

Patient and provider-level barriers to hepatitis C screening and linkage to care: A mixed-methods evaluation

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Abstract

Achieving practice change can be challenging when guidelines shift from a selective risk-based strategy to a broader population health strategy, as occurred for hepatitis C (HCV) screening (2012-2013). We aimed to evaluate patient and provider barriers that contributed to suboptimal HCV screening and linkage-to-care rates after implementation of an intervention to improve HCV screening and linkage-to-care processes in a large, public integrated healthcare system following the guidelines change. As part of a mixed-methods study, we collected data through patient surveys (n = 159), focus groups (n = 9) and structured observation of providers and staff (n = 9). We used these findings to then inform domains for the second phase, which consisted of semi-structured interviews with patients across the screening-treatment continuum (n = 24) and providers and staff at primary care and hepatology clinics (n = 21). We transcribed and thematically analysed interviews using an integrated inductive and deductive framework. We identified lack of clarity about treatment cost, treatment complications and likelihood of cure as ongoing patient-level barriers to screening and linkage to care. Provider-level barriers included scepticism about establishing HCV screening as a quality metric given competing clinical priorities, particularly for patients with multiple comorbidities. However, most felt positively about adding HCV as a quality metric to enhance HCV screening and linkage to care. Provider engagement yielded suggestions for process improvements that resulted in

Abbreviations: BPA, best practice alert; CDC, Centers for Disease Control; DAA, direct-acting antivirals; EHR, electronic health record; HCV, hepatitis C virus; PCP, primary care provider; PCR, HCV polymerase chain reaction; USPSTF, United States Preventive Services Task Force.

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increased stakeholder buy-in and real-time enhancements to the HCV screening process intervention. Systematic data collection at baseline and during practice change implementation may facilitate adoption and adaptation to improve HCV screening guideline implementation. Findings identified several key opportunities and lessons to enhance the impact of practice change interventions to improve HCV screening and treatment delivery.

KEYWORDS

electronic health records, population health, programme evaluation, qualitative research, quality improvement

1 | BACKGROUND

Changes in recommendations for guideline-based care are common in the current era of rapidly changing scientific discovery. However, achieving practice change in response to shifting guidelines can be arduous, particularly in large, integrated healthcare systems.¹ In 2013, the US Preventive Services Task Force recommended one-time screening for hepatitis C (HCV) infection for all adults born between 1945 and 1965, thereby simplifying screening from a risk-based approach to a population-based strategy in this age group.² This recommendation coincided with the advent of direct-acting antiviral (DAA) treatment that substantially increased treatment eligibility, tolerability and effectiveness. Although a shift from risk-based to population-based screening may seem straightforward, it can be difficult to achieve because it requires providers to move from a paradigm of screening and treating a few patients to screening and treating many.

In response to the change in guidelines, Parkland Health and Hospital System (Parkland), Dallas County's safety-net health system, developed a multi-level HCV screening process intervention to promote HCV screening and linkage to care (hereafter referred to as 'the HCV intervention'). The HCV intervention comprised three parts. First, system-level changes included creation of an HCV registry within the Epic electronic health record (EHR) with a best practice alert (BPA) highlighting the need for HCV screening among patients born between 1945 and 1965 who are HCV screen-naïve, a streamlined referral process, and expansion of the HCV Treatment Clinic that increased capacity fivefold. Second, hepatology and infectious disease specialists performed provider-level education through in-clinic forums for primary care providers (PCPs) and staff. Finally, we conducted patient-level telephone outreach and navigation for linkage-to-treatment evaluation.³ The intervention was developed following stakeholder engagement with the Medical Directors of the adult ambulatory care, primary care and hepatology clinics, in consultation with the Parkland Chief Executive Officer and Chief Medical Officer.

The purpose of this paper was to describe a mixed-method, multi-modal *evaluation* of the evidence-based HCV intervention. We have previously reported both screening and linkage-to-care significantly

increased after the HCV intervention was implemented; however, over two-thirds of patients still failed to undergo HCV screening and one-third with confirmed HCV infection were not linked to treatment evaluation, suggesting continued barriers to guideline implementation in clinical practice.³ Herein, we sought patient and provider experiences to identify ongoing barriers to adoption and implementation processes at the system-, provider- and patient-level across the HCV screening and treatment evaluation continuum.

2 | METHODS

As previously described, we implemented a multi-modal HCV intervention at Parkland, Dallas County's safety-net integrated health system including 12 community-based primary care clinics, outpatient hepatology clinics and a tertiary hospital – all sharing a single EHR system.³ Concurrent to this intervention, we conducted an evaluation in two phases of data collection: First, we conducted patient surveys, focus groups with clinic providers and staff, and structured observations of clinic flow and processes (Phase 1). Subsequently, we conducted semi-structured interviews with patients and providers to examine domains and trends of interest identified from initial phase data (Phase 2). All participants provided informed consent prior to study enrolment.

2.1 | Phase 1 data collection: Patient surveys, provider and staff focus groups, and structured observation

2.1.1 | Patient surveys

Our survey assessed (a) attitudes towards HCV and people with HCV, (b) knowledge about HCV and (c) sociodemographic information. Questions were selected because negative attitudes (eg fear or stigma) and lack of knowledge could contribute to reluctance to complete screening, diagnostic testing or treatment evaluation. The first section drew on social discrimination constructs and phrasing from HIV stigma instruments, selecting 10 items to assess HCV-related attitudes and

feelings.^{4,5} Although stigma and social discrimination should theoretically decrease with the shift to cohort-based screening, we included these constructs because prior research has indicated stigmatizing beliefs are often resistant to change.^{6,7} In the second section, eight questions assessed knowledge about HCV infection, transmission, treatment, perceived reasons for testing and sources of information. Thirdly, our survey queried patient age, sex, race and ethnicity, language and insurance status. Our intention in surveying patients was to determine if patient knowledge (about HCV and HCV-related screening and treatment) and stigma would contribute to continued screening process failures after implementation of the HCV intervention. We believed these constructs could contribute to reluctance to complete screening/diagnostic testing as well as impacting patient engagement in treatment evaluation. Such findings would inform future intervention design components to improve patient knowledge and/or reduce other persistent barriers to HCV screening.

We pre-tested survey items, using established cognitive interview techniques with three English-speaking and three Spanish-speaking participants, at which point saturation was achieved (individuals excluded from findings reported below).^{8,9} The final survey instrument required approximately 10 minutes to complete.

Surveys were administered to patients sampled from three different points along the screening-to-treatment continuum (Figure 1): (a) patients with positive HCV antibody who had not completed viral load testing ('antibody reactive'); (b) patients with positive HCV viral load who had not completed treatment evaluation ('HCV confirmed'); and (c) patients who completed treatment evaluation at the Hepatology Clinic ('clinic patients'). Exclusion criteria included patient refusal, uncontrolled hepatic encephalopathy or other medical conditions precluding survey completion, no phone number on file and primary language other than English or Spanish. Antibody-reactive and HCV-confirmed patients were identified from the EHR-based patient registry developed as part of the HCV intervention and recruited by telephone; clinic patients were also identified through the registry but recruited from the Parkland Hepatology Clinic waiting room. Research staff administered surveys by telephone for antibody-reactive and HCV-confirmed patients; clinic patients were

offered the choice to complete the survey themselves or with the assistance of research staff. We aimed to conduct a sample of at least 50 surveys in each of the three groups, sufficient to inform domains for the second phase of our evaluation.

2.1.2 | Provider and staff focus groups and observation

We conducted focus groups at 9 of 12 Parkland primary care clinics. We invited providers and clinical staff to participate in a 30-minute open discussion to assess knowledge, attitudes and concerns towards HCV screening and linkage to care and interventions to promote either step in the continuum. Participants at each clinic varied from 8 to 27, depending on clinic staffing volume and volunteer interest. We did not sample from the remaining three clinics due to thematic saturation. We then observed a convenience sample of providers and staff during nonpatient-contact activities to identify potential gaps in the targets of our evaluation, for example communication or documentation not captured in the EHR. We recruited a purposeful sample of key process stakeholders for interviews during the observation process, including primary care nurse managers, primary care providers and HCV Clinic providers and staff.

2.2 | Phase 2 data collection: Semi-structured interviews

We developed an interview guide to explore themes identified from Phase 1, notably barriers to HCV screening process completion, strategies to enhance screening initiation, follow-up testing and linkage to care, and stigma. We interviewed three sets of individuals 15-18 months after implementation: (a) patients undergoing HCV screening and treatment evaluation, (b) PCPs and staff involved in HCV screening and (c) specialty providers and staff at the HCV Clinic. All interviews lasted 30-45 minutes and explored the following domains: experiences with HCV screening and referral to

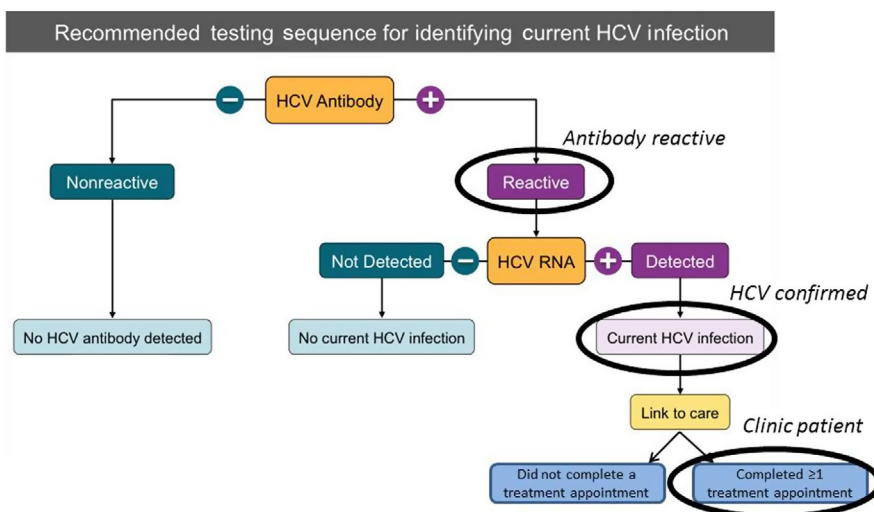


FIGURE 1 Survey and Interview Participant Sampling. Adapted from Infectious Diseases Education & Assessment, 2018.²¹

treatment evaluation processes pre- and post-intervention; communication among providers, staff and patients; knowledge of HCV and treatment; insurance coverage and out-of-pocket costs associated with treatment; and HCV-related stigma.

2.2.1 | Patient interviews

As above, we used the EHR patient registry to identify patients scheduled for appointments across the screening-treatment continuum, as well as opportunistic recruitment in the Hepatology Clinic waiting room. We recruited patients until we reached our target enrolment for the three points of the screening-to-treatment continuum (Figure 1).

2.2.2 | Primary care providers and staff interviews

We interviewed PCPs with the highest and lowest HCV screening rates, defined by the proportion of eligible 'baby boomer' patients for whom HCV screening orders were placed in the prior 6-9 months. We also interviewed two nurse manager staff members, selected by years of experience with clinic processes, at the recommendation of the Director of Nursing.

2.2.3 | Hepatitis C clinic provider and staff interviews

In HCV treatment clinics, we interviewed specialty providers and the clinic nurse navigator to assess perspectives on potential barriers to care.

2.3 | Analysis

For surveys conducted in Phase 1, we used chi-square tests to compare levels of knowledge and stigma across the three cohorts of patients, using STATA 14 (StataCorp). Focus groups and semi-structured interviews were transcribed and analysed using NVivo 9.0 (QSR). Two researchers trained in qualitative methods (RH, LQ) developed an initial, deductive codebook corresponding to the semi-structured interview guide domains. Researchers jointly coded the first six transcripts ('test set', 13%), sampling from patient and provider transcripts at baseline and post-implementation, to refine codebook definitions and add emergent codes. Researchers double-coded the next 18 transcripts (40%) using the refined codebook, meeting weekly to resolve discrepancies. The lead analyst (RH) single-coded 14 additional transcripts (31%) until reaching thematic saturation at 38 of 45 transcripts (84%). The lead analyst then reviewed resulting thematic node reports and selected representative quotes and findings for discussion with the team.

3 | RESULTS

3.1 | Phase 1: Patient survey findings

We completed 159 surveys (52 antibody-reactive, 51 HCV-confirmed and 56 clinic patients) and 24 interviews (7 antibody-reactive, 8 HCV-confirmed and 9 clinic patients), with a diverse sample of patients (67% female; 58% Non-Hispanic Black, 29% Hispanic; and 17% Spanish-speaking).

We found a significant difference in HCV-related knowledge across patient groups, increasing from antibody reactive to HCV confirmed to patients who had completed treatment evaluation at the Hepatology Clinic (see Table 1). For example, clinic patients were significantly more likely than HCV-confirmed and Ab-reactive patients to know that HCV can be present in the absence of symptoms (91.1% vs 87.3% vs 59.6%; $P < .001$) or IV drug use history (83.9% vs 80.0% vs 59.6%; $P = .016$), can be fatal if untreated (83.9% vs 80.0% vs 51.9%; $P < .001$) and can now be safely treated (69.6% vs 60.0% vs 38.5%; $P = .004$). However, the majority of patients in all three groups recognized that HCV could be cured in most patients (78.6% vs 74.5% vs 61.5%, $P = .33$). Less than one-third of patients in each group reported HCV-related stigma, including stigmatizing beliefs towards people with HCV or any direct experience of perceived stigma. The highest stigma-related responses included feeling that others talked negatively about HCV-infected patients, others not respecting HCV-infected patients and self-blame for acquiring HCV infection. Social isolation due to HCV infection was more common in antibody-reactive patients than the other two groups ($P < .001$), being reported in over 30% of these patients compared with <10% for the other two groups (Table 1).

3.2 | Phase 2: Semi-structured interview findings

3.2.1 | Patient and provider characteristics

We conducted 9 focus groups among 66 providers (physicians, nurse practitioners and physician assistants) and 73 staff (nurses and social workers) from nine primary care clinics. We then observed nine providers and staff and interviewed 21 providers and staff from the same primary care clinics and the HCV treatment clinic (Figure 2).

3.2.2 | Provider interviews

Providers expressed some scepticism about the HCV intervention prior to its implementation, in light of similar institutional quality improvement efforts. However, at the time of our phase 2 evaluation, all thought the HCV intervention had a positive impact on the health system's ability to screen a higher volume of patients and connect them to HCV treatment.

TABLE 1 Survey responses to stigma and knowledge items for patients in three cohorts

	Antibody reactive n = 52 (telephone)	HCV confirmed n = 55 (telephone)	Clinic patients n = 56 (in person)	P-value
Knowledge				
Hepatitis C is a medical condition that can kill you if left untreated				<.001
Yes	27 (51.9)	44 (80.0)	47 (83.9)	
No	1 (1.9)	2 (3.6)	1 (1.8)	
I don't know	24 (46.2)	9 (16.4)	8 (14.3)	
People can have Hepatitis C without any signs or symptoms for years				<.001
Yes	31 (59.6)	48 (87.3)	51 (91.1)	
No	1 (1.9)	1 (1.8)	0 (0.0)	
I don't know	20 (38.5)	6 (10.9)	5 (8.9)	
People can have Hepatitis C even if they never used IV drugs (drugs that are used with needles)				.016
Yes	31 (59.6)	44 (80.0)	47 (83.9)	
No	3 (5.8)	4 (7.3)	3 (5.4)	
I don't know	18 (34.6)	7 (12.7)	6 (10.7)	
Treatment for Hepatitis C is safe and easy to tolerate				.004
Yes	20 (38.5)	33 (60.0)	39 (69.6)	
No	6 (11.5)	4 (7.3)	8 (14.3)	
I don't know	26 (50.0)	18 (32.7)	9 (16.1)	
Hepatitis C can be cured in most patients				.33
Yes	32 (61.5)	41 (74.5)	44 (78.6)	
No	2 (3.8)	1 (1.8)	1 (1.8)	
I don't know	18 (34.6)	13 (23.6)	11 (19.6)	
Stigma				
Were you afraid of being tested for Hepatitis C because of how other people might respond if you tested positive?				
Yes	^a 3 (5.8)	9 (16.4)	11 (19.6)	.099
Have you ever been afraid that people would insult you because you have Hepatitis C?				
Yes	^a 16 (30.8)	10 (18.2)	11 (19.6)	.238
Have you ever been afraid that people would threaten you because you have Hepatitis C?				
Yes	^a 6 (11.5)	5 (9.1)	2 (3.6)	.28
Do you feel that other people talk badly about people with Hepatitis C?				
Yes	12 (23.1)	21 (38.2)	21 (37.5)	.174
Do you feel that other people don't respect people with Hepatitis C?				
Yes	16 (30.8)	17 (30.9)	16 (28.6)	.956
Have you ever been left out of social activities because you have Hepatitis C?				
Yes	^a 16 (30.8)	4 (7.3)	3 (5.4)	<.001
Do you feel that having Hepatitis C is something to be ashamed of?				
Yes	5 (9.6)	9 (16.4)	6 (10.7)	.516
Do you think other people should avoid you because you have Hepatitis C?				
Yes	^a 10 (19.2)	3 (5.5)	5 (8.9)	.062
Have you ever blamed yourself for having Hepatitis C?				
Yes	^a 16 (30.8)	18 (32.7)	20 (35.7)	.859
Do you feel you should be punished for having Hepatitis C?				
Yes	^a 0 (0.0)	1 (1.8)	2 (3.6)	.774

^aPhrased in the hypothetical for antibody-reactive patients, for example 'Would you feel....if you had hepatitis C?'

Bold entries are significant at $p < .05$.

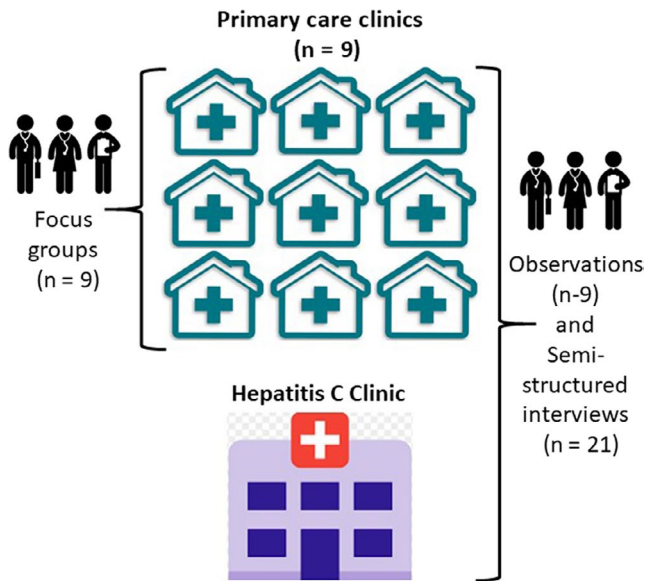


FIGURE 2 Phase 2 data collection

I think it's just as important as all the other types [of screenings]. If we can prevent cirrhosis, liver cancer – those are big things. So I think it would definitely be appropriate for it to be a quality metric...That's the same thing as screening mammograms for breast cancer, or screening for color cancer. –

Primary Care Provider

Although nearly all providers felt positively about the BPA, they identified reasons for continued HCV screening underuse: competing priorities in clinic and desire to group laboratory orders for patient convenience.

It's a great reminder, but sometimes [patients] come with so many complaints and they have so many things to address, sometimes we may overlook [it]. –

Primary Care Provider

Providers offered suggestions for improvements including change the BPA to appear in multiple EHR views (eg the health maintenance page); continue to flag the patient until the screening process including confirmatory viral load was completed; and make the BPA message more concise (removing information about the USPSTF and CDC's birth cohort recommendation). Most providers responded positively about the potential for establishing HCV screening rates as a quality metric comparable to existing metrics for cervical and colorectal cancer screening; however, others stated that, although the metric was positive in theory, they were overwhelmed by the number of existing metrics in the context of other competing clinical priorities, especially in patients with multiple comorbidities.

Providers responded overwhelmingly positively about the expansion in hepatology clinic capacity, resulting in fewer referral pre-requisite tests, such as HCV genotype, ultrasound, etc and shorter patient wait times for HCV treatment evaluation.

In the past year, things are smooth, people are getting into hepatitis C clinic. I think it's pretty easy, we don't have to wait for all these tests. When the results [to viral load screening test] are positive, we just refer patients, and patients are usually seen, so that's an improvement. –

Primary Care Provider

Provider education and training by hepatology and infectious disease specialists at mandatory institution-wide forums and voluntary in-clinic sessions was well-received. However, some providers still exhibited limited or imprecise HCV-related knowledge following these sessions including continued emphasis on screening high-risk populations over those in the 1945-65 birth cohort, being unaware that current HCV treatments are > 90% effective and being unaware that patient assistance programmes can make treatment available with low or no out-of-pocket cost to underinsured patients.

It doesn't happen often but I do see patients that just have positive antibodies with no viral loads being referred to us. So that's still some education that needs to be done with the PCPs. –

Hepatology Clinic Provider

3.2.3 | Patient interviews

Patient interviews confirmed patterns observed in our survey data with HCV-related knowledge increasing and HCV-related stigma decreasing as patients progressed along the HCV screening continuum from antibody screening-to-treatment evaluation.

People don't know... and they act different when they know that you're sick...somebody might find out and might not want me to touch them or hold their hands. –

HCV-Confirmed Patient

I didn't pass around no needles... so I didn't really feel bad [about having HCV]. I just wanted to get rid of it. I wanted it out of my blood. –

Clinic Patient

Patients reported other barriers to screening and linkage to care including lack of clarity regarding out-of-pocket costs, availability of DAA treatments to underinsured patients and the high likelihood of HCV cure even in difficult-to-treat patient populations.

I know a guy that has it...he was told that pills cost about \$80,000 or something like that. For that reason he won't try to do anything about it. –

Antibody-Reactive Patient

If they knew you could get cured, they would get tested... because otherwise, what's the use? But it's like, first, to know if anything could be done about it, you have to be tested. -

Clinic Patient

Additional exemplar quotes are presented in Table 2.

4 | DISCUSSION

Our evaluation provides insight into guideline implementation in large healthcare systems, even as guidelines ostensibly simplify recommendations and processes of care. Despite engagement with institutional leadership that resulted in fivefold increases in screening and treatment capacity,³ clinic providers and patients identified continued barriers to HCV screening and linkage to care in clinical practice. For example, provider interviews revealed ongoing need for education to inform providers about coverage for HCV treatment cost during conversations with patients about HCV screening. Patient survey data demonstrated knowledge increases as patients progressed through the screening continuum and suboptimal knowledge may play a larger role in HCV screening than linkage to care and treatment uptake. However, interview data suggested a continued need to address persistent misconceptions about HCV treatment cost and efficacy in all patient groups.

Additionally, while our survey data did not indicate statistically significant differences across patient cohorts, our patient interview data suggest that stigma may still play a role in deterring individuals from being screened or treated. Thus, while shifting HCV screening from risk-based profiling to a population health approach based on birth cohort may decrease disease-associated stigma, some interviewed patients still associated HCV with risk-taking groups, such as intravenous drug users. If future screening guidelines recommend extending HCV screening to all adults, not just 'baby boomers', it is possible that the influence of HCV-related stigma may diminish over time. Alternatively, it is possible stigma may increase in the future with increasing attention being paid to the opioid epidemic and associated increase in acute HCV infections.

Our evaluation builds on prior studies examining HCV screening and linkage-to-care interventions. Like other highly successful interventions, our intervention effectively integrated screening into routine primary care practice¹⁰ and utilized a multi-component programmatic approach that included clinician and staff education, EHR algorithms for eligibility and order entry to serve a hard-to-reach safety-net population.¹¹ Prior literature suggests that more modest designs that emphasize EHR-based tools can also achieve remarkable increases in screening and linkage to care.¹²⁻ However, additional evidence-based interventions such as reflex RNA testing among patients with positive antibody results, patient navigation¹⁵ and case management¹⁶ may further enhance HCV screening and linkage to care.

Our empirical findings reinforce a recently published roundtable outlining directions for future HCV intervention enhancements.¹⁷ For example, patients need greater assurance that currently available treatments have dramatically increased the likelihood of being cured. Additional support for emotional and social challenges need to be provided such as assisting low-income older adults with more comorbidities and/or barriers in access to care.¹⁶ Similarly, continued knowledge gaps among patients, particularly those earlier in the screening process, highlight an opportunity for better patient education when interfacing with primary care providers. It is possible that lowering barriers to HCV clinic referral may have had the unintended consequence of lowering primary care provider education of patients, instead deferring this responsibility to HCV clinic providers. Thus, our findings offer insights to inform improved performance from diagnosis to cure.

Recent changes in hepatitis C screening and therapy have created a paradigm shift in healthcare delivery. Instead of focusing on limitations of biomedical barriers, such as treatment eligibility, efforts to enhance care have shifted towards service delivery barriers, including underuse of screening to identify infected individuals. This shift requires health systems to optimize screening-to-treatment workflows, which can be particularly challenging for resource-limited systems that serve high-prevalence, but complex, difficult-to-reach patient populations. Limited clinician time for preventive care amid more urgent competing clinical demands requires additional strategies to facilitate systematic screening. For example, outreach invitations have been used in colon cancer and hepatocellular cancer screening but have yet to be evaluated for HCV screening and linkage to care.^{18,19} Based on our evaluation findings, we are adopting the following new strategies to enhance effectiveness of the original intervention: (a) use of mailed outreach strategies to identify and better educate at-risk patients who have not undergone HCV screening and refer them for screening; (b) posting flyers and other print materials emphasizing availability of low- or no-cost HCV treatment options, including tolerability and high likelihood of cure; and (c) enlisting nurses in primary care clinics to pend orders during intake for patients with incomplete HCV screening results (eg antibody-reactive result with no confirmatory HCV test). We have initiated additional studies to evaluate effectiveness of these strategies.

Our results must be considered within the context of the limitations of our study design. We evaluated an HCV intervention in a single integrated system; however, our multi-modal approach is likely to be relevant to other care settings undertaking screening and treatment evaluation, especially those seeking to care for underserved patient populations. In addition, with respect to our findings, we acknowledge the association between knowledge and screening completion may be driven by reverse causation; in other words, patients who attended Hepatology Clinic likely received additional education at that time. Our recruitment of physician and staff subjects relied on volunteer participation for interviews, and thus results may be biased by those who may have had stronger feelings about the intervention. Finally, we had a limited number of interview participants, although our sample size is typical for qualitative studies

TABLE 2 Exemplar quotes for specific domains

Best practice alert (BPA)		
Positive response	'I see that, okay, it's popping up saying that you need to order [the HCV screening test], so I just order it when I order the rest of my labs'	PCP
Nonresponse	'If I didn't need any other bloodwork, I usually wouldn't [order the HCV screening] because most people are going to need blood work sooner or later... every six or even three months... so just out of patient convenience I do that to group the labs together'	PCP
Provider attitudes & knowledge		
Yes to quality metric	'I don't see why it would be a negative thing. As long as we have a place to direct them to, [making the HCV screening a quality metric] would be a good thing because otherwise they're gonna be walking around with hepatitis C and without receiving treatment'	PCP
No to quality metric	'I can't speak for all physicians, but I do know that a majority of them already feel burdened with the requirements of what we have to do in terms of under the health maintenance tab and all these metrics. So I don't think they would be happy with having to add another one to it'	PCP
Attitudes towards referrals to treatment	'I remember them saying they have a specialized Hep C Clinic. I noticed it personally too that it seems like it's easier to get patients in there and less prerequisites for getting into the clinic. I've seen it in practice, I think the experience has been quicker and definitely fewer denied referrals'	PCP
	'The liver ultrasound before referring the patients – that was one of the hindrances [earlier on]. But now they are accepting patients just with a positive hepatitis C result. It's making the referral process a little smoother, so we don't get too many denials'	PCP
Provider education	'[The COPC forums] are the best time we get to learn updates on everything. We have wonderful speakers from different specialties come and update us on guidelines and things that are pertaining to everyone. It's really good...I think that would be the best way to reach everybody'	PCP
Stigma		
Infectious nature is stigmatizing	'They heard from other people that it was contagious so that's why they might lean away, you know, hide..."I don't want to get near them or I might catch it."	Clinic patient
	'My nephew – he had hepatitis and cirrhosis of the liver... [My nieces] wouldn't get too close to him or hug him or kiss him or anything, even though he was their brother'	Clinic patient
	'People treat people different when they've got viruses, you know, like HIV/AIDS...people might not want to sit by you or go out to eat with you, they might not even want to be friends with you anymore when they find out about viruses and things they don't understand'	HCV-confirmed patient
Risk behaviour is stigmatizing	'There is a little stigma around it because it's sexually transmitted so people tend to get defensive sometimes...They fear having hepatitis because they think it is something they got because of something they did'	PCP
	'They acting like you is nasty, you is a drug user'	Ab-reactive patient
	'It's embarrassing to have it...because of the way I contracted it'. I asked, 'Would it still be embarrassing if you had gotten it because you had a blood transfusion or something?' and he said, 'No, because that [would not have been] my fault'	Clinic patient
Shift focus to cohort-based screening	'I've said something to people because they was born during the years, "Hey man, have you ever had a hepatitis C test?" And I tell them my story. I just happened to see [the recommendation for birth cohort testing] on TV. "Man, you need to ask your doctor to check that out." When I see people I talk to them like that...I told probably about 10, 15 people that's born around my time'	Clinic patient
	'I can't look for who is at fault...all I want is a solution...because there's nothing you can do about it. You're already infected. How can I say, "It was you or her that infected me"? What's the point? I put that behind me and I would rather move forward to find a solution for myself'	HCV-confirmed patient
Shift focus to cure	'When it's something you can't get rid of, they don't have a cure for it...it made me feel like it was AIDS'	Clinic patient
	'The best thing that's going now is the commercials...seeing there is hope. That's the part. The word "hope" need to be swelled into people's minds that you can prolong your life if you choose to'	Ab-reactive patient

(Continues)

TABLE 2 (Continued)

Patient knowledge		
Lack of cure knowledge	'If there was a banner that was flying across the sky, "If you try so-and-so there's a 99 percent chance that you will be cured," a lot of them would try it. It just needs to be a spokesperson that looks like them and saying, "I had it and now I'm ok."'	HCV-confirmed patient
Word of mouth	'I had a patient...she heard about the interferon and how bad it was and she did not want to be treated...Now she says, "OK, you can perform it." So they are changing their mind and they want to be treated!'	PCP
	'I had a patient...she heard about the interferon and how bad it was and she did not want to be treated'. The doctor repeatedly reassured this patient that the new treatments have very few, mild side effects. She went on to describe how, after some time, this patient, like others in similar situations, are convinced into accepting treatment because they witness positive outcomes in other patients who complete the new treatment. 'Now she says, "OK, you can perform it." So they are changing their mind and they want to be treated!'	PCP
	'I came and seen those advertisements, and the guy was sharing about it in the AA group, him being tested and treated and cured. And I guess it just encouraged me to be tested because I heard there's a new [treatment]'	Clinic patient

and the consistency of participants' comments indicated thematic saturation.

In conclusion, we identified important opportunities for quality improvement to enhance the implementation of a multi-level practice change initiative to improve HCV screening and linkage to care. Patients and providers in our evaluation identified several persistent barriers despite our having implemented a multi-component intervention to advance HCV screening and treatment. Clinicians still struggled with addressing screening in the context of competing clinical concerns and highlighted opportunities for further education and/or audit-and-feedback interventions.²⁰ Identifying these barriers informed new strategies to enhance the effectiveness of our HCV intervention in the future. Our study highlights the importance of systematic stakeholder engagement and iterative intervention refinement to optimize adoption and change in clinical practice.

ETHICS STATEMENT

All study procedures have been performed according to the Declaration of Helsinki, and all study procedures have been approved by the UT Southwestern Medical Center Institutional Review Board (STU 072015-022; initial approval Nov 2015, expires 10/19/2020) and Site Approval by Parkland Health and Hospital System's Office of Research Administration.

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CONFLICT OF INTEREST

Dr Singal is a member of the speaker's bureau for Gilead, advisory boards for Gilead and Abbvie, and receives research support from Gilead and Abbvie. Dr Jain receives research funding from Gilead and Merck. All other authors declare no conflicts of interest.

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