to identify the most appropriate approach to linkage and follow through, reconnecting people to care.

While DAA treatment is widely available and accessible in San Francisco, there are gaps in funding for treatment that limit HCV treatment access for some PLWH.

UNMET NEEDS

- PLWH have always been a priority population for HCV treatment in San Francisco. Regardless of a patient’s overall eligibility for HCV treatment under Medi-Cal, **eligibility to initiate treatment is suspended during periods of incarceration.** Currently, San Francisco does not provide an alternate source of funding for people to initiate treatment during incarceration, leaving a gap in accessibility during a time that may be ideal for some people to begin such treatment. (See below for more on the perceived opportunity to better leverage engagement during periods of incarceration).

- Providers report opportunities to engage people who are not part of their primary care population, such as when a person who receives care at another clinic accesses other services at their site. While the provider may in this case have a unique and ideal opportunity to engage the person seeking other services in treatment, the provider typically cannot bill for this service. This creates barriers to making treatment accessible to people most efficiently, and also to ensuring that providers are reimbursed for the costs of delivering treatment.

OPPORTUNITIES

- Results from a recently-completed demonstration study on HCV treatment initiated during incarceration (in conjunction with navigation and pre- and post-release planning and supports) showed promise. Given achievement of 90% cure rates for participants in the study who completed treatment prior to release, and 65% cure for those released prior to completion (87% cure if full course of therapy was completed), DPH and project leaders should consider the cost/return ratio of financing a continuation of the model out of alternate sources of flexible funds. [7]
- Community providers are in some cases able to see a positive financial return on medications dispensed under 340B pharmacy access, enabling providers to minimize losses associated with delivery of treatment even if not a billable service. The project may benefit from assessing opportunities to ensure that all potentially eligible providers are encouraged to utilize this approach, promoting maximum flexibility in where people can access treatment.

Within the San Francisco Health Network, PLWH with highest barriers to HCV care and cure often have co-occurring medical and mental health diagnoses, and are experiencing housing instability and other socioeconomic challenges.

UNMET NEEDS

- Providers working in the SFHN typically see a high proportion of people with complex needs, low socioeconomic status, and multiple challenges to engaging in HCV treatment and cure. Nonetheless, the intentional focus on treating people with HCV in recent years has resulted in more than two-thirds of the known people with HCV/HIV coinfection in the SFHN successfully resolving their infections. The remaining people who have not yet been treated often have co-occurring disorders, are unhoused or experiencing housing instability, and may have mental health and/or substance use disorders. These intertwined issues often present barriers for people to remaining engaged with their providers, or to initiating or sustaining participation in a course of treatment. Homelessness or housing instability is a common barrier that interrupts engagement in care and can present barriers to engaging in treatment.
- These barriers to treatment are also associated with the experiences of people who are not engaged in care; while San Francisco has existing programs to locate and engage PLWH who are not in care, there has not been a focused effort for outreach and engagement around HCV treatment.
- Many PLWH who are coinfecting with HCV may be more comfortable accessing services and care in community settings, or in areas of the city that do not correspond to their primary or specialty care clinic. Regardless of the quality of a clinic's patient interactions, some people with HIV/HCV coinfection will remain irregularly engaged in care and may have difficulty developing trust and rapport with their designated providers.
- Particularly for people experiencing substantial instability in life circumstances, providers see consistent need for support around transportation needs and other requirements for keeping appointments, managing medication regimes, and remaining engaged in treatment.

OPPORTUNITIES

- For all people facing barriers to treatment, increased navigation support – with ease of access for initial referral to the navigator – was the most common opportunity that stakeholders cited as potentially high-impact.
- Given the relative accessibility and shorter-term horizon of HCV treatment, intentional outreach and engagement to PLWH who have uncured HCV presents an opportunity for reengagement in care that can be leveraged not only for HCV treatment, but for reengagement in care for HIV and other health needs.
- For PLWH who are coinfecting with HCV and who may be unhoused, providers suggest an effective approach could be to leverage emergency housing and stabilization services for PLWH (such as through the Kinney Hotel) for an initial period of HCV treatment. An additional opportunity may exist for experimenting with access to housing provided through residential substance abuse treatment facilities or “step-down” transitional housing to people during their HCV treatment.

Further inquiry and exploration should be conducted around questions of mixed-program housing and how to successfully integrate HCV treatment-related housing (likely to use a harm-reduction model) into programs that may be designed for substance-abuse treatment.

- In addition, stakeholders propose that increasing access to treatment through non-traditional locations is an ideal response to the needs of people getting care in the SFHN. This includes mobile treatment (currently in early stages through two programs in San Francisco), enabling people to access medications at community program sites such as needle exchange and opiate agonist therapy programs, and leveraging on-site supportive services to offer treatment support and medication access in permanent supportive housing settings and in shelter and navigation center temporary housing. Finally, as mentioned above, initiating treatment through Jail Health Services may be a highly effective opportunity for HCV treatment. Jail Health currently provides RNA testing to 12-17% of incoming people for HCV, with approximately an additional 15% receiving RNA testing through the jail nursing staff.

For PLWH receiving care in settings outside of the San Francisco Health Network, there are opportunities to engage providers and facilities in elimination efforts. Provider needs are likely to vary between settings, and will be best addressed through a process of case finding, needs assessment, and tailored technical assistance.

UNMET NEEDS

- While additional data and needs assessment will be necessary to assess the barriers to treating PLWH in care settings beyond the DPH clinic network, stakeholders noted that these providers will have varied needs for support around maximizing the effectiveness of HCV treatment, and around engaging in the HCV/HIV micro-elimination project.

Additional outreach is needed to assess what level of HCV services are being provided in private and nonprofit care settings and where there may be an opportunity for the HCV/HIV micro-elimination project to provide support.

- Private and nonprofit providers have additional considerations that impact HCV data-sharing and treatment, related to the business side of medicine; this can create disincentives to sharing data under a Data to Care model. Many providers also face technical challenges with their internal information and medical record systems' capacity to identify and track treatment progress and outcomes for people in the target population.
- Care teams may each have different protocols, such as managing care through a centralized specialist or treater, or conducting a fibroscan or other initial steps prior to initiating treatment, and may have internal

protocols that complicate opportunities to leverage outside expertise and technical assistance and/or to apply recommended practice improvements for PLWH with HCV coinfection.

- For providers who have already intentionally prioritized HCV treatment for PLWH, participants providing input perceive that the challenges and barriers that will arise for the HCV/HIV micro-elimination project are in large part parallel to those observed within the SFHN: co-occurring mental health issues, substance use, medical complexity, and personal circumstances including housing instability and economic means that affect engagement in treatment.

OPPORTUNITIES

- Private and nonprofit providers are likely to view the HCV/HIV micro-elimination project as a highly positive opportunity to eliminate HIV/HCV coinfection in San Francisco. An engagement approach that begins from needs assessment and development of an understanding of the status of HCV care practices and needs in these priority settings is likely to be well-received, and can provide an entry point for the broad collaboration that will be needed to achieve HCV elimination for PLWH.
- Technical assistance and solutions that address the issues that providers report with their internal electronic medical record systems are likely to be of particularly high interest.
- Navigation support and linkage to other programs and assistance that may assist in completing HCV treatment are perceived as likely to be of value and of interest to providers caring for people who need HCV treatment and who face higher barriers to care.

TREATMENT BARRIER DATA, PEOPLE IN SF HEALTH NETWORK CARE

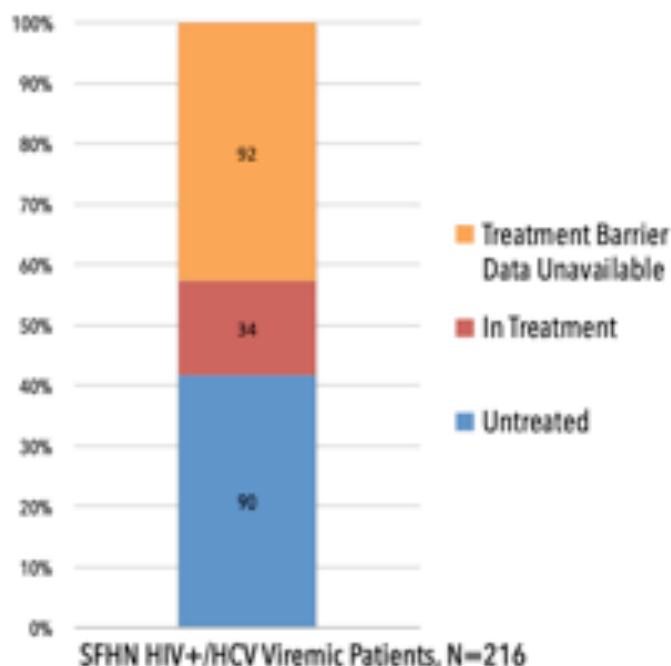
Over the past several years, particularly since 2016, leaders and practitioners in the SFHN have focused increased effort on treating people for HCV. As a result, of 684 people in SFHN care identified as co-infected with HIV and HCV, fewer than a third (216 people) appear to be viremic and definitively in need of HCV treatment as of January 2019.¹ To aid in identifying patient needs that must be addressed for a successful micro-elimination effort, staff at the SFDPH and the Zuckerberg San Francisco General's HIV/AIDS HCV coinfection clinic (ZSFG HIV/AIDS Clinic) completed a preliminary review of available data on treatment status and the known barriers to engaging in treatment and cure for these people.

PRELIMINARY DATA: BARRIERS TO TREATMENT FOR UNTREATED PEOPLE WITH HIV-HCV CO-INFECTION IN THE SAN FRANCISCO HEALTH NETWORK

Of the 216 PLWH identified as having HCV and a positive HCV viral load, 16% (34 people) have recently begun treatment or have been successfully referred to a specialist for comprehensive liver care, including HCV treatment. Of the remaining 182 individuals, data on treatment barriers was available for 49% (90 individuals).²

Staff at three SFHN clinics reviewed available data on known barriers to treatment and cure for these individuals and identified the primary barrier they see as impeding treatment and cure. DPH staff also reviewed select data points and collaborated with additional providers in order to identify primary barriers to treatment for people served at other clinics.

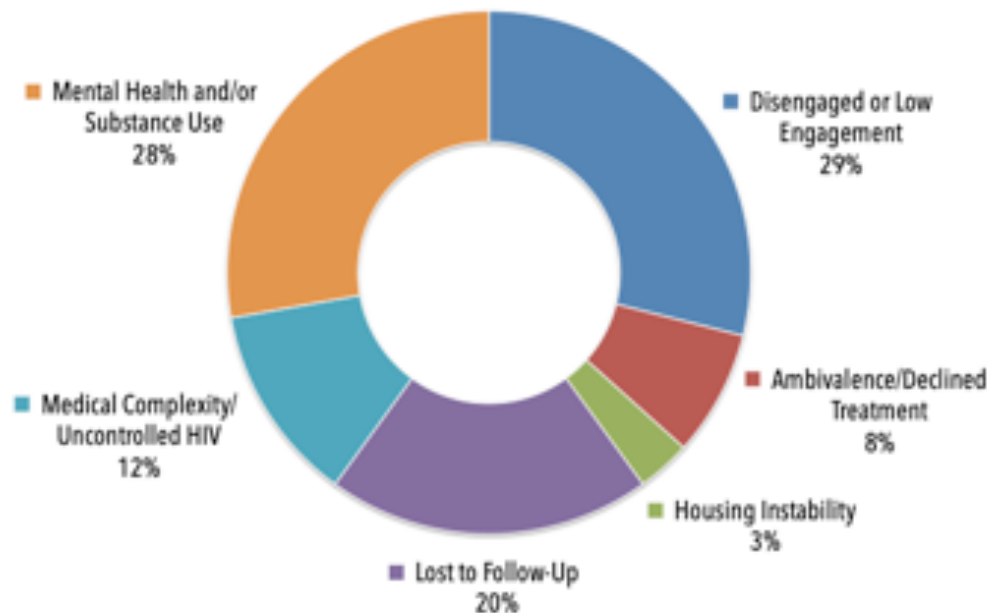
Selection of a “primary” barrier to treatment is recognized to be a subjective endeavor. Nonetheless, the results provide an initial assessment based on patient data that generally aligns with the themes from key informant interviews with practitioners and stakeholders who provided input into the plan.



¹ Co-infection and treatment data based on data extracted by DPH staff from electronic medical records for SFHN clinic patients. Clients who appear to have completed treatment based on treatment records and/or viral load testing were excluded. Additional data review and/or completion of confirmatory testing would be necessary to confirm the accuracy of this preliminary analysis.

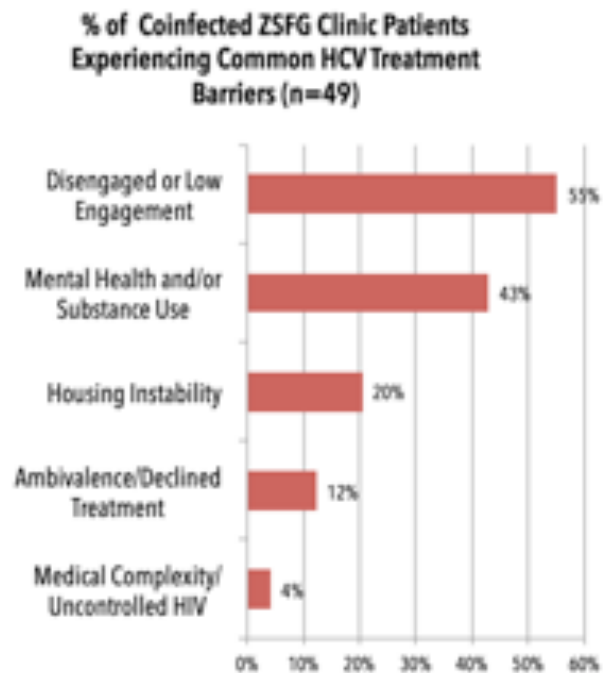
² DPH staff also conducted a chart abstraction for a random sample of 10 (11%) of the 92 patients for whom treatment barrier data could not be identified. Evaluation of these patients' engagement in care and evidence of evaluation for HCV treatment indicated that barriers to treatment were consistent with those identified for patients for whom data was available. Lack of engagement in care was similarly the most common barrier that could be identified.

Primary Barrier to HCV Treatment for Untreated San Francisco Health Network HIV/HCV Patients, N=90



- Among people with low engagement levels, there are varied provider perspectives about contributing factors. These range from incarceration (short-term), to limited connection and interpersonal engagement with providers, to challenges with keeping the appointments required to initiate treatment.
- Of people who were lost to follow-up, 39% have been out of care for less than 15 months (with a last date seen in clinic in 2018); a further 39% were last seen in 2017, and 22% were last seen in 2016

Participants in the data review note that most people in SFHN care who have not already treated and cured their infection are those who providers have attempted unsuccessfully to engage in treatment. In many, if not all cases, people are experiencing more than one barrier to treatment, and selection of the “primary” barrier is necessarily a subjective exercise. For an expanded view of multiple barriers to treatment, staff and community provider partners at ZSFG HIV/AIDS Clinic identified additional secondary and tertiary barriers, to assess the most common barriers to treatment for people in ZSFG care who have not been treated. Of note, while housing instability was considered the “primary” barrier to treatment for only 3% of people in SFHN care, unstable housing is a contributing factor for one-fifth of people cared for at ZSFG once multiple barriers to treatment are considered.



Review of Literature (Summary)

*To inform strategies and action-planning for the micro-elimination effort, a targeted review was conducted of the literature on (micro) elimination efforts underway in other communities in the US and internationally, as well as key practices related to successful engagement and treatment of communities with high barriers to treatment and cure. **The complete review of literature and relevant citations are included in the Appendices to this report.***

Current trends in prevention and treatment, particularly the introduction of direct-acting antivirals (DAAs), promise to enable a substantive reduction in Hepatitis C-related morbidity and mortality. The following key strategies are of particular relevance for elimination of HCV amongst PLWH:

Surveillance and Monitoring

Data to Care (or “Data to Cure”) models have demonstrated potential to achieve HCV micro-elimination, including amongst people co-infected with HCV/HIV. A Data to Care model requires accurate epidemiologic data on HCV prevalence and incidence, and patient monitoring and engagement data, used to focus outreach, linkage and treatment efforts under a care cascade. Data on engagement at each step of the care cascade enables effective action, interventions and follow-up. Adequate HCV testing data for a Data to Cure model requires complete test reporting, including HCV RNA negative results, to accurately track HCV cures and identify new infection, in-migration, and reinfection trends.

Case Finding

Case finding through screening is a critical step in the HCV care cascade and a foundational element for any micro-elimination effort. Case finding is defined as identification of undiagnosed people with HCV through screening and testing, and tracing of people who have been previously diagnosed and who are lost to care. Effective case finding relies upon promotion of testing and treatment, especially for high-risk groups, such as regular periodic testing for MSM who are HCV/HIV co-infected and PWID, and follow-up testing to identify reinfection after cure.

Linkage to Care and Treatment

Multiple strategies are essential for linkage to care and treatment, especially for those lost to care or in need of the highest levels of support during treatment. Essential components of linkage to care with the potential to increase treatment uptake for those with highest support needs include:

- Unrestricted access to DAA therapy
- Integrated care for PWID, particularly through warm handoffs, navigation services, HCV care integrated within substance use or psychiatric services and/or case management services, and on-site HCV care at locations where PWID are already accessing services, such as needle exchange and opioid agonist therapy programs
- Care coordination and collaboration across multi-disciplinary care teams to ensure detection and linkage to HCV care
- Retrieval of people who have been diagnosed and then lost to follow-up
- Expanded capacity for treatment through telehealth, mobile treatment access, and other non-traditional, innovative approaches

Lessons from Promising Projects

In New York City and Philadelphia, current hepatitis C virus micro-elimination efforts dedicated to treating people with HCV/HIV co-infection are underway. While there are notable differences in local contexts as well as regional and state policy settings, these efforts mirror the proposed initiative in San Francisco in multiple ways, and have been in motion long enough to offer early results and both guiding and cautionary instruction. Drawing from these micro-elimination projects presents an opportunity for San Francisco to build upon lessons and potential models for the SF initiative's design.

Several key observations from the New York and Philadelphia projects are reflected in the review of literature (above). In addition to review of existing (if not yet peer-reviewed) publications, staff at each program were interviewed and provided additional insights into the approaches used for implementation and advancement of each project, as well as preliminary results disseminated at conferences and as a resource to peers.

Overview: Project Succeed (New York)

GOAL: Eliminate hepatitis C among people living with HIV.

DESCRIPTION: Project Succeed utilizes a Data to Care model to identify and work with HIV facilities with a high burden of HCV, and provides surveillance data, feedback, training, technical assistance and motivation to support HCV elimination efforts. In addition, large-format training and sector education activities work to build quality of care and excitement for best-practice HCV treatment amongst providers jurisdiction-wide. The Health Department also uses surveillance data to identify PLWH still in need of HCV treatment, and provides telephone outreach and linkage to HCV care services.

TARGET # CASES FOR MICRO-ELIMINATION (2017): 4,200

PROGRESS TO DATE: 48% categorized as resolved as of January 2019, either now Hep C RNA Negative or no follow-up needed (ie found to be deceased, not infected, out of area).

Overview: C-YA! (Philadelphia)

GOAL: Eliminate hepatitis C among people living with HIV.

DESCRIPTION: C-YA! uses quantitative and qualitative data to assess progress towards micro-elimination and target integration of hepatitis C response into existing activities, thereby enhancing HIV services in a systematic and sustainable way. The Philadelphia Department of Public Health (PDPH) routinely matches data from HCV and HIV registries to monitor the HCV continuum among PLWH. Community feedback compliments surveillance data by describing best practices and barriers that influence HCV continuum outcomes. Collectively, this data helps PDPH target resources by identifying areas where building HCV capacity can make the most impact. Two primary examples are **building provider capacity to treat** by incorporating HCV into the Mid-Atlantic AIDS Education and Training Center's provider training curriculum, and **finding lost-to-care** individuals by collaborating with the HIV care re-engagement team to revise their data and outreach processes to include hepatitis C as priority condition.

TARGET # CASES FOR MICRO-ELIMINATION (2017): 3,086 coinfection cases

PROGRESS TO DATE: 50% of people in the target group have resolved infection as of January 2019

PROMISING PROGRAMS: COMPONENTS AND SUCCESS FACTORS

	Project Succeed (NYC)	C-YA! (Philadelphia)
Surveillance and Data Management	<ul style="list-style-type: none"> Mandated negative RNA test reporting to HCV registry Initial HIV and HCV annual surveillance registry matching, followed by annual updates Integration of HIV and HCV public health units via housing the HCV micro-elimination effort under HIV department 	<ul style="list-style-type: none"> Mandated negative RNA test reporting to HCV registry Monthly HCV-HIV registry matching, using SAS coding Project-funded epidemiologist embedded in HIV team to address privacy requirements, data sharing agreement with assigned HCV epidemiologist
Collaboration and Tailored Support for Providers	<ul style="list-style-type: none"> Dashboards provided to 47 HIV facilities on HCV treatment initiation for people in their care with coinfection, compared w/NYC overall rates, list of people with coinfection from surveillance offered as well. Mini-grants, technical assistance awarded to facilities to support practice transformation in querying EHRs, HCV service improvement Broad-reach training program for all providers, including those not targeted for practice facilitation projects 	<ul style="list-style-type: none"> Initial site visits w/numerous providers; regular ongoing site visits with select sites. Technical assistance to support tailored practice transformation: authorization, EMR improvements, implementing best practice HCV care, starting to treat HCV Technical assistance to Ryan White clinics to integrate HCV variables into CAREWare data set
Case Finding and Retrieval	<ul style="list-style-type: none"> Project targets only patients who are in HIV care. An existing HIV Field Services Unit provides linkage to care for HIV out-of-care patients. Providers report that assistance with EMR querying and patient lists has enabled identification of patients lost to care and internal efforts to re-engage 	<ul style="list-style-type: none"> Integrated HCV into intensive HIV reengagement process for PLWH lost to care: TA to facilities to generate lists monthly, matched to surveillance for disposition and case identification. Referred to health department investigators. Disease investigation specialists work in the field to locate and re-engage patients, using motivational interviewing techniques.
Additional Success Factors	<ul style="list-style-type: none"> Patient lists, combined with EMR query tools and IT support were highly appreciated by providers/facilities, meeting a priority internal gap they were aware of Has been helpful for health department partners to identify service improvements providers are excited about that add to care quality/resources. Ex: accessing additional underutilized supports available to patients 	<ul style="list-style-type: none"> Providers report high professional satisfaction in seeing patients achieve cure; peer to peer learning has built momentum Quality Improvement aspects of the project are building overall quality of care for all HCV care, has built excitement amongst providers and stronger provider-health department partnership overall
Challenges	<ul style="list-style-type: none"> Gap in resources/capacity: case finding and investigation, community outreach, navigation, retention in care, improved capacity for quality care for people who use drugs Known gap in engaging w jail/prison population and people without housing Need for further enhanced surveillance capacity: assess screening rates, expand surveillance-based tools (dashboards, patient lists, facility lists) 	<ul style="list-style-type: none"> Clearance of homeless encampments has made it challenging to find and link high-risk individuals to HIV and HCV prevention and care services Micro-elimination will not be feasible if providers continue to rely on requiring harder-to engage clients to come to care sites; this challenge has fostered conversations about strategies like street medicine that would bring medical care to the community

Implementation Plan: Elimination of Hepatitis C Among PLWH

Drawing upon best and promising practices in the literature, as well as needs, current resources and strengths in HCV response in San Francisco, the following is proposed for an implementation plan. The project plan is intended to be carried out over 3 years, from 2020-2022, with an initial period of early activities and preparation to be implemented during the remainder of 2019.

PROJECT GOAL AND BENCHMARKS

In the absence of current data on the prevalence of HCV among PLWH in San Francisco, the following timeline draws upon the assumption that there are approximately 500-1,000 PLWH who are in need of HCV treatment, 216 of whom are identified people currently receiving care in the SFHN.

Recommended San Francisco HCV Micro-Elimination Goal and Annual Targets:

By the year 2023, reduce Hepatitis C among PLWH in San Francisco by 90% and ensure prompt identification and rapid treatment of any new HCV cases occurring in PLWH

Estimated No. of people living with HIV/HCV (viremic) coinfection	Treatment and Cure Annual Targets				Reduction	
	2019	2020 (Y1)		2021 (Y2) - 2022 (Y3)		
500-1000 (including 216 identified in SFHN care)	20%	+	25%	+	45%	= 90%

Efforts, Major Activities, Timeline

The project plan is designed around three major efforts that, taken together, offer a feasible approach to achieving micro-elimination by 2022. While each effort is comprised of a set of distinct activities, the three areas are highly interdependent and multiply the impact of work carried out under the other components.

Undergirding the three major efforts, the project will require investment of additional resources, both to deliver new activities required to achieve the goal of eliminating HCV amongst PLWH, and to add needed capacity for coordinating and supporting the focus of existing resources and stakeholders who can contribute to carrying out the plan.

The main components of the project will include the following efforts towards elimination:



For each effort, major activities are designed to build initially upon existing capacity and strengths that can support the project during the first 12-18 months, while conducting activities required to achieve readiness for deeper work in each area.

This approach will enable an immediate launch of the project and an opportunity to pilot and learn from early activities that can be initiated without further planning or capacity investments. Simultaneously, areas of work that rely upon completion of other activities and/or additional research and planning can be developed and prepared for.

A. HCV SURVEILLANCE AND DATA MANAGEMENT PROCESSES



In order to fully implement a micro-elimination effort, San Francisco will require increased capacity and new processes for HCV surveillance data collection, analysis and monitoring. For any effort relying upon a Data to Care model, access to relatively timely and specific data is an essential component that serves as both the entry point and source for selection of where, when, and how to deploy project activities. Data also serves as the mechanism for monitoring progress and, ultimately, evaluating success.

It is worth emphasizing that without enhancements in reporting/data collection on HCV testing and capacity for data analysis and reporting, the project is unlikely to realize its potential. In particular, preparation for the implementation of the anticipated state mandate for reporting of RNA negative test results is essential, as is enhanced capacity for data management, analysis, and the development and continuing use of surveillance-related tools (patient and provider lists, monitoring of metrics and progress).

Additionally, a micro-elimination effort that does not occur simultaneously with strengthening HCV epidemiology overall may face significant barriers to success. Without adequate HCV surveillance, the project will be unequipped to assess and respond to new infections, in-migration, and any reinfection trends, should they occur, and may be unable to identify and address risks of crossover infection between coinfecting and HCV mono-infected populations.

The following surveillance and data management action steps will enable the HCV/HIV micro-elimination project to initiate activity immediately, drawing on present resources as an interim approach to generating quality data, adding key components in years 2-3 of the project:

Implement process to create Data to Care list (identification of PLWH with untreated HCV)

- Using current data in the HIV Surveillance system, complemented by data from the HCV registry, identify a preliminary list of people who are believed to have HIV/HCV coinfection, with subsequent outreach to providers and health case systems to address targeted strategies to link patients to care, within the privacy confines of what is permissible with these data. Document procedures and processes, including execution of MOU(s) required for compliance with privacy requirements associated with HIV surveillance data.

By leveraging the high-quality data managed by HIV surveillance, which includes regularly updated data such as demographics, care engagement, and treatment status for HIV, the initiative can ensure that the preliminary data-to care list is as accurate as possible. Because the HIV registry does not track HCV treatment in a quantitative data point, and chart review for the entire registry is impractical, data from the HCV registry will be used to complement HIV surveillance data and add efficiency to the development of the Data to Care list. A select number of charts, typically less than half of the registry, are reviewed annually through HIV surveillance efforts; combining use of the HCV registry with chart reviews will provide the most comprehensive approach possible. By combining data available from HIV surveillance efforts as well as the HCV registry, this process will generate the most-accurate-possible list from which to initiate the HCV/HIV elimination effort.

- For an initial period of 12-18 months, leverage collaboration between HIV and HCV epidemiology teams to conduct active surveillance based on the results of the initial data analysis, addressing data gaps related to treatment and cure status for patients identified via the registry data analysis.
- Continue regular analysis of data to update the Data to Care list, anticipated to occur semi-annually beginning in 2020 or 2021, depending on progress towards addressing the preliminary list of people potentially in need of treatment/support and outreach. As needed, iterate data analysis processes to build on prior cycles and to adapt to changes in DPH information systems that are currently being implemented.

Of note: Data analysis leveraging the current registries will provide an essential data source for the initiative and can be implemented with modest additional resources along with allocation of existing SFDPH staff time. HIV surveillance data includes relatively complete patient and provider information;

the HCV registry includes data-analysis ready testing results that are not included in the HIV registry in data-analysis-ready format.

Key data points can be used to identify a sub-set of patients that appear to fall into the target population of those with HIV/HCV coinfection and who are likely to be untreated and viremic. For these patients, action steps (engaging providers, addressing opportunities within the SFHN, etc.) can be initiated based on the preliminary results.

For an additional subset of the list resulting from preliminary analysis, HIV surveillance staff currently have capacity to include a review of HCV test results within the process of HIV surveillance chart reviews, conducted annually for a portion (approximately half) of the patients in the HIV registry.

This approach will provide the most efficient method to generate the initial data required to begin implementation for the project, with process improvements to be added in subsequent years.

Build HCV surveillance capacity and data quality, elevating the prioritization of accurate HCV data associated with the initiative

- Develop a prevalence estimation model for coinfection in San Francisco, providing an initial model that can assist in assessing the results of data analysis to produce the preliminary Data to Care list and quality improvement efforts for HCV surveillance data.
- Increase HCV surveillance team capacity through addition of a dedicated epidemiologist position to support the HCV/HIV micro-elimination project, and address outstanding data import and entry needs to complete backlog of manual data entry from reports received in 2018-19.
- Make micro-elimination updates accessible to the public via regular reporting and communications.
- Beginning with the 2021 annual HIV epidemiology report (presenting data from the 2020 calendar year), integrate HCV elimination data into San Francisco's core HIV epidemiology metrics and reporting, establishing and communicating the prioritization of HCV care and treatment measures, and reinforcing the city's commitment to providing HCV treatment to PLWH as a standard of care.
- Update current data systems to allow for anticipated upcoming HCV negative RNA test results reporting, and increase HCV surveillance staffing as needed to address gaps in data quality and inefficiencies in laboratory reporting processes.

Provide data tools and assistance to all providers, within and beyond the SFHN, developing data-exchange partnerships over time

- Develop preliminary data tools (HCV dashboards and patient lists), as feasible, from initial data analysis and active surveillance data, and provide tools to providers in conjunction with developing mechanisms and agreements for participation in the project.

Recommended data tools include dashboards that provide visibility into opportunities for treatment efforts for providers, presenting aggregate data on the numbers and percentages of people with coinfection who may be in need of treatment in each provider/care setting, with comparison to the overall universe in San Francisco. For providers within the DPH clinic network, and for any others with whom DPH-compliant protocols for exchange of patient data can be developed, provision of a names-based list generated through data analysis could be beneficial. Care to ensure that privacy and data-sharing protocols are maintained will be essential for any data exchanges conducted with providers.

- As provider engagement develops, invite and establish exchanges of patient data (as feasible) to support feedback loops and coordination of care/outreach for all coinfecting patients across provider systems, ensuring compliance with DPH data-sharing protocols and privacy requirements.

B. PROVIDER COLLABORATION AND TECHNICAL ASSISTANCE



A citywide HCV elimination effort for PLWH must necessarily reach beyond the DPH network of clinics and engage those not as actively involved in HCV programs and efforts. Because there is limited data and information available at present on the state of treatment practices and efforts in private and nonprofit settings, the project will be well served to begin by gathering further information and conducting needs assessment to design the focus of this effort.

The following action steps are recommended to ensure that the project successfully reaches and supports all PLWH to access and complete HCV treatment, irrespective of the setting in which they receive care:

Identify priority care settings/providers and engage in needs assessment and partnership development. Offer immediate limited-scope technical assistance (academic detailing).

- Based on the results of data analysis, identify highest-priority providers and care settings for engagement in the project. Update and refine priority provider and facility lists semi-annually following updates to the Data to Care list.
- As an immediate offer of support, the project should extend an offer of academic detailing support simultaneously with provision of initial data results from data analysis and the request for participation in a needs assessment process.
- Assess current practices and status of HCV testing/treatment for co-infected individuals in care settings beyond the SFHN through needs assessment research and listening sessions with priority providers. Identify provider technical assistance needs and interests.

Determine highest-leverage programmatic supports and develop programs to support providers and facilities beyond DPH's clinic network.

- Identify highest-leverage supports to offer to prioritized providers, emphasis on provider settings outside of SFHN safety-net clinics. Expected to include: targeted technical assistance and/or funding to support implementation of HCV data management and treatment tracking such as modifications to EMR; academic detailing and/or additional practice transformation supports; tailored provider education to increase linkage to existing/external services and support for individuals with opportunity for HCV treatment.
- Implement programs that respond to needs and opportunities in the variety of care settings identified as priority facilities/practices.

C. INCREASE SUPPORT FOR COMMUNITIES WITH HIGHEST BARRIERS TO TREATMENT AND CURE



Drawing on lessons from efforts in other communities and from the expertise of local stakeholders, the project has promising opportunities to address support needs for communities facing the highest barriers to care. San Francisco's early focus on addressing inequities in care has enabled substantial progress in providing HCV treatment for PLWH who face barriers to treatment and cure.

Given that a high proportion of the target population for the project will have need of more substantive support than has already been offered, it will therefore be essential to increase the resources targeted to the community in need of treatment.

Extend awareness, prevention, and testing efforts to increase reach to communities of PLWH affected by HCV.

- Increase education, advocacy, and public awareness efforts targeting communities of PLWH. Develop a joint effort with key partners such as Getting to Zero, the HIV Community Planning Council, and community advocates to promote the HIV/HCV initiative and adoption of the micro-elimination goal.
- Address gaps in accessibility of community-based testing and treatment provision, building on End Hep C SF's community-based programs to expand reach and geographic coverage for accessibility of prevention and treatment supports for PLWH.

Increase navigation support, providing on-site navigator staffing dedicated to HCV treatment at high-priority care provision settings.

- Strengthen linkage to care provided by HCV navigators, potentially in partnership with the LINC HIV navigation team, by developing procedures to integrate navigation more closely into HIV care settings.
- Fund and deploy on-site, "embedded" navigators at high-priority clinics and care settings for a rotation of 6-12 months at each site, enabling immediate warm-handoff connections to navigators for patients in need of support. High priority sites recommended for on-site rotation of navigator supports are: ZSFG HIV/AIDS Clinic, Tom Waddell Urban Health Clinic and Jail Health Services (2020, Y1); an additional clinic to be determined, and an embedded navigator working with the mobile testing and treatment program recommended for expansion in Y2-3 (2021-22).

Address gaps in support and accessibility of HCV care for PLWH with barriers to treatment and cure, ensuring treatment initiation and completion is accessible.

- Expand mobile treatment access and other mechanisms to offer treatment in the location of choice and with highest accessibility for PLWH who are more comfortable accessing treatment in alternate locations from primary/specialty care clinics. These should include a street-medicine/mobile treatment model (in conjunction with an embedded navigator working with the mobile treatment team to support follow-up and treatment continuation). In addition, extend treatment access via community programs, on-site in permanent supportive housing sites, and in shelter and navigation centers.
- Pilot and develop a temporary housing program for PLWH to support stability during HCV treatment (approximately 8-12 weeks). Emergency housing access could be provided through the existing HIV housing program(s) such as the Kinney Hotel, and/or through prioritization for access to the city's navigation centers.
- Explore the potential to leverage temporary housing through priority/leveraging of residential substance abuse programs, consistent with American Society for Addiction Medicine (ASAM) criteria, and/or step-down housing to provide stability for unhoused PLWH during HCV treatment.

- Conduct a feasibility assessment and identify funding sources to finance treatment initiation for people who are incarcerated, along with more flexible approaches to support treatment that may be non-billable under Medi-Cal (i.e. treatment access through multiple clinic settings), considering the cost-benefit ratio and return on cost savings in additional service and public health costs.
- Develop and deploy specialized investigators in Y2-3 (2021-22) to locate and engage people who are lost to HCV care, in collaboration with the LINC navigator team. The investigator model utilized in Philadelphia should serve as a strong model for this intervention, combining investigative activity with outreach and client-centric approaches for re-linkage to care, such as motivational interviewing.
- Based on HCV/HIV data, conduct an analysis in Y2-3 (2021-22) on reinfection rates and risk factors. Adjustments should be made to prevention, program and treatment supports as appropriate based on the results of reinfection analysis.

TIMELINE OF MAJOR ACTIVITIES

	2019	2020 (Y1)	2021 (Y2) - 2022 (Y3)
Data Management and Quality	Complete preliminary HCV/HIV data analysis, generating Data to Care list , document process & procedure.	Conduct semi-annual (or more frequent) data analysis updates.	
		Adapt data processes and HIV/HCV collaboration to align w/implementations of PHNIX and EPIC .	
	Develop prevalence estimation model for HCV/HIV coinfection in San Francisco; apply model to predict and assess elimination timeline and assist in HCV surveillance data quality improvements.	Begin tracking and reporting on HCV elimination among PLWH as a standard metric of quality in the SF annual HIV epidemiology report.	
	Active surveillance (through existing HIV chart review process) to address HCV data gaps until negative RNA reporting has been implemented; update providers and health systems with metrics on remaining untreated PLWH with HCV using Data to Care models.	Maximize use of mandated negative test reporting upon request (specifically, RNA negative results) , enabling adequate HCV data quality for a Data to Care model.	
	Offer immediate core tools, and TA to all providers (within and beyond SFHN): develop and offer HCV dashboards and patient lists .	In conjunction with technical assistance engagement, offer data exchange and feedback loops with priority providers.	
Provider Engagement (Non-SFHN)		Based on data analysis, identify highest-priority care settings/facilities ; update and adjust priority provider/facility lists semi-annually.	
		Engage priority providers in needs assessment for technical assistance/support (non-SFHN clinics).	Conduct additional needs assessment as appropriate for newly prioritized non-SFHN providers.
		Offer immediate academic detailing, provider education to priority providers in conjunction with needs assessment.	Tailored to needs assessment results, provide additional direct TA/programs to providers , i.e. data management to target treatment, academic detailing, practice transformation, linkage to existing/external HCV services and support for patients.
Support for Communities with Highest Needs	Increase HCV education and public awareness of coinfection treatment, encourage adoption of elimination goal among PLWH advocate and stakeholder communities.	Expand prevention & testing to reach PLWH and monoinfected high-risk groups w/overlap who may be identified via surveillance data, i.e. PWID, MSM (additional testing sites, peer outreach, awareness & education).	
	Pilot embedded navigator placement on-site at one priority high-prevalence facility .	Embedded navigator rotations (2) at additional high prevalence, priority locations (may include Tom Waddell Urban Health Clinic, Jail Health Services).	Embedded navigator rotations (3): 2 at additional priority facilities; and 1 with mobile testing/treatment unit.
		Expand mobile testing and treatment to hotspots identified via surveillance data, offering street medicine treatment for people without housing and residing in shelter or navigations centers. Integrate associated navigator role to support linkage and treatment navigation post-mobile treatment initiation.	
		Pilot temporary housing for PLWH during HCV treatment for unhoused individuals in partnership w/existing housing and treatment centers.	Based on results from pilot, prioritize temporary housing for PLWH during HCV treatment for unhoused individuals.
			Begin investigator intervention , modeled after C-YA! investigators, for people lost to care and/or highly disengaged.
		Assess opportunities and address gaps in funding for HCV treatment.	Assess and respond to gaps associated with reinfection , if needed, based on registry data.
Resources	2019: \$217,960	2020 (Y1): \$560,921	2021 (Y2): \$655,921, 2022 (Y3): \$565,921
*See Appendix III for budget detail on recommended resource requirements			

Appendix I: Review of Literature

To inform strategies and action-planning for the micro-elimination effort, a targeted review was conducted of the literature on (micro) elimination efforts underway in other communities in the US and internationally, as well as key practices related to successful engagement and treatment of the communities with highest barriers to treatment and cure.

Context: HCV Treatment Today

With the introduction of direct-acting antivirals (DAAs) in 2014, HCV elimination became a possibility for the first time. The World Health Organization (WHO) released a strategy in May 2016 to reduce new HCV infections worldwide by 80% and HCV mortality by 65%. Among other targeted initiatives enabled by these developments in treatment, focused efforts on HCV treatment and cure for people with HCV/HIV co-infection are increasingly making progress. Modeling of HCV elimination amongst PLWH indicates that elimination is feasible, accounting for the particular needs of MSM and PWID. [6]

The following strategies or approaches related to **surveillance and monitoring**, **case finding**, and **linkage to care and treatment** show promise for a micro-elimination effort in San Francisco targeting people who have HCV/HIV co-infection.

Surveillance and Monitoring

Data to Care models for surveillance have the potential to achieve HCV micro-elimination including amongst people co-infected with HCV/HIV. (For HCV treatment, can be considered Data-to-Cure)

Data to Care provides a framework for health departments to use surveillance data to identify individuals with HCV and link them to or re-engage them in care. It is a public health strategy that uses data to inform and support the continuum of care for individuals diagnosed with HCV. With robust epidemiologic data on HCV prevalence and incidence, a Data to Care strategy can help health departments and health care agencies inform the focus of outreach, linkage and treatment efforts.

Of particular relevance, New York City's HCV elimination effort among people living with HIV, called Project SUCCEED, has used surveillance data to identify and link patients to care. By matching HIV and HCV surveillance data, Project SUCCEED identified individuals with co-infection, estimating 4,200 people co-infected with HCV and HIV in 2017 [9]. Matched surveillance data were then used to assess patient care status, identify facilities with the highest burden of co-infection, create HCV dashboards for HIV health care facilities, create out-of-care lists of co-infected patients for outreach and linkage to care, conduct practice transformation and systems level improvements with high-burden facilities, and monitor progress towards HCV elimination [9]. Similar to San Francisco's Data to Care efforts for HIV response, between 2015-2016, New York State also implemented two Data to Care models that identified individuals living with HIV in New York City who were lost to follow-up. Using surveillance data, including the absence of HIV laboratory tests in the surveillance system and provider encounter data, the Data to Care strategies were successful in re-linking a high proportion of individuals living with HIV back to care [10].

A surveillance-based HCV care cascade provides important benchmarks or steps along the spectrum of engagement to care and can be useful for monitoring efforts towards HCV elimination.

A care cascade outlines specific steps that individuals with HCV infection must go through, starting with initial diagnosis, to achieve an undetectable viral load. It also shows how many individuals with HCV are engaged at each stage of the cascade. Aiming to be one of the first countries worldwide to eliminate HCV, the Netherlands developed a care cascade that defines specific targets for each step as an essential part of its national plan to address viral hepatitis. The Dutch HCV health care cascade includes the following steps: awareness and prevention, testing and diagnosis, linkage to care, access to medication, cure, and monitoring for reinfection. Robust data and monitoring for subpopulations prioritized for the Dutch micro-elimination model have enabled accurate and timely progress tracking and strategies for treatment tailored to each sub-population. For example, all individuals diagnosed with HIV are screened for HCV once per lifetime, or repeatedly for those with additional risk factors, and are provided with linkage to treatment; as a result, by February 2017, 80% of co-infected individuals were cured (76%) or in the course of treatment (6%) [11].

Similarly, Philadelphia and New York utilize a care cascade to identify where along the spectrum of engagement patients might be falling out of care (e.g., untested; HCV Ab screened; HCV RNA confirmed; linked to specialist care; treated; and cured). The care cascade relies on surveillance data to assess each step, identify gaps in the diagnosis and treatment of people for HCV infection, and monitor progress towards HCV elimination [12].

Adequate monitoring and tracking of all individuals in each step of the HCV healthcare cascade is essential to achieve HCV elimination.

- a. *HCV elimination requires an accurate data information system that tracks engagement and progress at each step of the HCV care cascade.*

Data on exact prevalence and engagement at each step of the care cascade allows progress against HCV to be tracked appropriately and accurately. It allows health departments to understand whether efforts to screen, test, and link persons with HCV are successful. Reduction in the drop out rates at any of the stages of the HCV care cascade provides an indication that elimination efforts are working [11]. In an effort to strengthen HCV surveillance and monitoring systems in the Netherlands, it became mandatory to report acute HCV infections to the local Public Health Services as early as 1999, and in 2018, registration of chronic HCV infections became mandatory [11].

- b. *Adequate patient monitoring systems are necessary to determine the success of HCV therapy uptake in subpopulations.*

In order to ensure that patients diagnosed with HCV are engaging in HCV therapy, it is vital that adequate monitoring systems are in place to track patients, especially those in subpopulations at higher risk for being lost to care [11]. In 2017, the Dutch Association of Internal Medicine (NIV) and Gastroenterology and Hepatology (NVM DL) specialists and participating hospitals piloted a registry for treatment uptake and outcome of all viral hepatitis B & C mono-infections [11]. Similarly, the Cherokee Nation utilizes an HCV registry to monitor clinical care for HCV-positive patients who have begun antiviral treatment [13]. In conjunction with expanded testing, the Cherokee Nation Health Services (CNHS) utilized the HCV registry to track patients who initiated antiviral treatment and to target outreach activities which included home visits. The HCV registry allowed the CNHS to follow the HCV epidemiology among the American Indian/Alaska Native (AI/AN) population in northeastern Oklahoma, confirming a fivefold increase in the percentage of persons tested for the first time; initiation of HCV treatment was seen for more than half of the approximately 400 patients identified with chronic HCV infection, 90% of whom completed treatment and were cured [13].

- c. *A robust public health surveillance data and monitoring system should include reporting of all HCV tests administered including negative HCV test results.*

Reporting of RNA- and Rapid Antibody test results ensures an accurate picture of who is getting screened and confirmed and a more complete surveillance dataset. To this end, Philadelphia and New York City both modified their health codes in 2014 to mandate the reporting of HCV test results, including negative test results [12; 14]. This enabled significant improvements in the use of surveillance data to track infections and progress, and to develop and utilize treatment cascades. The New York City Department of Health and Mental Hygiene (DOHMH) collects data on all test results (i.e., antibody, RNA, and genotype) including test dates, the name of the facility where the test was ordered, laboratory and provider information, and patient demographic information including name, date of birth, sex, and address [12]. Its person-level HCV surveillance system is electronically populated from laboratory reports in real time and includes patient identifiers, allowing for case ascertainment to be highly complete [12]. New York City's robust surveillance system has enabled it to monitor the HCV epidemic, target resources, change policy, and evaluate the effectiveness of interventions [12].

Case Finding

Case finding through screening is a critical step in the HCV care cascade and a foundational element for any micro-elimination effort.

Case finding is defined as the identification of undiagnosed HCV patients through screening and testing, and the tracing of previously diagnosed patients who are lost to care [11]. Screening for hepatitis C is conducted by measuring antibody to HCV in a person's serum. The presence of HCV antibodies, which is a positive screening test, indicates that a person was previously exposed to hepatitis C, and requires confirmation of active disease with an HCV viral load test. While HCV screening identifies presence of antibodies and does not distinguish active HCV infection without confirmatory testing, it is a simple and cost-effective way to identify people who may be living with HCV before the onset of symptoms, allowing for linkage to timely treatment and care. [15]. HCV screening is especially important among high-risk groups. The Centers for Disease Control and Prevention (CDC), for instance, recommends HCV screening for everyone born between 1945-1965 due to the high rate of HCV infection among this age cohort. In response to this recommendation, the New York City DOHMH began a campaign to inform all licensed physicians about current screening requirements, produced training materials such as a screening toolkit posted on its website, and conducted educational sessions for providers to encourage HCV screening [12]. Additionally, the DOHMH conducts HCV screening in sexually transmitted infection clinics and is assessing the potential for screening in emergency departments due to a recent HCV serosurvey in large NYC emergency department that found a 7.3% HCV antibody positivity rate [12,16].

Actively identify undiagnosed persons with HCV and promote testing and treatment, especially for high-risk groups.

- a. *Universal and routine screening, coupled with prompt treatment, has the potential to eliminate HCV within high-risk groups.*

Switzerland, the Netherlands, and Iceland have implemented systematic screening policies that require the close monitoring and regular HCV screening of identified risk groups. In Switzerland, a population-based HCV screening program for HIV-positive MSM, known as The Swiss HCVree Trial, was implemented between 2016-2018 and subsequently identified a high number of individuals potentially co-infected with HCV [17]. In the Netherlands, annual HCV screening is recommended for people living with HIV (PLWH) [11] while in Iceland, screening has been increased at emergency rooms, addiction treatment centers, and within prisons as part of the TraP HepC, a treatment-as-prevention program

initiated in 2016 that prioritizes treatment for people who inject drugs (PWID), patients with advanced liver disease, and incarcerated individuals [18,19]

- b. *Regular HCV testing is recommended for MSM who are HIV/HCV co-infected.*

The Swiss HCVree Trial, mentioned above, aimed to eliminate HCV in MSM living with HIV by a combination of interventions including HCV screening of all MSM living with HIV; HCV treatment; and behavioral counseling focusing on risk reduction for HCV-reinfection [17]. This treatment-as-prevention strategy led to a 49% reduction in incident HCV infections and a 92% decrease in chronic infections among the study population. Researchers proposed that systematic screening followed by DAA treatment can be a promising strategy for HCV micro-elimination in MSM with HCV/HIV co-infection [17,20].

Linkage to Care and Treatment

Multiple strategies/approaches and resource allocation are essential for linkage to care and treatment, especially for those lost to care or in need of the highest levels of support during treatment.

- a. *Unrestricted access to DAA therapy is a vital component of HCV elimination.*

In 2015, the Netherlands required that all DAA therapy be reimbursed by basic health care insurance which is mandatory for all of its residents [11]. Since unrestricted access to DAAs became available regardless of fibrosis stage, alcohol, or substance use status, acute HCV infections among HIV-positive MSM decreased by 51% [21]. The following year, Australia implemented a similar policy that subsidized access to DAA therapy among adults with chronic HCV irrespective of liver disease stage and drug use. The unrestricted DAA program resulted in an estimated 58,500 individuals, or 26% of the total HCV-infected population, initiating treatment through 2017. Of these, 70% were individuals with cirrhosis [22].

- b. *Integrated care for PWID is an effective approach for HCV micro-elimination in this subpopulation.*

In a review of HCV elimination efforts among PWID, researchers highlighted previous studies in the interferon era that demonstrated the effectiveness of facilitated referrals for HCV assessment and scheduling of specialist appointments in linking patients to treatment [10]. HCV care integrated within substance use and psychiatric services and delivered by a coordinated, multidisciplinary care team with case management services has also been associated with improved treatment uptake, suggesting that models of care that provide on-site HCV care where PWID are already accessing services can be an important approach to HCV elimination in this population [23].

- c. *Care coordination and collaboration across multi-disciplinary care teams ensure detection and linkage to HCV care.*

Other studies aim to demonstrate the importance of coordinated, multidisciplinary care teams in increasing linkage to HCV care and uptake of DAA therapy. TraP HepC, a nationwide program in Iceland, is based on a multidisciplinary team approach that involves doctors, nurses, psychosocial staff, homeless shelters, and the penitentiary system. Through a cohesive, multi-pronged and coordinated approach that includes prevention, testing, and early treatment in hospital and community settings, a large proportion of patients living with HCV were connected to treatment over a 12-month period [18]. Researchers concluded that a well-organized approach coordinated across government, health services, the penitentiary system and community organizations can lead to treatment initiation among HCV-positive patients, including PWID, in a short period of time [18].

A non-profit research center, The Trimbos Institute (the Netherlands Institute of Mental Health and Addiction), has sought to structurally improve HCV detection and linkage to care through a multidisciplinary team approach. The coordinated model, known as “hepatitis teams”, includes gastroenterology specialists from a local hepatitis treatment center and nurses, medical doctors and managers from local addiction care centers, creating a seamless HCV referral pathway and linkage to care for HCV-positive individuals. [11].

- d. *Retrieval efforts of diagnosed patients who have been lost to follow-up are an important part of HCV micro-elimination.*

The REACH Project in the Netherlands aimed to trace and treat all HCV patients lost to follow-up in the Utrecht region. It piloted a retrieval strategy to find and contact individuals who were previously diagnosed with HCV over the past 10-15 years but then lost to follow-up, remaining untreated. Through the pilot, individuals who had been lost to follow-up received targeted outreach, and when contacted were invited to an outpatient clinic for treatment. Of all lost-to-follow-up patients identified in the study, 28.3% were traced as a result of the tracing and outreach efforts, and of these, 59% either scheduled or initiated DAA therapy [24]. Researchers conclude that screening of past laboratory diagnostics can be effective in tracing and retrieving lost-to-follow-up HCV patients, which is necessary to completely eliminate chronic HCV infection [24].

- e. *Treatment through telehealth and other non-traditional, innovative approaches can expand capacity for HCV treatment.*

Telemedicine can expand access to HCV treatment and care for geographically harder to reach populations, such as people who are incarcerated [25] and HCV-infected individuals in rural areas [13]. Through a telehealth program known as ECHO (Extension for Community Healthcare Outcomes), the Cherokee Nation Health Services (CNHS) increased the capacity for primary care providers to care for HCV-infected patients living in the rural northeast region of Oklahoma. Altogether, the telehealth program expanded access to HCV care services from one clinic with one health care provider with expertise in HCV to five clinics staffed by seven HCV-trained health care providers which include physicians, nurse practitioners, and pharmacists [13]. In addition to ECHO, capacity for HCV treatment was expanded through the work of public health nurses who conducted home visits to HCV-infected patients, making it easier for patients to get the care they need [13].

Appendix II: Interview and Discussion Group Participants

The following individuals and groups participated in the planning process through interviews and/or input discussions:

Stakeholder Group Input Discussions

End Hep C SF Executive Advisory Committee

End Hep C SF Treatment Access Workgroup

End Hep C SF Coordinating Committee

San Francisco EMA HIV Community Planning Council

Getting to Zero SF Steering Committee

Additional Stakeholder Interviews

Alison Hughes, Epidemiologist, HIV Epidemiology and Surveillance, Applied Research, Community Health Epidemiology and Surveillance Branch (ARCHES), Population Health Division, San Francisco Department of Public Health

Amy Nishimura, Epidemiologist, Viral Hepatitis Surveillance, Applied Research, Community Health Epidemiology, and Surveillance (ARCHES), Population Health Division, San Francisco Department of Public Health

Andrew J. Desruisseau, Medical Director & Infectious Diseases Physician, Tenderloin Health Services, a Program of Healthright360

Annie Luetkemeyer, MD, Division of HIV, Infectious Diseases and Global Medicine, Zuckerberg San Francisco General Hospital, University of California, San Francisco

Brad Hare, Infectious Disease Specialist, Kaiser Permanente San Francisco

David Leiva, Prevention Services Coordinator, HIV & Integrated Services, a program of Jail Health Services, SF Department of Public Health

Katie Burk, Viral Hepatitis Coordinator, Community Health Equity & Promotion Branch, Population Health Division, San Francisco Department of Public Health

Melissa Sanchez, Director, Viral Hepatitis Surveillance, Applied Research, Community Health Epidemiology and Surveillance Branch (ARCHES), Population Health Division, San Francisco Department of Public Health

Susan Scheer, Director, HIV Epidemiology and Surveillance, Applied Research, Community Health Epidemiology and Surveillance Branch (ARCHES), Population Health Division, San Francisco Department of Public Health

Val Robb, HCV Academic Detailing Consultant

Wayne Enanoria, Director, Applied Research, Community Health Epidemiology, & Surveillance (ARCHES) and Associate Chief Health Informatics Officer for Population Health Division, San Francisco Department of Public Health

Appendix III: Recommended Resource Requirements

As a preliminary estimate of staffing and cost projections for the project, the following personnel and direct costs would be required to implement the plan as recommended. This estimate assumes additional allocation of in-kind personnel and non-personnel resources in addition to these dedicated costs.

	FTE	Annual Salary (1 FTE)	Indirect (38%)	2019 (6 mos)	2020 (Y1)	2021 (Y2)	2022 (Y3)	Notes/Description
Personnel: Dedicated Project Staff								
Health Program Coordinator II (2591)	1.0	92,911	35,306	64,109	128,217	128,217	128,217	Micro-Elimination Program Coordinator: Central project management position, collaborates with HIV unit/staff, support EHCSF lead on overall project coordination, partnership management, reporting, etc, executes or delegates program activities.
Administrative Program Support	0.5	62,894	23,900	43,397	86,794	86,794	86,794	Program administration and support, especially communications, coordination, contracting for community and city partners around HCV/HIV micro-elimination project.
Epidemiologist I (2802), HCV/HIV Micro-Elimination	1.0	82,693	31,423	57,058	114,116	114,116	114,116	Data manager for micro-elimination: conduct and coordinate registry matching, data analysis, report development and production for initiative data tools, manage data interchanges with providers, facilities, and partners (CBOs, internal DPH partnering units).
Health Worker II (2506)	0.5	62,894	23,900	43,397	86,794	86,794	86,794	Ongoing data entry and reconciliation for HCV registry data related to micro-elimination project, assistance in preparation/execution in regular registry matches.
TOTAL PERSONNEL	3.0			207,960	415,921	415,921	415,921	
Note: Personnel budget assumes salaries at midpoint for positions as listed in San Francisco City & County Compensation Manual, Fiscal Year 2018-19								
Direct Costs								
One-time data entry/quality remediation				10,000	5,000			Contractor support to address backlog of HCV registry test reporting data entry/import electronic reports into registry
Private/Nonprofit Provider Needs Assessment					60,000	40,000		Contract support to assist project staff in conducting initial needs assessment with prioritized providers for practice improvement/micro-elimination supports and development of programs in response to needs assessment results.
Private/Nonprofit Provider Capacity Building					30,000	120,000	120,000	Y1: Academic detailing projects. Y2-3: Direct contracting to capacity-builders (trainers or technical assistance) and/or modest awards to support practice improvements associated with initiative. Assumes average of 6 (5-7) partner organizations receiving targeted support at 20k per partner annually.
Lab results reporting technical requirements development					50,000	80,000	30,000	Technical support to DPH IT team for development of reporting/data transfer processes for negative results reporting.
TOTAL DIRECT COSTS				10,000	145,000	240,000	150,000	
TOTAL				217,960	560,921	655,921	565,921	

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