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Cross-site evaluation of alcohol screening and brief intervention implementation programs in healthcare systems serving individuals of reproductive age

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Abstract

Background.—With U.S. Centers for Disease Control and Prevention funding, from 2018–2022, four large healthcare systems (n=53 health centers across seven states) serving people of reproductive age trained staff and provided implementation support for alcohol screening and brief intervention (SBI). This cross-site evaluation explores each healthcare system’s implementation approach to implement SBI, reduce excessive alcohol use, and prevent prenatal alcohol exposure (PAE) and fetal alcohol spectrum disorders.

Methods.—The SBIRT (Screening, Brief Intervention, and Referral to Treatment) Program Matrix framed the multi-level strategies to implement alcohol SBI programs from 2018–2022. Qualitative and quantitative data sources examined outcomes, guided by one logic model, through systems-level process data and provider-level performance metrics. Data analyses utilized frequencies and means for quantitative data and themes for qualitative data according to an established framework.

Results.—Successful approaches within systems included using electronic health records, flexible implementation and workflow protocols, customized training and technical assistance programs, quality assurance feedback loops, and stakeholder buy-in. Centralized management structures were efficient in standardizing implementation across health centers. Decentralized management structures used tailored approaches, enhancing provider/staff SBI acceptance. Across systems, 1,259 staff (e.g., clinicians, medical assistants) were trained to provide alcohol SBI

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services and reported pre-post training increases in self-efficacy in performing brief intervention; skills in PAE counseling; and confidence in screening. Fifty-three (48 providing data) health centers implemented alcohol SBI, screening 106,826 patients over the study period with most of the 10,087 patients who screened positive for excessive alcohol use receiving a BI.

Conclusions: Maximizing the use of technology, employing flexibility in program delivery, and institutionalizing processes and protocols improved workflow, efficiency, and program reach. Ongoing partnership and stakeholder communication identify areas for ongoing improvement, engagement, and best practices for sustainability around substance use screening, which are essential with increases in substance use since the pandemic.

Keywords

Cross-site evaluation; alcohol screening and brief intervention; substance use screening and brief intervention; SBIRT Program Matrix; screening; brief intervention and referral to treatment; SBI; SBIRT; FASD; fetal alcohol spectrum disorders

Background

Alcohol use among women continues to increase,¹ and those who may become pregnant are at additional risk for alcohol-exposed pregnancies (AEPs) resulting in miscarriage, stillbirth, and a range of lifelong physical, behavioral, and intellectual disabilities known as fetal alcohol spectrum disorders (FASDs).² It is estimated that up to 1 in 20 U.S. school-aged children might have an FASD.³ Four healthcare systems implemented and systematically evaluated alcohol screening and brief intervention (SBI) in primary and reproductive care settings that provided health services for females and women of reproductive age. Funded by the Centers for Disease Control and Prevention (CDC) with cooperative agreements between the healthcare systems and academic institutions, the four-year implementation projects began in 2018.⁴ While SBI has been established as effective in reducing drinking and associated harm,^{5–8} including the risk of AEP,⁹ alcohol SBI has not been widely implemented and even fewer healthcare settings have evaluated systems-level strategies to support implementation.¹⁰

Despite strategies and guidelines for delivering alcohol SBI, adoption in practice can be challenging. Accordingly, variations in operationalizing alcohol SBI within settings results in numerous implementation and evaluation frameworks.^{11–13} One framework, the Screening, Brief Intervention and Referral to Treatment (SBIRT) Program Matrix was designed to understand how program variations are associated with alcohol SBI-specific implementation success.¹⁰

A previous cross-site evaluation found implementation challenges can be addressed by adequate start-up and planning periods, comprehensive education and training, development of intra-and inter-organizational communication, and emphasis on collaboration for buy-in from practitioners and opinion leaders.¹⁴ Additionally, a recent scoping review on SBIRT program implementation research¹⁵ found that most studies identified efforts to involve stakeholders rather than engage consumers of healthcare in efforts to promote

implementation, and that the strongest implementation efforts were on impacts on screening levels instead of brief intervention rates.

There are limited evaluations on cross-site approaches to screening, brief intervention, and referral to treatment. While keeping resources and activities constant, this rigorous evaluation provides important opportunities for context-specific recommendations for implementation. This is timely given the pandemic-related increases in alcohol consumption and alcohol-related deaths¹⁶ and the need for enhanced screening and prevention efforts.

This paper focuses on gaps in current research and implementation of alcohol SBI during the COVID-19 pandemic, which necessitated significant shifts in SBI training formats (in-person to virtual), program delivery (telehealth), and data collection strategies (virtual assessments and online observations). We describe the cross-site evaluation of alcohol SBI implementation across four healthcare systems within the framework of the SBIRT Program Matrix to guide future considerations for application, particularly in the pandemic context.

Methods

Aim.

This mixed methods cross-site evaluation aimed to describe implementation of alcohol SBI programs in different healthcare settings, the impact of those activities on systems-level and provider-level outcomes, and inform best-practice recommendations.

Sample.

The four academic-healthcare system partnerships provided women's health care through Planned Parenthood regional affiliates (University of Alaska Anchorage Center for Behavioral Health Research Services with Planned Parenthood Great Northwest, Hawai'i, Alaska, Indiana, Kentucky [PPGNHAIK] and University of Connecticut, School of Medicine with Planned Parenthood of Southern New England [PPSNE]) and through large medical systems (Boston University School of Public Health with Boston HealthNet, Boston Medical Center [BMC] and Center for Health and Research Transformation and Henry Ford Health [HFH]).

Cross-Site Evaluation Design.

The CDC Logic Model for Implementing Alcohol Screening and Brief Intervention Programs in Primary Healthcare Settings (Figure 1) guided each healthcare system's implementation efforts while allowing flexibility in approach to accomplish the required outcomes. The logic model specified the overarching performance measures and provided common metrics for assessing outcomes.

The SBIRT Program Matrix provided a template to identify, classify, and organize commonalities and variations in implementation factors within and across programs, as well as specifying systems-level and provider-level outcomes.¹⁰ Long-term patient outcomes were not evaluated. Emphasis was on examining implementation factors across programs to understand factors that fostered success of intermediate outcomes, which serve as proxies

for longer-term goals, including patient outcomes such as reduction in excessive alcohol use and prevention of AEPs and FASDs.

Data Sources and Analysis.

Quantitative and qualitative data sources were used to examine systems- and provider-level outcomes in a way that reduced burden on respondents, aligned with current systems and protocols, and utilized existing data and evaluation infrastructure (Table 1, Online Supplemental Material 1). Because data collection used existing, site-specific evaluation methods, there was variation in outcome data provided across sites. Human subjects review and exemption or approval were obtained from each academic institution and/or healthcare system.

Systems-Level Implementation Data Sources.—Programs obtained site-specific workflow documentation for screening, brief intervention and referral procedures (e.g., when each service is conducted and by whom) using observation data and meeting notes to record SBI implementation processes; training attendance records to quantify number and roles of individuals trained; and de-identified electronic health record (EHR) data to measure documentation of SBI service delivery. Descriptive quantitative analyses were conducted using administrative and EHR data, provider surveys, and administrative reports to describe the population and outcomes.

Programs also provided supplemental data including: secondary data to contextualize findings across sites (n=2); environmental scans to describe SBI protocols prior to implementation (n=2); key informant interviews and focus groups of leadership and staff to contextualize data, describe SBI workflows and processes, and identify supports to promote efforts (n=3); site visits to document program fidelity (n=1); training observations to track process measures, provide quality improvement recommendations, and measure program fidelity (n=1); and, podcast metrics and Continuing Medical Education (CME) data to measure knowledge after listening to a project-developed podcast.

Provider-Level Data.—Provider-level data were collected via anonymous online staff surveys before and after SBI training (PPGNHAIK, PPSNE, BMC). Questions included skills, attitudes, and self-efficacy about SBI activities; training satisfaction; readiness to change practice behavior; facilitators and barriers to integration of SBI protocols and workflows; and FASD knowledge. Each site utilized questions tailored from validated SBIRT-focused surveys and/or developed custom items to correspond to the site activities. For example, PPSNE used questions derived from the Cutting Back SBI Program.¹⁷ A sample of questions for each site and topic area (including statistical findings) can be found in Online Supplemental Material 1. Unmatched survey data reflect participants who completed the pre- and post-training surveys. The Mann-Whitney U test (unmatched ordinal data) or the Wilcoxon Rank Sum test (matched data) were used with alpha set at 0.05.

Surveys for PPSNE and BMC were distributed via Qualtrics or paper surveys (pre-pandemic); PPGNHAIK's surveys were distributed via the health center's online learning management system. Pre- and post-training surveys were administered; unmatched samples measured changes in these factors and reported practice behaviors in participating providers.

At BMC, 262 pre-training surveys were completed representing all 12 participating sites and 49 post-training surveys were completed 3–6 months post-training, representing five participating sites. At PPSNE, 140 pre-training surveys were completed representing all 15 health centers and 56 post-training surveys representing 12 centers were completed approximately 6 months after training. Data from PPGNHAIK comprised 198 pre-training surveys and 139 post-training surveys.

Qualitative data analysis allowed for triangulation of information from stakeholders through focus groups, key informant interviews, document review, and observations. Qualitative data was collected and analyzed by trained evaluators through a variety of strategies across sites including semi-structured interviews and focus groups. Site-specific Institutional Review Board approvals guided data collection with most interviews audio recorded and transcribed; in the absence of recording, detailed notes were taken. Semi-structured interview protocols were guided by implementation science and evaluation frameworks (e.g., the Consolidated Framework for Implementation Research).¹¹ The interview guides included questions related to protocols and workflows, internal and external contextual factors, patient interactions and provider self-efficacy, and barriers and facilitators to practice change. Convenience sampling was used to identify stakeholders who had relevant perspectives. Interview data were analyzed using thematic analysis.¹⁸ Content was coded by topic area and analyzed in Excel or NVIVO. Common themes that emerged across all programs, and site-specific themes uncovered during meetings and discussion, were included in the cross-site evaluation.

Results

Systems-Level Implementation Outcomes.

Using the process-related outcomes identified in the logic model (Figure 1), systems-level implementation outcomes were measured via a variety of data collection strategies (Table 1). Program-based components of the SBIRT Program Matrix included: performance site descriptions, providers and workflow; management structure, program receptivity and leadership involvement; training format and content; use of technology; and program evaluation and dissemination. Pandemic-driven changes, adaptations, or enhancements in service delivery or clinic needs were identified through process evaluations (Table 2).

Risk Factors Addressed and SBI Services.—Although variation across programs in their implementation of alcohol SBI services existed, similarities emerged in targeting risk factors (alcohol and other substances) and services performed. All programs implemented evidence-based alcohol and drug SBI protocols, including prescreens (USAUDIT-C,¹⁹ Single Item Screening Questions for Drug²⁰ and Alcohol²¹ use), full screens (USAUDIT,¹⁹ WHO AUDIT,²² DAST-10,²³ ASSIST-FC²⁴), brief interventions (motivational interviewing style, brief negotiated interview,²⁵ FRAMES²⁶) and EHR-integrated referral procedures to local substance use disorder treatment services.

Performance Programs, Providers, and Workflow.—All programs provided preventive, primary, reproductive and gender-affirming care in diverse, underserved communities but with varying workflows and types of providers involved in care. At

three of the four programs, clinicians conducted brief intervention following patient self-administered screening and electronic scoring or scoring by medical assistants. In one program (HFH), an interactive computer-based SBI program was used, supported by EHR best practice alerts for clinicians interacting with patients with moderate- or high-risk alcohol consumption.

Management Structure, Receptivity, and Leadership Involvement.—Health systems with a centralized management structure (PPGNHAIK, PPSNE, HFH) were associated with a higher level of receptivity to SBI implementation and greater initial leadership involvement. Health centers independently managed within the system (BMC) experienced varying levels of receptivity in community health centers, necessitating further engagement strategies for buy-in.

Training Format and Content.—Training format and content was similar across programs, before and during the pandemic. Pre-pandemic, most programs included in-person presentation-style education incorporating skills-building, practice, role-play, and video demonstrations, with a focus on preventing AEPs and FASDs. During the pandemic, all programs transitioned to live video synchronous training with three programs shifting to web-based asynchronous training. The fourth program provided support and continued technical assistance via virtual consultation. In three programs, training content was formalized and incorporated into health systems' learning management system for sustainability and delivered using technology-based engagement strategies with some variation in systemization of adaptations due to health center disruptions. For example, when a state of emergency was declared, in-person experiences were limited to emergency- or essential-workers only, clinics temporarily shut down or closed, and shifts in protocols and workflows followed. Other disruptions included clinics adapting to technology-based care using telehealth, staff shortages, staff reallocation, and deployment of trained staff to other functions.

Trained Staff.—Across all programs, 1,259 individuals were trained in alcohol SBI service delivery representing: clinicians (physicians, physician assistants, nurse practitioners, certified nurse-midwives, and behavioral health clinicians; n=340); licensed and registered nurses and medical assistants (n=403); administrative and front desk staff (n=191); non-clinical leadership, including health system and/or project staff trainers (n=84); and other types of providers (n=5) (Table 3). These numbers represent unique individuals trained even though a majority attended multiple trainings (e.g., tailored follow-up training). Technical assistance was provided to health centers and providers based on identified need.

Use of Technology.—Two programs incorporated screening assessments in the EHR when electronic check-in was performed. EHRs were modified to accommodate screening scores, facilitate documentation of brief intervention, and provide clinical decision support, including facilitating referrals and billing processes. One program incorporated automated patient education materials. Technology was used to support SBI services, including integration of training videos and materials in two programs' learning management system and, in one program, the development and dissemination of a podcast to educate providers

on FASDs. One program delivered SBI services through the Computerized Intervention Authoring System program, fully integrated with the EHR to capture SBI delivery.

Program Evaluation and Dissemination.—Program evaluation and dissemination efforts included utilizing de-identified EHR data to monitor program performance and provide regular feedback to stakeholders, relying on already established electronic systems, pre-existing collaborations and partnerships, project-specific data dashboards, and routine opportunities for meetings and feedback mechanisms.

Provider-Level Outcomes.

Provider-level implementation outcomes were measured across all programs.

Practice Change Behaviors: Intermediate provider-specific practice changes, serving as proxies for longer-term change,²⁷ were evaluated in three of the four programs (PPGNHAIK, PPSNE, BMC) including: 1) self-reported assessment of skills in providing SBI services; 2) attitudes about the importance of conducting SBI services; 3) self-efficacy/confidence in conducting SBI activities; 4) readiness to change practice behavior; 5) training satisfaction; and, 6) knowledge about alcohol use limits and effects on pregnancy. Results below summarize a larger sample of questions; more details are available in Online Supplemental Material 1.

Skills: Skill assessment across programs (PPSNE, BMC) ranged from questions on perceived *effectiveness* and *preparedness* to self-rated *ability* to conduct behavioral counseling services for risky alcohol or other drug use. Pre- and post-training responses with unmatched samples showed significant increases in staff's skills assessment: increases in *preparedness* to talk to patients about reducing their alcohol consumption; increased self-rated *ability to counsel* patients about the risks of PAE; and, increased self-rated *ability to perform a brief intervention* for risky alcohol use.

Attitudes: Two programs (PPSNE, BMC) assessed changes in attitudes before and after trainings. Changes in attitudes did not differ significantly for some measures, including providers' attitudes about the *importance* of talking to patients about reducing their alcohol use (PPSNE). The *importance* of educating patients about the risks of PAE in routine care significantly decreased among respondents BMC. There was a significant decrease from pre-training to post-training in staff's beliefs that patients will get angry or annoyed if they advise them about their drinking. While attitudes can be immediately impacted by a training leading to behavior change, provider attitudes were generally positive prior to training.

Self-Efficacy: Programs measuring self-efficacy and confidence (PPGNHAIK, PPSNE) exhibited significant increases from pre-training to post-training in staff's confidence to perform SBI activities (Online Supplemental Material 1). These were assessed through questions including *confidence* to ask questions about a patient's risk for alcohol-related problems; *confidence* in providing patients with educational materials to help them reduce their drinking; improvement of their skills to ask female-bodied individuals, including pregnant individuals, about their alcohol use; and, improvement of their skills to educate

individuals of reproductive age, including those who are pregnant, about the effects of alcohol on a developing fetus.

Readiness to Change: One site (BMC) measured readiness to change post-training, finding that 84.8% of providers agreed that communication with their patients about excessive alcohol use will change and 64.8% of providers indicated that they would implement skills in practice (screening patients for alcohol use, performing a brief intervention for excessive alcohol use, counseling patients about the risks of PAE, communicating information on FASDs to patients, and applying the core principles of motivational interviewing). Commonly-reported challenges to change were patient resistance (53.8%), lack of support to staff to help make changes (24.4%), or not a priority given limited time (21.8%).

Training Satisfaction: Satisfaction indicators monitored acceptability and engagement in the trainings and program activities. Two programs (PPGNHAIK, BMC) found that providers agree that the trainings enhanced their skills and knowledge. For example, providers at PPGNHAIK *agreed* that they were satisfied with their experience and agreed the training enhanced their professional expertise. Almost all BMC providers agreed that the training gave them valuable skills (91.7%) or knowledge (90.4%) to use in practice and were satisfied with the training (93.1%).

Knowledge: In this evaluation, baseline knowledge on many indicators was high, as expected in a well-established provider population, but offered room for improvement around general FASD knowledge, the steps to conduct an appropriate brief intervention, and recommended drinking guidelines. For example, pre-training, 42.0% of providers correctly identified the definition of excessive drinking for non-pregnant female-bodied individuals aged 21 and over, increasing to 79.0% post-training (PPGNHAIK). At PPSNE, 76.8% and 92.3% of staff correctly identified excessive alcohol use pre-training and post-training, respectively.

Recognizing that providers operate within a larger system that may impede practice changes, clinic workflows and protocols were assessed to identify facilitators and barriers to providers' training competencies. This included long-term integration of SBI protocols and expansion; billing processes and facilitators; standardization of referral procedures; staff roles, responsibilities, and connection to clinic workflow; EHR experiences, facilitators, and barriers to documentation and data availability; and, adoption and implementation of electronic SBI within the larger system.

To monitor SBI service delivery in the practice settings, including changes over the course of the programs, standardized quarterly data were reported to the CDC, obtained via de-identified EHR data that captured alcohol and other drug screening, brief intervention, and referral rates.

Performance Outcomes.—SBIRT service data were obtained from EHR records and used to measure program performance with 48 health centers reporting data across the four programs (Table 4). Three programs (PPGNHAIK, PPSNE, BMC) provided data for 36 months (July 1, 2019 through June 30, 2022); HFH began 18 months later on January

1, 2021. The target population were individuals aged 18 and older, presenting for an annual, preventive, or reproductive health care visit (308,938 individuals, ranging from 3,079 to 268,651). Populations served and screening information was tracked across years for comparison within each program, not across programs. The proportion of the target population screened for alcohol use ranged from 9.0% (HFH) to 89.5% (PPGNHAIK) across programs with 106,826 patients screened. The proportion of patients who screened positive for excessive alcohol use (n=10,087) ranged from 7.8% (BMC) to 26.7% (HFH). Programs had varying proportions of patients scoring in the high-risk range for alcohol use. All programs tracked BIs that were conducted for *either* alcohol or another substance. Proportions of those who screened positive for *any* substance who received a brief intervention ranged from 13.7% (BMC) to 61.5% (PPGNHAIK). Where possible, programs reported on screening, alcohol-only brief intervention, and referral rates for substances other than alcohol (Table 4).

Patient Characteristics.—Patient characteristic categories for race and ethnicity are reported in the manner in which they were collected from their collaborating health centers/sites. Three programs served predominantly female patients (97%–100%), while one (BMC) served more male patients (52.5%) (Table 5) with mean ages between 29 and 34 years old. HFH served a majority Black/African American (72.0%) population while PPGNHAIK served a majority White (68.6%) population. PPSNE’s patient population was primarily White (46.1%) but with the largest Hispanic population (24.7%) across programs, while BMC’s patient profile was 37.1% Black/African American and 24.6% White. Within the two Planned Parenthood affiliates, approximately 42% of patients received public assistance.

Discussion

Successful implementation of systems-level change, such as alcohol SBI, is essential, especially in the context of an ongoing pandemic. While these changes are not often evaluated at the systems level, there are known barriers, including limited time and competing demands for providers²⁸; lack of necessary systems-level supports; and, clinician beliefs, experiences, and self-efficacy when discussing alcohol use with patients.²⁹ Efforts to systematically address these barriers are relatively new and untested and may be met with skepticism or apprehension if they are perceived as disruptive to existing clinical operations. This program provided the opportunity to evaluate and summarize facilitators and barriers to implementation of SBI efforts across systems. Given the differences in context, complexity of program delivery, variety of data sources, and analysis plans, the SBIRT Program Matrix¹⁰ was used to organize implementation factors of focus of the cross-site evaluation. This framework facilitated aggregation of information, including facilitators and barriers, which impacted systems- and provider-level outcomes.

SBI Services.

The adoption of standardized SBI service protocols and uptake across 53 health centers demonstrates successful implementation and reach. Protocol adaptations across settings, clinics, and in response to external factors improved acceptability, feasibility, and appropriateness of implementation. Comparing SBI outcomes is difficult and must consider

implementation factors that include setting type (hospital, primary care clinic), population density (urban, rural), provider type (medical assistant, clinician) and relative priority (leadership).³⁰ And, although screening rates reported here vary from 9.0% - 89.5%, the programs collectively screened a large number of patients using validating screening instruments and protocols (106,826 patients over 5 years).

The COVID-19 pandemic caused about six months of disruption in the implementation and evaluation of programs. Pivoting to online and virtual formats for training, technical assistance, assessment, and delivery of the brief intervention changed the originally-planned protocols but facilitated continuation of services. Furthermore, leveraging EHR and other technology resulted in more efficient data collection. Measurement and reporting evolved as the process evaluation informed program course corrections and modifications to provider workflows. All programs were successful in adapting their implementation approaches while maintaining adherence to the protocols. The adoption of virtual training formats has shown promise in other related studies as well. For example, in a recent study³¹ of SBIRT training for social workers, those trained online showed increases in SBIRT practice, confidence, and sense of responsibility. Virtual training has clear benefits to health systems; benefits reported here among reproductive health care providers have been similarly demonstrated in other disciplines³² during the pandemic. Virtual training is a critical feature for sustainability of these efforts.

Performance programs.

Existing literature shows that primary care programs are feasible locations for SBI services and somewhat effective at reducing excessive drinking among patients.^{28,33–35} However, previous studies indicate that reproductive and women's health providers are less likely than other clinicians to conduct SBI.^{36,37} The high rates of screening and brief intervention at two reproductive care systems in this project demonstrate the feasibility of SBI when implementation is supported with training and quality improvement feedback.

Patient attributes.

The target population of focus for this project was patients attending primary and reproductive healthcare settings to reduce excessive alcohol use in individuals who could become pregnant. Accordingly, the population was predominantly females of reproductive age; however, programs reflected a racially- and ethnically-diverse mix of patients. Previous research demonstrates effectiveness and efficacy outcomes of SBI are mixed and vary by population, risk levels, and substance type.^{30,38} Further understanding of the ways that patient characteristics may influence implementation, acceptability, and overall program success is warranted.

Management structure and activities.

Consistent with the literature,^{14,28,33–35} readiness for implementation, leadership support, and the ability to use available resources (especially IT and EHR platforms) were common factors that supported the implementation and evaluation of SBI in primary care practices. Having leadership champions at both system- and clinic-levels facilitated uptake of the SBI protocol and collection of evaluation data. While sometimes a strength, the ability to use and

reliance on technology and EHRs come with inherent limitations: a lack of interoperability; inability to collect data as specified within the evaluation metrics; delays due to systems upgrades; relying on IT staff to query and deliver the data; and, competing demands within health systems that may delay changes or data delivery, all of which can impact the ability to evaluate the effectiveness of an intervention because of potential issues with data integrity. Consistent terminology and open lines of communication between project members minimized these impacts.

Developing and maintaining continuous feedback loops between program and evaluation teams is a demonstrated strategy to facilitate successful implementation.³⁵ While there were nuances, each program used regular reflection and data reviews to provide ongoing feedback to clinic staff and stakeholders, including data dashboards showing screening and brief intervention rates by clinic, quarterly reviews of data, monitoring click-through rates on web-based information links, and/or EHR flags or best practice alerts. Consistent with previous research, this regular feedback supported successful implementation, enabling the teams to course-correct and to be as responsive as possible to clinician concerns regarding SBI implementation.

Provider characteristics.

Using evaluation data and learnings around provider knowledge and beliefs can help improve the process of SBI implementation and in particular patterns in uptake and acceptability.³⁹ Knowledge arms providers with relevant information and new research, corrects misperceptions, and enables understanding of the larger landscape of FASDs and their role in discussions with their patients. In all programs, standard SBI training protocols incorporated information about FASD risks and prevention of AEPs. Pre- and post-test surveys assessed baseline and changes in knowledge and perceptions about the need for SBI, demonstrating provider intention to change behavior. Assessing this is important given that improvements in confidence and self-efficacy to perform a behavior combined with skills to execute the behavior can lead to successful behavior change in practice.²⁷

Limitations

There are some limitations in this cross-site evaluation. First, it was not possible to assess the patient perspective and outcomes within the study timeframe. Patient experiences could offer more nuanced explanations for successful engagement, uptake with SBI, and effectiveness. Second, while many evaluation factors were consistent, some programs used different assessment tools, survey questions, and data collection strategies to fit their context and resources. Third, there was limited ability to link the providers trained with the data in the EHR thereby reducing our ability to link training to SBI metrics. Fourth, programs had varying degrees of SBI trainings and activities before the funding. Fifth, there was a reliance on secondary data collected by collaborating organizations and/or the EHR leading to some incomplete data. Finally, follow-up evaluation activities were limited due to resources, lack of response, and competing priorities for provider time.

Conclusion

Evaluation of multi-site, systems-based efforts is complicated, especially when the activities and implementation of those activities differ based on the programs' context, resources, internal organizational structure, and other factors. Having resources and leadership support are key to system-wide change.¹⁴ Despite the hypothesized and proven benefits of alcohol SBI, adoption of these programs within established healthcare settings can be challenging, potentially more so with pandemic-related increases in substance use and shifts in clinic protocols. This cross-site evaluation explored and described barriers and facilitators to SBI implementation efforts and effectiveness on systems-level and provider outcomes. Evaluations of systems-based approaches to support provider behavior in delivering SBI are essential to understanding best practices for delivery and achieving positive outcomes in patients. Such evaluations are even more useful for large-scale adoption and adaptation when a variety of contexts are examined.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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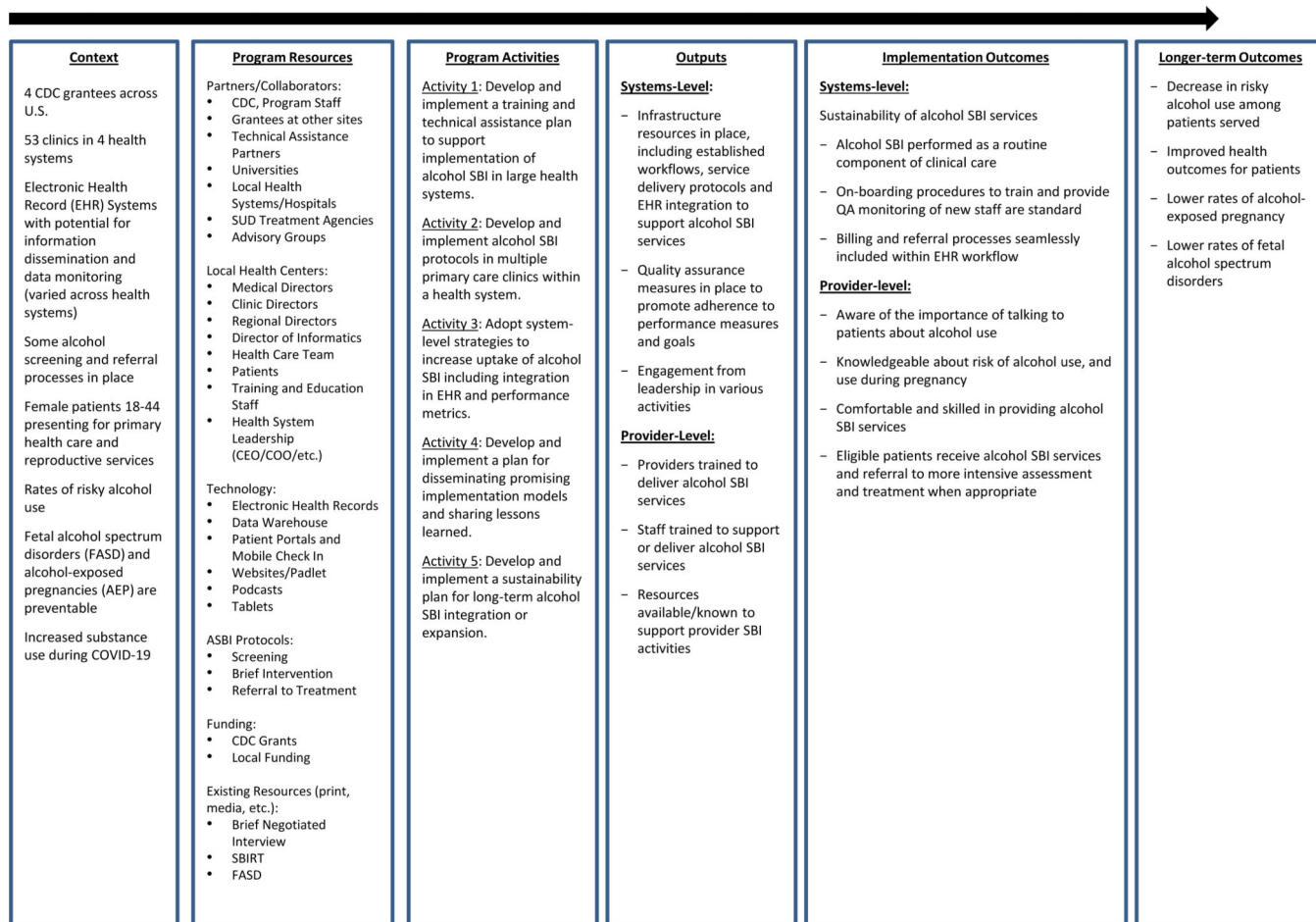


Figure 1. Alcohol Screening and Brief Intervention Programs Cross-site Evaluation Logic Model

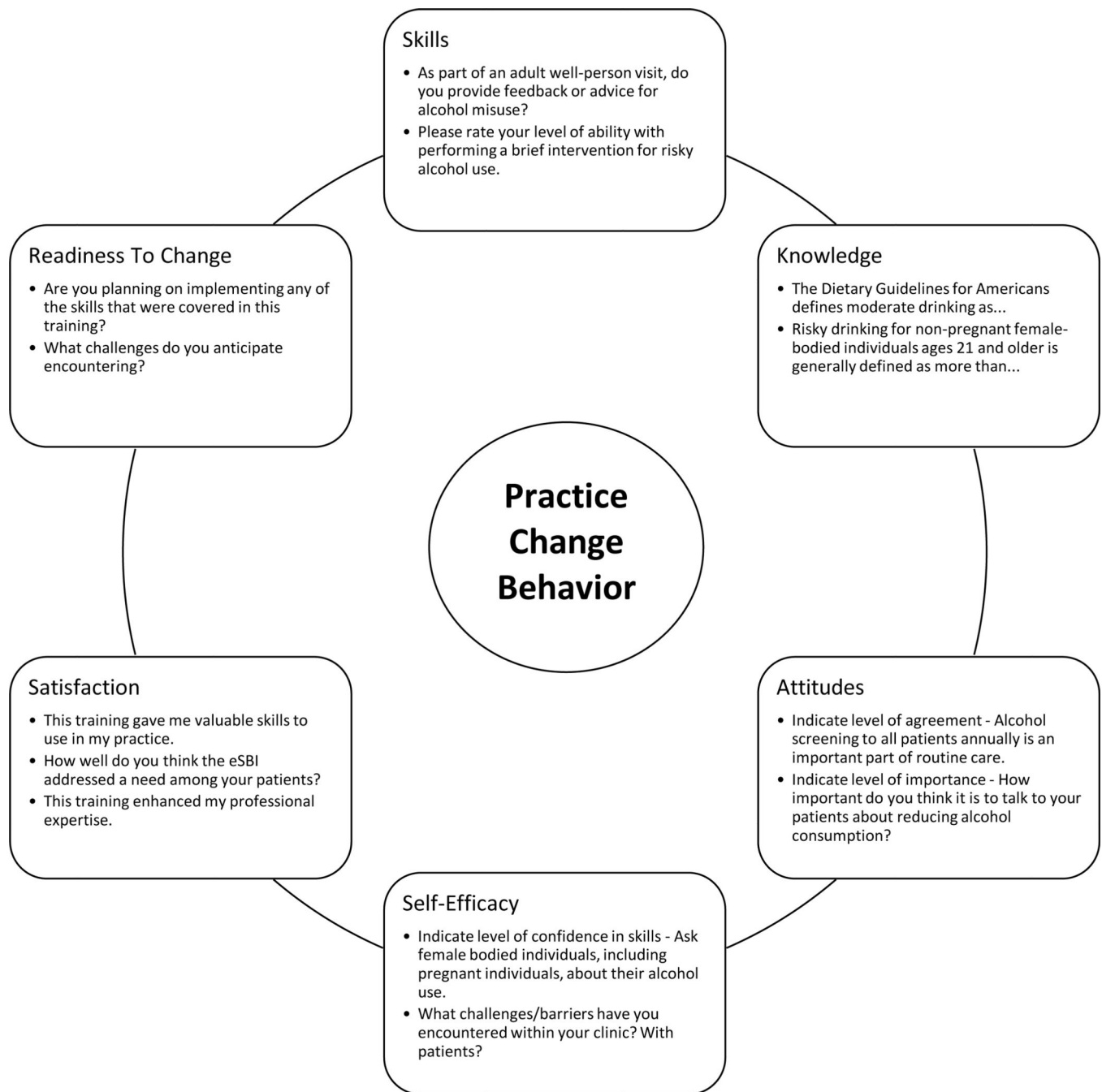


Figure 2. Sample Questions That Assessed Provider Skills, Knowledge, Attitudes, Self-efficacy, Satisfaction, and Readiness to Change, across programs (n=4)

Table 1.

Data Sources by Program

	University of Alaska Anchorage Center for Behavioral Health Research Services (UAA)	University of Connecticut School of Medicine at UConn Health (UConn Health)	Boston University School of Public Health (BUSPH)	Center for Health and Research Transformation (CHRT)
Program Documentation (i.e., meeting notes, informal notes, observations, etc.)	X	X	X	X
Secondary Data Sources (i.e., technical assistance documents, user interface data, etc.)			X	X
Environmental Scan		X	X	
Pre, Post, Follow-Up Surveys	X	X	X	
Key Informant Interviews		X	X	X
Focus Groups/Group Interviews	X	X	X	
Site Visits		X		
Training Rosters/Attendance Records	X	X	X	X
Training Observation Forms			X	
Program Electronic Health Record Tracking Data	X	X	X	X
Podcast Metric Data			X	
Continuing Medical Education Credit Data			X	

Table 2.

Systems-level Implementation Outcomes by Program

Funded Recipient & Clinical Partner	University of Alaska Anchorage Center for Behavioral Health Research Services (UAA) & Planned Parenthood Great Northwest, Hawai'i, Alaska, Indiana, Kentucky (PPGNHAIK)		University of Connecticut School of Medicine at UConn Health (UConn Health) & Planned Parenthood Southern New England (PPSNE)		Boston University School of Public Health (BUSPH) & Boston HealthNet, Boston Medical Center (BMC)		Center for Health and Research Transformation (CHRT) & Henry Ford Health (HFH)	
	Risk Factors Addressed	Alcohol, drug use	Alcohol, drug use	Alcohol, pregnancy, drug use	Alcohol, pregnancy, drug use	Alcohol, pregnancy, drug use	Alcohol, pregnancy, drug use	
SBIRT Services	Pre-screen	USAUDIT-C	USAUDIT-C	SISQ (Drug and Alcohol)	SISQ (Drug and Alcohol)	SISQ (Drug and Alcohol)	NIDA Quick Screen	
	Full screen	USAUDIT DAST-10	USAUDIT ASSIST-FC	USAUDIT	AUDIT (WHO version) DAST-10	AUDIT (WHO version) DAST-10	USAUDIT-C	
	Brief Intervention Approach	Motivational Interviewing, FRAMES	Brochure-driven, Motivational Interviewing, FRAMES		Brief Negotiated Interview, Motivational Interviewing	Brief Negotiated Interview, Motivational Interviewing	e-brief intervention provided to those who screen positive; e-brief intervention messaging tailored by risk profile; Motivational interviewing	
	Referral to Treatment	EHR-integrated referral procedures, vetted referral lists to local SUD treatment agencies	EHR-integrated referral procedures, vetted referral lists to local SUD treatment agencies		EHR-integrated referral procedures, referral to specialists and resources per clinic protocols, warm hand-off to behavioral health	EHR-integrated referral procedures, referral to specialists and resources per clinic protocols, warm hand-off to behavioral health	BPA in EHR during visit; referral to HFH behavioral health as accepted by patient	
Performance Programs	24 health centers providing reproductive and sexual health services in Alaska, Hawai'i, Idaho, and Washington state.	15 health centers providing reproductive, gender-affirming, preventive and primary care services in Connecticut and Rhode Island; 2 Patient-Centered Medical Home (PCMH) certified.	11 health centers; Boston Medical Center (BMC) and 10 Boston HealthNet Community Health Centers (CHC), which include 33 practices in Boston and surrounding communities providing integrated health care.	3 women's health clinic sites in southeastern (Detroit and metropolitan area) and southcentral Michigan.				
Providers and SBIRT Workflow	- Screening questions self-administered during Mobile Check-In (patient's phone or clinic iPad) - If paper format, front desk staff/medical assistant enters screening results into EHR - If indicated, clinician (physician assistant, nurse practitioner, physician) provides BI and documents need for referral in EHR - Provider or referral coordinator links patients to external services as needed	- Screening questions self-administered in waiting room (pencil and paper) - Clinic assistant tallies responses and enters scores into EHR; verbally conveys results to clinician - Clinician (nurse practitioner, physician assistant, certified nurse midwives) conducts BI during clinical visit; documented in EHR via SBI order set which also facilitates billing - Referrals made by clinician or health center manager as needed; documented in EHR	- Screening questions self-administered before provider visit (pencil and paper or electronically) - If paper format, medical assistant tallies responses and enters scores into EHR; verbally conveys results to clinician - Clinician (primary care physicians, nurse practitioners) conducts BI during clinical visit; documented in EHR (BI checkbox, free text notes) - Referrals made by clinician as needed via warm hand-off or clinic protocol; documented in EHR	- Screening questions self-administered via iPad while waiting for wellness visit on the day of appointment or as a 'direct-to-patient' link sent prior to appointment - Results uploaded to EHR; a BPA is issued prompting referral or follow-up - Patients offered educational videos and informational resources about risk and alcohol consumption; motivational interviewing techniques are incorporated into eSBI protocol				
Management Structure, Receptivity, and Leadership Involvement	- Centralized clinical operations support, EHR, training, quality assurance and decision-making - Affiliate leadership receptive to SBI expansion	Centralized clinical operations support, EHR, training, quality assurance and decision-making; center managers provide on-site clinical support; regional directors provide	- CHCs are independently managed with individual fiscal management, administrative staff and clinical leadership - Boston HealthNet leadership	Mixed management structure; health systems level is centralized, top-down administrative leadership; operations among clinics vary in management structure				

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	• Multidisciplinary planning team met semi-monthly throughout planning and implementation phases • Planning team included affiliate leadership, clinical operations staff, clinicians, and quality assurance, informatics, and training staff	quality assurance oversight; training and education department maintain patient care standards • Affiliate leadership receptive to adopting alcohol SBI and collaborated on funding application • Multidisciplinary implementation planning team included staff in clinical operations, grants management, training and evaluation, strategic healthcare initiatives and program management; PPSNE leadership engaged health center managers to serve as site champions and assist in organizing and managing the program at their health centers	supportive of alcohol SBI implementation; however, with little influence over CHCs, receptivity ranged from none to highly interested Boston HealthNet management, grand round coordinators, CME course directors, and medical and behavioral health directors; included presentations on alcohol SBI, prenatal alcohol exposure and FASDs; tailored education, training and technical assistance was offered to interested CHCs	• HFH receptive to integrating technology-based alcohol SBI as universal, standardized screening was not occurring; strong interest in integrating primary and behavioral health care • Physicians in leadership roles and information technology leaders served as champions to assist in planning, implementation procedures and troubleshooting problems. Clinic managers were engaged as on-site champions and single points of contact to troubleshoot and encourage participation
Training Format (including COVID-19 pandemic-related adaptations)	• Phased, staggered on-site training for each health center • Hybrid of online training modules followed by half-day, in-person training facilitated by PowerPoint presentations. Training included role-play vignettes, training videos, and skills practice activities • After COVID-19 limited in-person meetings: transitioned to online format via organization's internal learning management system, followed by a distance-format skills practice activities (asking questions, role-playing) • Training followed by qualitative feedback sessions with staff to address problems as they arose	• Staggered training for each health center, with roll-out targeting larger health centers first • In-person training sessions facilitated by Power Point presentations, practice, and role-play activities • After COVID-19 limited in-person meetings: transitioned to virtual, on-line training sessions facilitated by Power Point presentations hosted on Zoom using polling, chat, videos, breakout rooms, modeling, and with live support • Implemented broader reach trainings through podcast with survey, lunch and learns, and qualitative feedback sessions with clinic leadership	• In-person training sessions facilitated by Power Point presentations, practice and role-play vignettes, training videos, and resource cards • After COVID-19 limited in-person training sessions facilitated by Power Point presentations hosted on Zoom using polling, chat, videos, breakout rooms, modeling, and with live support • Implemented broader reach trainings through podcast with survey, lunch and learns, and qualitative feedback sessions with clinic leadership	• A series of meetings and trainings with each clinic leading up to and following implementation of alcohol SBI. • At the provider level, focused e-learning modules provided to ensure consistent understanding of the importance of alcohol SBI and of their role in carrying it out. • Ongoing technical assistance and support provided as needed • Regular meetings and performance reports to trouble-shoot and facilitate adjustments to implementation • At the beginning of the pandemic (March 2020), the State of Michigan was under emergency orders to close all non-essential work and businesses, including in health care. HFH was closed for several months. This delayed implementation as in-person visits were generally impossible. As the health system ramped up telehealth visits, the eSBI was adapted so it was available to patients through the HFH patient portal prior to their scheduled visit. This adaptation has been incorporated into the overall implementation plan going forward.
Health Center/Clinic Staff Training Content	Training modules included: • Risks of substance use during pregnancy • FASDs • Preventing substance-exposed	• Starting with CDC's Collaborative for Alcohol-free Pregnancy's online training, all staff participated in 4 additional training modules • Overview and Rationale for Alcohol	• All staff received initial training together to establish baseline knowledge of FASDs, and how alcohol SBI fit into their practice • Healthcare teams trained using	Additional trainings conducted to familiarize clinic leadership and staff with CIAS platform for eSBI delivery

Funded Recipient & Clinical Partner	University of Alaska Anchorage Center for Behavioral Health Research Services (UAA) & Planned Parenthood Great Northwest, Hawaii, Alaska, Indiana, Kentucky (PPGNHAIK)	University of Connecticut School of Medicine at UConn Health (UConn Health) & Planned Parenthood Southern New England (PPSNE)	Boston University School of Public Health (BUSPH) & Boston HealthNet, Boston Medical Center (BMC)	Center for Health and Research Transformation (CHRT) & Henry Ford Health (HFH)
	pregnancies - Reasons SBI is being adopted system-wide - SBI utility and history - How and when to conduct screening, make referrals - What SBI workflows in the clinic look like	SBI, including preventing substance-exposed pregnancies and FASDs - Screening for Substance Use - Brief Intervention Techniques - SBIRT Workflow - EHR documentation and billing for SBI - Technical assistance/booster sessions provided as needed after 6-week performance audit	existing educational venues (e.g., business meetings, grand rounds), and subsequent trainings were targeted to roles (providers, nurses, behavioral health, medical assistants) and additional related areas of interest (AUD treatment, adolescent alcohol use), and tailored by site Technical assistance was provided based on additional needs and gaps in workflow as identified through surveys and follow-up discussions with sites	
Use of Technology	- EHR: NextGen® - Screening instruments incorporated into visit check-in protocols (on paper and via electronic check in) - Changes made to EHR to facilitate the brief intervention and documentation - Training materials included in PPGNHAIK's online Learning Management System	- EHR: Athena - EHR modified to: 1) accommodate the USAUDIT and ASSIST-FC scores; 2) facilitate documentation of BI and referral services (e.g., Smart Phrases) within the clinical workflow; 3) include automatic referral processes to local treatment agencies; and 4) add the Connecticut SBI billing codes to PPSNE's fee schedule - Alcohol SBI and FASDs competencies training integrated into PPSNE's online Learning Management System for new staff hires	- EHR: Epic, Epic OCHIN - EHR modified to include SmartPhrases, SmartSets, and added decision support plan for alcohol use disorder medications, and automated patient education materials - Some trainings assisted with EHR documentation processes in specific clinics - Podcast dissemination integrated with BMC's CME online platform	- EHR: HFH IT and CIAS developers built a secure interface between the eSBI and Epic - For patients scoring above recommended cutoffs, a BPA alerts provider and includes brief talking points for initiating a discussion with the patient and the option to submit a referral to see a behavioral health specialist
Program Evaluation and Dissemination	- Implementation fidelity monitored monthly via EHR reports and clinician feedback - Dashboards display screening and BI rates by clinic; dashboards under development will display clinician-specific rates to support quality assurance efforts - Data dashboards reviewed monthly by leadership team, development of internal dashboards for use by clinic leadership - Presentations of outcomes at conferences; papers in peer-reviewed journals	- Monthly reports using EHR data monitor progress at each health center - Feedback includes screening and BI performance rates and clinician-specific BI documentation quality provided to PPSNE leadership, regional directors, health center managers and staff - Presentations of outcomes at conferences; papers in peer-reviewed journals	- Weekly updates provided at team meetings - Training outcomes and satisfaction tracked through surveys (i.e., pre, post, follow-up), polling during trainings, and reflecting questions between trainings - Training observations with feedback for quality monitoring - Quarterly reports using EHR data to monitor progress at each center - Feedback includes screening and BI performance rates and clinician-specific BI documentation quality - Regular use of data (i.e., tracking, process, outcomes) for evaluation, quality monitoring and improvement, and clinic recruitment - Multimedia (i.e., training video, podcast, educational video, website); print (i.e., brochure, infographics internal reports); presentations and	- Piloted in one clinic with a progressive, stepwise roll out thereafter - Implementation team provided regular clinic updates, progress reports and monitored follow through on all aspects of eSBI intervention, including click-through rates on BPAs triggered by positive screens, screening and follow through rates on handing out iPads and feedback on impact on workflows - Conversations and follow up conducted regularly, as needed, to troubleshoot and correct issues with protocol fidelity and to identify adjustments to better facilitate uptake of the intervention. Additionally, the CIAS software and eSBI protocol allowed for monitoring patient engagement, satisfaction, and preferences with the intervention. This allowed the intervention team to make adjustments to improve user experience - Development of a dashboard by

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			conferences; papers in peer-reviewed journals	implementation team used with clinic managers and other leadership to highlight progress and identify opportunities for improved implementation. • Presentations and papers at conferences, Grand Rounds, etc.

UAA: University of Alaska Anchorage; PPGNHAIK: Planned Parenthood Great Northwest, Hawai'i, Alaska, Indiana, Kentucky; PPSNE: Planned Parenthood of Southern New England; BMC: Boston Medical Center; BUSPH: Boston University School of Public Health; HFH: Henry Ford Health; CHRT: Center for Health and Research Transformation; SBIRT: screening, brief intervention, and referral to treatment; USAUDIT-C: Alcohol Use Disorders Identification Test, US version, items 1–3; SISQ: Single Item Screening Question; NIDA: National Institute on Drug Abuse; USAUDIT: Alcohol Use Disorders Identification Test, US version; DAST-10: Drug Abuse Screening Test, 10-item; ASSIST-FC: Alcohol Smoking and Substance Involvement Screening Test-Frequency and Concern; WHO: World Health Organization; FRAMES: Feedback, Responsibility, Advice, Menu Options, Empathy, Self-efficacy; EHR: electronic health record; SUD: substance use disorder; BPA: best practice alert; PCMH: patient-centered medical home; CHC: community health centers; SBI: screening and brief intervention; BI: screening and brief intervention; CME: continuing medical education; FASD or FASDs: fetal alcohol spectrum disorders; CDC: Centers for Disease Control and Prevention; CIAS: Computerized Intervention Authoring System; AUD: alcohol use disorder; IT: information technology

Table 3.
Number and Type of Staff Trained in Alcohol SBI Service Delivery by Program (n=4)

	UAA/PPGNHAIK	UConn Health/PPSNE	BUSPH/Boston HealthNet, BMC	CHRT/HFH	TOTAL
Total Staff Trained ¹	445	235	516	63	1,259
Trained by Type of Staff ²	438	235	287 ³	63	1,023
Clinicians/Providers	40	49	214	37	340
Physician	2	0	125	–	127
Physician Assistant/Nurse Practitioner	33	40	70	–	143
Certified Nurse Midwife	5	9	1	–	15
Other Clinician/Provider (i.e., Behavioral Health, Social Worker)	–	0	18	–	18
Registered Nurse, Medical/Clinic Assistant	200	142	47	14	403
Other administrative staff (front desk, center manager, etc.)	150	29	0	12	191
Non-clinical leadership, management, trainers	48	15	21	–	84
Other Type	–	--	5	--	5

SBI: screening and brief intervention; UAA: University of Alaska Anchorage; PPGNHAIK: Planned Parenthood Great Northwest, Hawai'i, Alaska, Indiana, Kentucky; PPSNE: Planned Parenthood of Southern New England; BMC: Boston Medical Center; BUSPH: Boston University School of Public Health; HFH: Henry Ford Health; CHRT: Center for Health and Research Transformation

¹This number represents the total number of staff/providers trained in each program, regardless of whether they indicated a staff type. Type of staff was not collected of all trainees;

²This number represents the total number of staff trained in each program who indicated a specialty type;

³This number includes staff trained virtually and for whom specialty type was collected.

Table 4.
Alcohol and Other Drug Use Screening, Brief Intervention and Referral Rates by
Program (7/1/2019–6/30/2022)

	UAA/ PPGNHAIK	UConn Health/ PPSNE	BUSPH/Boston HealthNet, BMC	CHRT/ HFH ¹
Number of health centers reporting data	24	15	6²	3
Screening for Alcohol Use				
Number of patients in target population (# of patients who should have been screened)	21,171	15,498	268,651	3,078
Number of patients screened for alcohol (# of patients who are actually screened)	18,949	12,924	74,676	277
Percent of patients screened for alcohol (# of patients screened/# in the target population)	89.50%	83.39%	27.80%	9.00%
Number of patients who screen positive for alcohol (# of patients deemed positive for risky alcohol use)	2,025	2,189	5,799	74
Percent of patients who screen positive for alcohol (# of patients who screen positive/# of patients screened)	10.69%	16.90%	7.77%	26.71%
Number of patients who screen positive for alcohol who receive a brief intervention ³	--	--	729	43
Percent of patients who screen positive for alcohol who receive a brief intervention (# of patients who receive a BI/# of patients who screen positive) ³	--	--	12.57%	58.11%
Number of patients scoring in the high-risk range/possible moderate to severe AUD	49	47	178	47
Percent of patients scoring in the high-risk range/possible moderate to severe AUD (# of patients scoring in the high-risk range/possible moderate to severe AUD/ # of patients screened for alcohol)	0.26%	0.36%	0.24%	16.97%
Number of patients referred for additional treatment for alcohol ³	10	--	1,270	--
Percent of patients referred for alcohol (# of patients referred for alcohol/# of patients who should have been referred [scoring in the high-risk range/possible moderate to severe AUD]) ³	20.41%	--	--	--
Screening for Drug Use				
Number of patients in target population (# of patients who should have been screened)	21,171	15,498	271,655	3,078
Number of patients screened for drugs (# of patients who are actually screened)	17,749	12,970	73,621	252
Percent of patients screened for drugs (# of patients screened/# in the target population)	83.84%	83.69%	27.10%	8.19%
Number of patients who screen positive for any drug (# of patients deemed positive for risky drug use)	3,484	4,307	2,370	41
Percent of patients who screen positive for any drug (# of patients who screen positive/# of patients screened)	19.63%	33.21%	3.22%	16.27%
Number of patients scoring in the high-risk range for any drug	62	219	135	--
Percent of patients scoring in the high-risk range for any drug (# of patients scoring in the high-risk range for drugs/# of patients screened for drugs)	0.35%	1.69%	0.18%	--
Screening for Alcohol and/or Drug Use				

	UAA/ PPGNHAIK	UConn Health/ PPSNE	BUSPH/Boston HealthNet, BMC	CHRT/ HFH ¹
Number of patients screened for alcohol or other drugs (any substance)	19,052	13,001	--	252 ⁴
Number of patients who screen positive for any substance ⁵	4,825	5,251	6,889	117
Percent of patients who screen positive for any substance (# of patients who screen positive/# of patients screened)	25.33%	40.39%	--	46.43%
Number of patients who screen positive for any substance who receive a brief intervention	2,968	2,830	947	46
Percent of patients who screen positive for any substance who receive a brief intervention (# of patients who receive a BI/# of patients who screen positive)	61.51%	53.89%	13.75%	39.32%
Number of patients who screen positive for any substance who are referred for additional treatment ³	11	160	--	--
Percent of patients who screen positive for any substance who are referred for additional treatment (# of patients who are referred/# who screened positive)³	0.23%	3.05%	--	--

SBI: screening and brief intervention; UAA: University of Alaska Anchorage; PPGNHAIK: Planned Parenthood Great Northwest, Hawai'i, Alaska, Indiana, Kentucky; PPSNE: Planned Parenthood of Southern New England; BMC: Boston Medical Center; BUSPH: Boston University School of Public Health; HFH: Henry Ford Health; CHRT: Center for Health and Research Transformation; BI: brief intervention; AUD: alcohol use disorder.

¹Implementation at HFH eSBI began in January 2021 due to IT delays and COVID-19 related clinic shutdowns. Data presented here is from January 2021-June 2022;

²This number reflects the number of health centers that consented to provide EHR data for this evaluation;

³In some cases, it is not possible to distinguish for which substance (alcohol or other substances) the brief intervention or referral was conducted;

⁴This number reflects those screened for substances other than alcohol;

⁵This is applicable when sites are using screeners that capture multiple substances, not only alcohol. The number includes screen-positives for any substance so that includes alcohol as well as any other substance assessed.

Table 5.
Demographic Characteristics of Patients Served Across Programs (7/1/2019–6/30/2022)

	UAA/PPGNHAIK (n=21,173)	UConn Health/ PPSNE (n=15,498)	BUSPH/Boston HealthNet, BMC (n=268,651)	CHRT/HFH ¹ (n=4,013)
Gender (% female)	97.4%	100.0%	47.5%	100.0%
Age [mean (SD)]	29.41 (7.83)	34.08 (9.95)	--	30.89 (7.99)
Race/ethnicity (%)				
Alaska Native/American Indian	1.6%	0.4%	0.2%	0.0%
Asian/Pacific Islander	8.2%	2.6%	2.8%	2.0%
Black	9.5%	20.4%	37.1%	72.0%
White	Hispanic: 3.7% Non-Hispanic: 68.6%	46.1%	24.6%	17.6%
Other/Unknown	Multi-racial /other: 7.9%; Unknown/prefer not to answer: 0.7%	5.8%	Other: 13.4%; Unknown: 11.3%	8.4%
Hispanic	--	24.7%	10.6%	5.2%
Insurance type (%)			Not collected	Not collected
Public	42.0%	42.7%		
Self-pay/uninsured	--	15.4%		
Commercial	58.0%	41.9%		

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¹Time period for demographic data collected at CHRT/HFH is 1/1/21–6/30/22.