Improving screening, brief intervention and referral to treatment for unhealthy alcohol use in diverse, low-resourced primary care clinics

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Abstract

Background Implementation of screening brief intervention and referral to treatment (SBIRT) and medication-assisted treatment for alcohol use disorder (MAUD) remains low in primary care. ANTECEDENT (*Partnerships to Enhance Alcohol Screening, Treatment, and Intervention*) was a practice-facilitator led implementation study to increase SBIRT and MAUD use in diverse primary care clinics.

Methods From November 2019 – April 2023, we conducted a convergent parallel mixed methods evaluation. Participants were small and medium-sized primary care clinics in the Northwestern U.S. Clinics received foundational support (i.e., baseline/exit assessment, access to SBIRT Oregon website) and the option for supplemental implementation support (e.g., practice facilitation, expert consultation) over the 15-month intervention to improve SBIRT and MAUD. Qualitative and quantitative data regarding clinic characteristics, implementation strategies, and SBIRT/MAUD outcomes were collected through practice facilitator interviews, periodic reflections and clinic contact logs, interviews, pre-post surveys, and electronic health record (EHR) queries. Quantitative analyses included descriptive statistics, logistic regression, and the Wilcoxon sign-ranked test. Qualitative analysis took an immersion crystallization approach. Data were reviewed in a matrix to evaluate intervention adoption, implementation, and effectiveness.

Results We recruited 75 unique clinics; 66 participated and 48 (73%) completed the study. Eight participating clinics chose to receive foundational support only (12%) while 58 chose to engage in supplemental support (88%) activities. Clinics that received supplemental support and completed the intervention (*n* = 42) engaged in practice facilitation (Mean: 293 min, range: 75–550 min); data review (38%), HIT support (31%), expert consultation (19%), and peer-to-peer learning (5%). Pre- and post-intervention assessments showed significant improvement in self-reported SBIRT process outcomes. Performance data improved among the subset of completing clinics able to produce data (*n* = 17).

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Clinics described positive experiences with ANTECEDENT support and highlighted remaining barriers to SBIRT and MAUD implementation.

Conclusions Participating clinics engaged in a diverse range of supportive activities. A flexible approach using practice facilitation and implementation support could be helpful for low-resourced primary care clinics in improving SBIRT and MAUD for unhealthy alcohol use.

Keywords Unhealthy Alcohol Use, Substance Use Disorder, Practice Facilitation, Primary care, Quality Improvement, SBIRT

Background

Unhealthy alcohol use (UAU) is a leading cause of death and disability in the US, causing an estimated 178,307 deaths each year [1, 2]. Evidence suggests that both alcohol-related deaths and alcohol use increased during the COVID-19 pandemic, with the increase in deaths estimated to be 29% from 2017 to 2021, with a larger increase of almost 35% in women [3, 4]. The US Preventive Services Task Force (USPSTF) recommends screening all adults for UAU in primary care settings [5, 6]. Evidence-based interventions to address UAU include alcohol screening, brief intervention, and referral to treatment (SBIRT) and medication assisted treatment for alcohol use disorder (MAUD) in primary care [7–9]. The USPSTF and Cochrane collaboration recommend screening all adults and providing brief intervention for individuals engaged in risky drinking [2, 10–12].

Despite effectiveness, neither SBIRT nor MAUD are widely implemented in primary care [13–15]. Quality improvement strategies have improved SBIRT delivery in large, urban health systems [16, 17], yet barriers are found in clinics that are smaller, low-resourced, and rural, and serve populations with complex needs [18–21]. Few studies explore MAUD implementation for UAU in primary care [22, 23], particularly across rural and lower-resourced settings [24].

To enhance the use of SBIRT and MAUD in primary care practices, we could use implementation science methods to examine practice facilitation supporting UAU strategies [25–31]. Practice facilitation builds clinic capacity to improve process and outcomes; [32, 33] and is conceptualized here as a meta-implementation strategy to coordinate improvement support [30]. Although many facilitation studies have structured, prescriptive approaches [29, 34, 35], facilitation can be tailored to context [34, 36]. Practice facilitation for implementing SBIRT and MAUD has not been well studied in non-integrated primary care clinics [27, 37, 38].

Therefore, in ANTECEDENT (P*art*n*e*rships *t*o *E*nhance Alcohol Scr*e*ening, Treatment, an*d* Interv*ent*ion), we evaluated flexible practice-facilitator-led implementation support to increase SBIRT and MAUD in primary care clinics, with priority in reaching diverse small- to medium-sized, rural, and low-resourced clinics [39]. This flexible approach was designed to align implementation support with clinic needs, interests, and capacity. We report here on the (a) characteristics of clinics engaged, (b) support strategies and SBIRT and MAUD intervention components implemented, and (c) self-reported impact on UAU processes and outcomes.

Methods

We used a convergent parallel mixed methods evaluation design [40, 41] applying a conceptual framework that is a hybrid of the Integrated Promoting Action on Research Implementation in Health Services (i-PARIHS) [42] and the Dynamic Sustainability Framework (DSF) [43] as detailed in the study protocol paper [39, 43]. The i-PARIHS framework focuses on practice facilitation to align implementation support to the innovation, recipients, and broader contexts (e.g., local, regional) [42]. The DSF highlights the longitudinal nature of change, such that interventions are adapted and improved as they integrate into real-world settings over time [43]. Our hybrid framework situates practice facilitation as a meta-strategy for implementation support and helped us to examine how practice facilitators work with clinics over time to support SBIRT and MAUD delivery in routine primary care [39].

Study activities were approved by the Oregon Health & Sciences University Institutional Review Board (IRB) through an expedited review (STUDY00020592). The study obtained a waiver of HIPAA authorization for use of the EHR data on patient outcomes. All participants gave their informed consent to participate in the study after receiving a study information sheet. The IRB-approved information sheet included information describing the study including voluntariness, risks, benefits, and ability not to participate without penalty.

Study setting and clinic eligibility

ANTECEDENT was one of six regional projects in the Agency for Healthcare Research and Quality (AHRQ) EvidenceNOW: Managing Unhealthy Alcohol Use Initiative [39, 44]. The EvidenceNOW model promotes the use of external support to improve primary care with a focus on dissemination and implementation of evidence-based practices [44]. Aggregate results were measured across

all grantees by an AHRQ-funded contractor. ANTE-CEDENT was a partnership between the Oregon Rural Practice-based Research Network (ORPRN), Oregon Health Authority (OHA) Transformation Center, and SBIRT Oregon [39]. ORPRN is an established practice-based research network [45, 46]. SBIRT Oregon provides curriculum, training, and resources to support SBIRT implementation [47]. The OHA Transformation Center supports quality improvement strategies to enhance Medicaid Health Plan (aka Coordinated Care Organizations or CCOs) performance on the state's quality metrics [48, 49]. An Electronic Health Record (EHR)-based SBIRT metric was introduced in January 2019 for Oregon CCOs [50].

The ANTECEDENT study team recruited clinics from November 2019 to February 2022; clinics could choose when to initiate participation by quarterly waves starting in February 2020. The final cohort of clinics enrolled in February 2022 and completed activities in April 2023. Study activities occurred concurrently with another ORPRN project called PINPOINT (Improving Pain and Opioid Management), which addressed opioid management through facilitation [51] and during the COVID-19 pandemic [52]. Initially, we prioritized outreach and enrollment of 150 primary care clinics in Oregon, focusing on engaging small- to medium-sized rural and low-resourced clinics (<10 providers). However, in July 2021 due to pandemic-related clinical practice stressors [52], the study team transitioned to a target of 80 clinics in Northwestern states.

Evidence-based intervention: SBIRT and MAUD
Our intervention targeted clinic implementation of SBIRT and MAUD. First, we encouraged clinics to select evidence-based screening tools for UAU, including the 10-question Alcohol Use Disorders Identification Test (AUDIT) [47, 53], the abbreviated 3-question AUDIT-Consumption (AUDIT-C), and the National Institute on Alcohol and Alcoholism's Single Alcohol Screening Question (SASQ) [54]. Second, we targeted implementation of brief intervention within a primary care visit, which the Cochrane Collaboration identifies as "feedback on the harms of alcohol use, coping strategies, and developing a plan to reduce drinking." [12] The final component was referral to treatment and/or MAUD, which involved supported behavioral interventions as well as prescription medication, such as naltrexone or acamprosate, to reduce alcohol use [55]. Our approach also included support for screening for recreational and illicit drug use in alignment with the Oregon SBIRT metric [39, 56].

Flexible implementation support
Participating clinics received foundational support and could elect to receive tailored supplemental support for up to 15 months according to their local needs and resources; see Table 1. Support was provided to administrative clinic managers, quality improvement staff, and/or clinician champions.

Foundational support
Foundational support included a baseline assessment, access to the SBIRT Oregon website, and an exit assessment. The baseline assessment, which occurred during the first 3 months of study activities, was a kick-off meeting and completion of a clinic intake form that gathered data on SBIRT and MAUD implementation, population demographics, health information technology (HIT) capacity, and outcome metric performance reporting (if possible). Study staff and facilitators then co-developed a tailored implementation support plan based on clinic needs, improvement targets, and available data. Facilitators shared information about the SBIRT Oregon website during the kick-off meeting and encouraged clinics to explore these resources [47]. The exit assessment, held during the final 3 months of the intervention, was a meeting to update the baseline data (implementation and performance reporting), celebrate achievements, and gather project impressions. All participating clinics received foundational support.

Supplemental support
For clinics that opted to receive supplemental support, the team provided customized support for SBIRT and MAUD implementation (see Table 1). Supplemental support was coordinated by practice facilitators and could include practice facilitation with clinic staff, HIT expert consultation and support to enhance data reporting, academic detailing session(s) with an SBIRT motivational interviewing expert, data review (audit and feedback), and/or referral to peer-to-peer learning opportunities via the Oregon Extension for Community Health Outcomes (ECHO) Network or webinars [58, 59].

Mixed methods data collection and analysis
Our mixed-methods evaluation was informed by the Reach, Effectiveness, Adoption, Implementation, Maintenance (RE-AIM) framework and our hybrid conceptual model [60, 42, 43, 60–62]. The evaluation used clinic self-reported process implementation data collected in REDCap [63, 64], post-intervention clinic interviews, interviews and periodic reflections with practice facilitators, pre-and post-SBIRT/MAUD implementation surveys, and performance data via EHR queries (at baseline and/or exit assessments). Quantitative data management and descriptive analyses were conducted using R 4.2.2

Table 1 Implementation strategies, sub-components, and measurement[*]

Implementation strategies	Strategy Sub-Components	What was Implemented	Measurement	EPIS stage [57]
Foundational				
Baseline assessment	Kick off facilitation meeting, clinic intake data form	An initial e-mail scheduling meeting with clinic intake form on demographics, health information technology (HIT), SBIRT/MAUD implementation and reporting	Completion of clinic data forms, in REDCap	Preparation
	Implementation plan co-developed	Review of meeting materials, an improvement plan covering HIT capacity, SBIRT workflow, project motivation, current practices, and tailored implementation support	Contact logs, in REDCap	Preparation
SBIRT Oregon website	Online SBIRT Resources, Guides, and e-Screening Tools	Website reviewed during the kickoff facilitation meeting and links shared after the meeting	Referral to website, in REDCap	Implementation
Exit assessment	Meeting to assess capacity and impact	A final meeting captures clinic context, experience with SBIRT/MAUD, and project impressions	Fieldnotes, in REDCap	Sustain
	Clinic exit data form	Clinics update information on the clinic data form	Completion of clinic data forms, in REDCap	Sustain
Supplemental				
Practice facilitation (PF)	Ongoing meetings to facilitate SBIRT implementation	Consensus building and goal setting activities, quality improvement facilitation, plan-do-study-act (PDSA) cycles, and workflow mapping/design	The total number of PF meetings, in REDCap	Implementation
HIT support	HIT expert consultation(s)	Consultation with an expert on HIT via in-person visits, phone calls, video, or email	Receipt of HIT support, in REDCap (Yes/No)	Implementation
Expert Consultation	Academic detailing meeting(s)	Academic detailing session(s) with an SBIRT/MI Expert, via phone call or video call	Delivered at least one session, in REDCap	Preparation, Implementation
Data review (Audit and feedback)	Meeting to discuss performance data	Practices pulled and reviewed data with assistance from research team either with PF or HIT expert	Discussed with PFs, in REDCap	Implementation, Sustain
Peer-to-peer learning via Oregon ECHO® Network	12-session ECHO series on addiction treatment	Provided a referral to ECHO series (*Effective Systems for Treating Addiction in Primary Care*)	ECHO session registration and attendance	Preparation, Implementation
Peer-to-peer learning via webinars	SBIRT webinars live or recordings	Attended two webinars on SBIRT basics and measurement	Attendance, recorded in REDCap	Preparation, Implementation

[*]Participating clinics also engaged in evaluation related data collection as described in Methods

[65]. Qualitative data were uploaded into ATLAS.ti (Version 22) for data management and analysis. Quantitative and qualitative data were summarized and compiled into a matrix to evaluate three RE-AIM domains: adoption, implementation, and effectiveness.

Participation (adoption)
We explored intervention adoption at three levels: recruited, participating, and study completion. Clinics were "recruited" when they signed an ANTECEDENT Partnership Agreement Letter and considered "participating" if they engaged in at least one baseline assessment activity. Clinics that signed the letter but did not participate in baseline activities were classified as "did not engage." "Study completion" included participating clinics that had either an exit interview, final visit, and/or completed the SBIRT data collection.

Characteristics of participating clinics were compared between those that completed the study and those that withdrew. We classified clinics based on patient panel size as small (<10,000 patients), medium (10,000–20,000 patients), or large (>20,000 patients). In alignment with prior research, we applied the US Department of Agriculture's Rural-Urban Commuting Area (RUCA) codes to classify clinics as urban (1–3), micropolitan (4–6), or rural (7–10) [66, 67]. Categorical variables were presented descriptively as counts and percentages. Adjusted and unadjusted logistic regressions were run to evaluate the impact of clinic characteristics on study completion versus withdrawal in participating clinics.

Support strategies and implementation targets (implementation)
Supportive activities, intervention components implemented, and improvement targets were collected via contact logs, practice facilitator interviews and periodic reflections, and post-intervention clinic interviews. Clinic encounters were documented in a semi-structured contact log in REDCap by study team members; data included encounter date/length, participants, materials covered, and any goals/improvement targets [63, 64]. A qualitative analyst reviewed the contact logs at least monthly for quality assurance. Virtual bi-annual interviews and monthly periodic reflections with practice facilitators were conducted by two qualitative analysts (EK, CB) to document program implementation [68].

One qualitative team member (CB) conducted post-implementation interviews with clinic staff to explore clinic context and experiences. At the time of interview scheduling, we provided participants with an IRB-approved information sheet detailing risks and benefits of study participation and that participation was voluntary. Interviews and reflections were conducted via videoconference, recorded, professionally transcribed, and validated.

Qualitative data were analyzed using an immersion crystallization approach [69, 70]. An a priori codebook was developed by the analyst team (EK, CB, TW) based on a subset of the data and research questions. All data were double coded and two analysts (CB, TW) created analytical memos of coded data for each clinic. These memos were discussed and refined at weekly meetings to identify emerging themes. On a second pass, coded data were put into a matrix to identify and refine themes. On a third pass, queries of coded data, selected based on emergent themes, were pulled and reviewed to solidify final themes [71].

Change in SBIRT/MAUD processes and outcomes (effectiveness)

We measured effectiveness through changes in SBIRT and MAUD processes (i.e., by intervention component) via self-reported survey data and performance outcomes using EHR data. Clinics completed a pre-and post-intervention survey that included a self-assessment of UAU process implementation, including screening frequency, results review, assessment of UAU symptoms, brief intervention provision, and referral to treatment. The survey was developed by the AHRQ R18 consortium and asked respondents to rank themselves from Not Started, Planning, Active, to Full Implementation. The survey also gathered data on the UAU screening tools and target population; a question about clinic implementation of MAUD was included in the exit survey.

During baseline and exit assessments, clinics were asked to submit SBIRT and MAUD performance data via fillable PDF. The SBIRT performance data were provided in one of three formats: (1) the Oregon CCO SBIRT Metric [56]; (2) the Merit-Based Incentive Payment System (MIPs) format [72], or (3) clinic EHR data using custom data extracts to calculate an AHRQ-specified SBIRT performance metric [73, 74] (i.e., the "research metric") (see Additional File 1). If none were possible, performance data were recorded as unavailable for that clinic. When elected as a supplemental support strategy, a HIT facilitator (JM) worked with clinics to write EHR queries to obtain a minimum data set directly from a clinic's EHR using customized database queries and data were cleaned, normalized, and used to calculate the research metrics using the Tableau Analytics and Data Preparation Tool [75]. The Wilcoxon Signed-Rank test was used to assess changes in self-reported SBIRT and MAUD outcomes in clinics pre- and post-intervention. An absolute difference between baseline and exit percentages for two research metrics was used to determine the change in performance for screening (M2) and intervention (M4) rates within each clinic able to provide data.

Results

Adoption

As summarized in Fig. 1 , 75 clinics were recruited into ANTECEDENT, of which 66 participated in foundational support only (12%, $n=8$) or both foundational and supplemental support (88%, $n=58$) activities. Of the 66 participating clinics, 44 (67%) also engaged in the PINPOINT study which focused on improving opioid prescribing safety and treating chronic pain. Over 70% of the participating clinics completed study activities (73%, $n=48$), with similar rates for those receiving foundational (75%, $n=6$) and supplemental support (72%, $n=42$).

Participating clinics included federally qualified health centers (32%), non-federally designated clinics and hospitals (26%), rural health clinics (21%), Veteran's Administration clinics (3%) and Academic health centers, Tribal or other types of clinics (8%), see Table 2. The majority of clinics were small (patient panel<10,000) (62%) and clinics varied in urbanicity (46% urban, 36% micropolitan, and 18% rural). Over 80% of participating clinics provided at least one type of service in addition to primary care (e.g., behavioral health, dental), and 40% used the Epic EHR. Thirty-six clinics (55%) participated in study activities as a group, where practice facilitators engaged with centralized staff that implemented changes across multiple clinics.

There were no statistically significant differences in the characteristics of clinics that completed the study versus those that withdrew. Some clinics requested to stop participation (active withdrawal), while others stopped returning calls or emails (passive withdrawal). Qualitative findings highlighted organizational factors important for study completion, such as having a consistently engaged point of contact, which ensured attendance at facilitation meetings and clinic follow-through between meetings, or strong leadership buy-in.

Implementation

Table 3 summarizes the implementation support received by the 48 clinics that completed the study. Practice facilitation support averaged 267 min total, with a mean of 88 min for the six foundational support clinics (Range: 80–90) versus a mean of 293 min for the 42 supplemental support clinics (Range: 75–550). Clinics receiving supplemental support also engaged in data review (38%), HIT
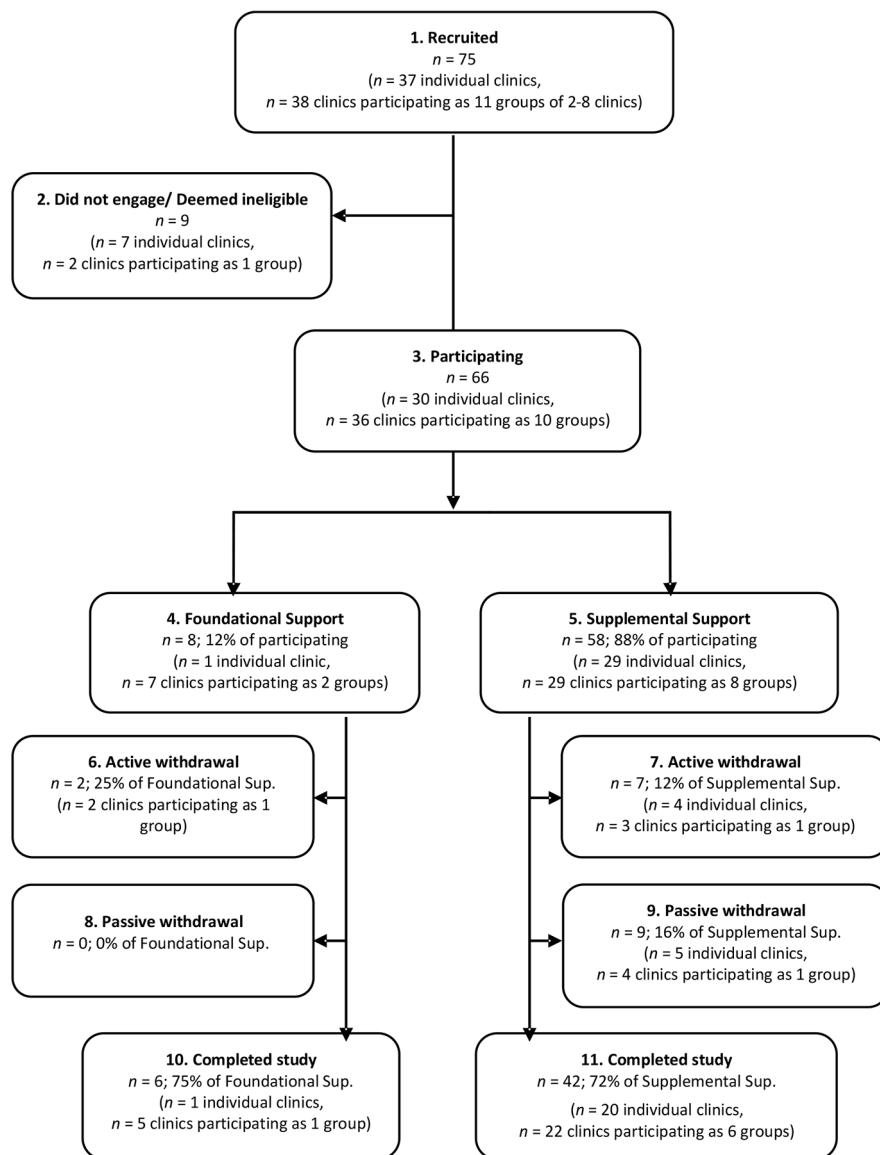
1. Recruited
n = 75
(*n* = 37 individual clinics,
n = 38 clinics participating as 11 groups of 2-8 clinics)

2. Did not engage/ Deemed ineligible
n = 9
(*n* = 7 individual clinics,
n = 2 clinics participating as 1 group)

3. Participating
n = 66
(*n* = 30 individual clinics,
n = 36 clinics participating as 10 groups)

4. Foundational Support
n = 8; 12% of participating
(*n* = 1 individual clinic,
n = 7 clinics participating as 2 groups)

5. Supplemental Support
n = 58; 88% of participating
(*n* = 29 individual clinics,
n = 29 clinics participating as 8 groups)

6. Active withdrawal
n = 2; 25% of Foundational Sup.
(*n* = 2 clinics participating as 1 group)

7. Active withdrawal
n = 7; 12% of Supplemental Sup.
(*n* = 4 individual clinics,
n = 3 clinics participating as 1 group)

8. Passive withdrawal
n = 0; 0% of Foundational Sup.

9. Passive withdrawal
n = 9; 16% of Supplemental Sup.
(*n* = 5 individual clinics,
n = 4 clinics participating as 1 group)

10. Completed study
n = 6; 75% of Foundational Sup.
(*n* = 1 individual clinics,
n = 5 clinics participating as 1 group)

11. Completed study
n = 42; 72% of Supplemental Sup.
(*n* = 20 individual clinics,
n = 22 clinics participating as 6 groups)

Fig. 1 CONSORT diagram

support (31%), expert consultation (19%), and peer-to-peer learning (5%).

Clinics chose a variety of goals to advance SBIRT workflows; some came to the project with specific goals in mind and others developed their goals with the practice facilitator. Among the 48 completing clinics, the top three improvement goals included increasing understanding and skill for brief intervention (*n*=34; 70%), developing or improving screening (*n*=26; 54%), and improving EHR data reporting (*n*=21; 44%). 35% (*n*=17) of these clinics also set goals around MAUD (*n*=17; 35%). Clinics varied in their goal targets, with some focused on improving performance on metrics while others emphasized operational goals.

Informants described perceived benefits and challenges to the flexible implementation approach, with the benefits illustrated below.

[The practice facilitators were] really positive and helpful and let us think about what would be the best plan for our clinic. . Even though it's important to have tried and true tests or metric or well-researched ways [to do SBIRT], to start acknowledging that [it] might be slightly different for where we are. And so that balance, allowing us [to explore] with [the practice facilitator] input. . felt like there was a gentle guidance and a balance of how things would unfold for our individual clinic that I really

Table 2 Characteristics of clinics in ANTECEDENT study, n(%)

	Total Participating (*N*=66)	Completed (*n*=48)	Withdrew (*n*=18)
Clinic Type			
FQHC†	21 (31.8)	19 (39.6)	2 (11.1)
Clinics/Hospitals	17 (25.8)	13 (27.1)	4 (22.2)
Rural Health Clinic	14 (21.2)	10 (20.8)	4 (22.2)
VA Admin	2 (3.0)	2 (4.2)	0 (0.0)
Tribal/Academic/Other	5 (7.6)	4 (8.3)	1 (5.6)
Did not Respond	5 (7.6)	0 (0.0)	5 (27.8)
Missing	2 (3.0)	0 (0.0)	2 (11.1)
Patient panel			
< 10,000	41 (62.1)	34 (70.8)	7 (38.9)
10,000–20,000	8 (12.1)	7 (14.6)	1 (5.5)
> 20,000	6 (9.1)	6 (12.5)	0 (0.0)
Missing	11 (16.7)	1 (2.1)	10 (55.6)
Additional Services*Provided			
Behavioral Health	42 (65.6)	36 (75.0)	6 (37.5)
Dental	15 (23.4)	13 (27.1)	2 (12.5)
Other services	26 (40.6)	23 (47.9)	3 (18.8)
None	13 (19.7)	8 (16.7)	5 (27.8)
Geographic Location			
Urban	30 (45.5)	21 (43.8)	9 (50.0)
Micropolitan	24 (36.4)	16 (33.3)	8 (44.4)
Rural	12 (18.2)	11 (22.9)	1 (5.6)
EHR Type			
eClinicalWorks	8 (12.9)	6 (12.8)	2 (13.3)
Epic	25 (40.3)	18 (38.3)	7 (46.7)
Intergy	8 (12.9)	8 (17.0)	0 (0.0)
NextGen	5 (8.1)	5 (10.6)	0 (0.0)
Allscripts	5 (8.1)	5 (10.6)	0 (0.0)
Athena	5 (8.1)	2 (4.3)	3 (20.0)
Other	6 (9.7)	3 (6.4)	3 (20.0)
Participation Approach			
Group	36 (54.6)	27 (56.3)	9 (50.0)
Individual	30 (45.4)	21 (43.7)	9 (50.0)
Study Participation			
Both Studies	42 (36.6)	32 (66.7)	10 (55.6)
ANTECEDENT Only	24 (36.4)	16 (33.3)	8 (44.4)
PINPOINT Only	0 (0.0)	0 (0.0)	0 (0.0)

*Clinical practices were asked what services were provided in their settings in addition to primary care. Options were Behavioral Health; Dental; Chiropractic; Acupuncture, Massage, or Physical Therapy; Community Health; Public Health; or Other

†FQHC = Federally Qualified Health Center

appreciated. - Clinic Champion, Academic Health Center Clinic.

However, clinics also noted how flexible implementation could make it difficult to know what they should be working on and when they were successful. Practice facilitators described how the time required to identify key areas of need could lead to clinic disengagement.

I think there's benefit in having open-endedness because we can ideally really tailor our work to what the clinic needs. That's the ideal. The challenge, I think, is that when clinics enroll in a project, they often expect to be told what to do. And it actually takes a lot of work to figure out what they really need. Sometimes it takes so much work that they disengage. I haven't experienced that as much, but I know that others have. What I have experienced is it taking multiple months to figure out what they're working on, and sometimes we lose momentum in that time. - Practice Facilitator.

Clinics had mixed perspectives on whether SBIRT and MAUD changes were sustainable given various barriers to implementation. Participants noted that, especially in rural communities, privacy and familiarity with patients were barriers, particularly for brief intervention. Some described addiction stigma and societal acceptance of UAU as barriers to getting clinician and staff buy-in for SBIRT. Clinics not using MAUD were often concerned about the risks or preferred abstinence-only approaches; clinics also described a lack of referral options for treatment (e.g., inpatient treatment, detox) in rural areas. Clinics emphasized multiple implementation challenges amplified by the COVID-19 pandemic, including limited staffing, modified operations, increased patient care needs, and competing priorities. EHR limitations for goal setting and progress tracking made it difficult to assess the impact of quality improvement efforts fully; changes to EHR systems often resulted in delays or stopping implementation altogether. Other clinics had limitations relating to their organizational culture and structure. While the co-implementation of the PINPOINT study was complementary in its content, it also created a competing priority for clinics to simultaneously engage in two similar studies.

Effectiveness
Process outcomes
Clinics that completed the baseline and follow-up surveys displayed statistically significant improvement in self-reported SBIRT outcomes; overall clinics moved from "Not Started" towards "Full implementation" in each of the categories assessed; see Table 4. Improvements included changes in screening frequency, implementing UAU processes, and enhancing results review and appropriate follow-up through brief intervention or referral to treatment. Notably, clinics reported using a variety of tools to screen for UAU, including the AUDIT (52%, *n*=25), SASQ (31%, *n*=15), AUDIT-C (19%, *n*=9), or other instruments. On the exit survey, 17 clinics (46%) reported providing MAUD for UAU during the study period.

Table 3 Implementation support received by clinics that completed the study (*N*=48)*†

	TOTAL	Duration of Intervention: # months	Practice Facilitation Intensity: # mins	HIT Support: # with any	Expert Consult (i.e., Academic Detailing)	Data Review (Audit and Feedback)	Peer-to-Peer Learning via ECHO
	N (%)	Mean (range)	Mean (range)	*n* (%)	*n* (%)	*n* (%)	*n* (%)
All clinics that completed study	**48 (100%)**	**15.9 (11–22)**	**267 (75–550)**	**13 (27%)**	**8 (17%)**	**16 (33%)**	**2 (4%)**
Foundational Support Clinics‡	6 (12%)	16.5 (14–17)	88 (80–90)	N/A	N/A	N/A	N/A
Wave 2 05/2020	5 (10%)	17.0 (17–17)	90 (90–90)	N/A	N/A	N/A	N/A
Wave 4 11/2020	1 (2%)	14.0 (N/A)	80 (N/A)	N/A	N/A	N/A	N/A
Supplemental Support Clinics	**42 (88%)**	**15.1 (11–22)**	**293 (75–550)**	**13 (31%)**	**8 (19%)**	**16 (38%)**	**2 (5%)**
Wave 1 02/2020	1 (2%)	22.0 (N/A)	110 (N/A)	0 (0%)	0 (0%)	1 (6%)	0 (0%)
Wave 2 05/2020	5 (10%)	20.2 (19–22)	243 (220–305)	2 (15%)	0 (0%)	2 (13%)	1 (50%)
Wave 3 08/2020	7 (15%)	16.3 (15–18)	313 (110–540)	1 (8%)	0 (0%)	4 (25%)	1 (50%)
Wave 4 11/2020	0 (0%)	--	--	--	--	--	--
Wave 5 02/2021	10 (21%)	15.8 (15–17)	249 (75–550)	5 (39%)	0 (0%)	3 (19%)	0 (0%)
Wave 6 08/2021	1 (2%)	15.0 (N/A)	440 (N/A)	0 (0%)	0 (0%)	1 (6%)	0 (0%)
Wave 7 11/2021	14 (29%)	14.4 (14–15)	335 (245–493)	2 (15%)	8 (100%)	1 (6%)	0 (0%)
Wave 8 02/2022	4 (8%)	13.0 (11–15)	290 (250–360)	3 (23%)	0 (0%)	4 (25%)	0 (0%)

*Data are reported at the clinic level

†Wave indicates the dates during which they conducted study activities, with the starting date indicated

‡Foundational support practice facilitation consisted of baseline assessment and kickoff activities, where facilitators presented supplemental support activities as options. Only Waves 2 and 4 had clinics that chose Foundational Support

Exit interviews indicate that clinics described largely positive experiences with ANTECEDENT and the practice facilitators. One clinic expressed that the benefit was an increased understanding of opportunities to improve SBIRT implementation. Clinics also appreciated having dedicated time and space to think about UAU care, building general quality improvement capacity (such as the ability to run SBIRT reports), establishing or improving workflows, expanding screening modality, and training for BI via motivational interviewing. Informants also described how the project increased staff motivation, lifted clinic morale, brought meaning to clinicians, and increased attention to health equity.

I think the whole project and team was great. I had an MA, it was her first time being on a [quality improvement] project. The two providers that had not been on a project before. . they were very excited. I think it actually brought some sense of accomplishment to work. We'd leave the meetings, and you could feel people came in tired, especially the providers, and then it perked them up. . Being part of a team like that where you have a scheduled time to meet, and it's been blocked, is really key. - Clinic Champion, Rural Family Medicine Clinic.

SBIRT performance outcomes
Clinics' ability to produce SBIRT performance data varied widely; specifically, of the 48 clinics that completed the study, 69% (*n*=33) were able to produce any SBIRT performance data by the study end. Of those clinics for which performance data were collected, 15 clinics (31%) self-reported the Oregon Medicaid CCO metric; 1 clinic (2%) self-reported the MIPS metric; and 17 clinics (35%) provided EHR data to calculate the research metric. In the subset of clinics with submitted or extracted EHR data (*n*=17), no clear pattern of SBIRT performance was seen, see Fig. 2. However, 7 clinics (41%) increased their number of patients screened, 8 (47%) increased their rate of brief interventions for people who screened positive on UAU (i.e., those for whom it was recommended).

The different measurements and availability of data in EHRs contributed to heterogeneity in measurement periods (e.g., calendar year, rolling year, custom selection), patient populations (e.g., all payers, Medicaid only), and age ranges. For example, three clinics had somewhat larger decreases in eligible patients screened, which could have reflected edits to EHR reports that may have pulled more patients eligible for screening reflecting standardization of criteria for screening or actual decreases in screening of the same population over time. In addition, clinics reported performance measures at different time points during their study participation, partially depending on whether they needed HIT support to generate the data.

Table 4 SBIRT and MAUD implementation outcomes, n (%)

	Baseline (Pre-intervention)	Exit (Post-intervention)	*p*-value
Self-Reported Process Outcomes (Survey Data, *N* = 37)			
Screening Frequency			< 0.001
Never	0 (0.0%)	0 (0.0%)	
Up to 25%	11 (29.7%)	10 (27.0%)	
26–50%	7 (18.9%)	2 (5.4%)	
51–75%	6 (16.2%)	16 (43.2%)	
76% or more	11 (29.7%)	9 (24.4%)	
Unknown/Missing	2 (5.4%)	0 (0.0%)	
Practice Implemented UAU Process			**< 0.001**
Not Started	2 (5.4%)	0 (0.0%)	
Planning	11 (29.7%)	11 (29.7%)	
Active	10 (27.0%)	4 (10.8%)	
Full	14 (37.8%)	22 (59.5%)	
Unknown/Missing	0 (0.0%)	0 (0.0%)	
Practice Implemented Results Review Process			**< 0.001**
Not Started	6 (16.2%)	4 (10.8%)	
Planning	14 (37.8%)	9 (24.3%)	
Active	8 (21.6%)	5 (13.5%)	
Full	8 (21.6%)	19 (51.4%)	
Unknown/Missing	1 (2.7%)	0 (0.0%)	
Practice Implemented Assessment UAU Symptoms			**< 0.001**
Not Started	6 (16.2%)	2 (5.4%)	
Planning	14 (37.8%)	11 (29.7%)	
Active	11 (29.7%)	8 (21.6%)	
Full	6 (16.2%)	16 (43.2%)	
Unknown/Missing	0 (0.0%)	0 (0.0%)	
Practice Routinely Provides Patient Feedback (Brief intervention)			**< 0.001**
Not Started	5 (13.5%)	1 (2.7%)	
Planning	16 (43.2%)	11 (29.7%)	
Active	11 (29.7%)	11 (29.7%)	
Full	5 (13.5%)	13 (35.1%)	
Unknown/Missing	0 (0.0%)	1 (2.7%)	
Practice Routinely Provides Referral to Treatment			**< 0.001**
Not Started	4 (10.8%)	3 (8.1%)	
Planning	17 (46.0%)	11 (29.7%)	
Active	10 (27.0%)	12 (32.4%)	
Full	6 (16.2%)	11 (29.7%)	
Unknown/Missing	0 (0.0%)	0 (0.0%)	
SBIRT Performance Reporting (EHR Data, *N* = 48)			
Any SBIRT Reporting Ability	31 (64%)	33 (69%)	
Oregon CCO Metric, Self-reported	13 (27%)	15 (31%)	
Research Metric	16 (33%)	17 (35%)	
MIPS #432	2 (4%)	1 (2%)	

Discussion

ANTECEDENT applied flexible, tailored support to improve SBIRT and MAUD implementation in diverse primary care clinics. Most participating clinics elected to receive supplemental support, including practice facilitation, data review, HIT support, expert consultation, and peer-to-peer learning. Clinics chose a variety of goals and displayed significant improvement in the implementation of SBIRT and MAUD clinical processes. EHR performance data on SBIRT outcomes were mixed, but challenges with reporting make overall improvement trends difficult to assess. Clinics that completed the study found benefits from having time and space to focus on improving UAU care. Health care staff noted the project was valuable for them due to improvements in workflows, training, and morale.
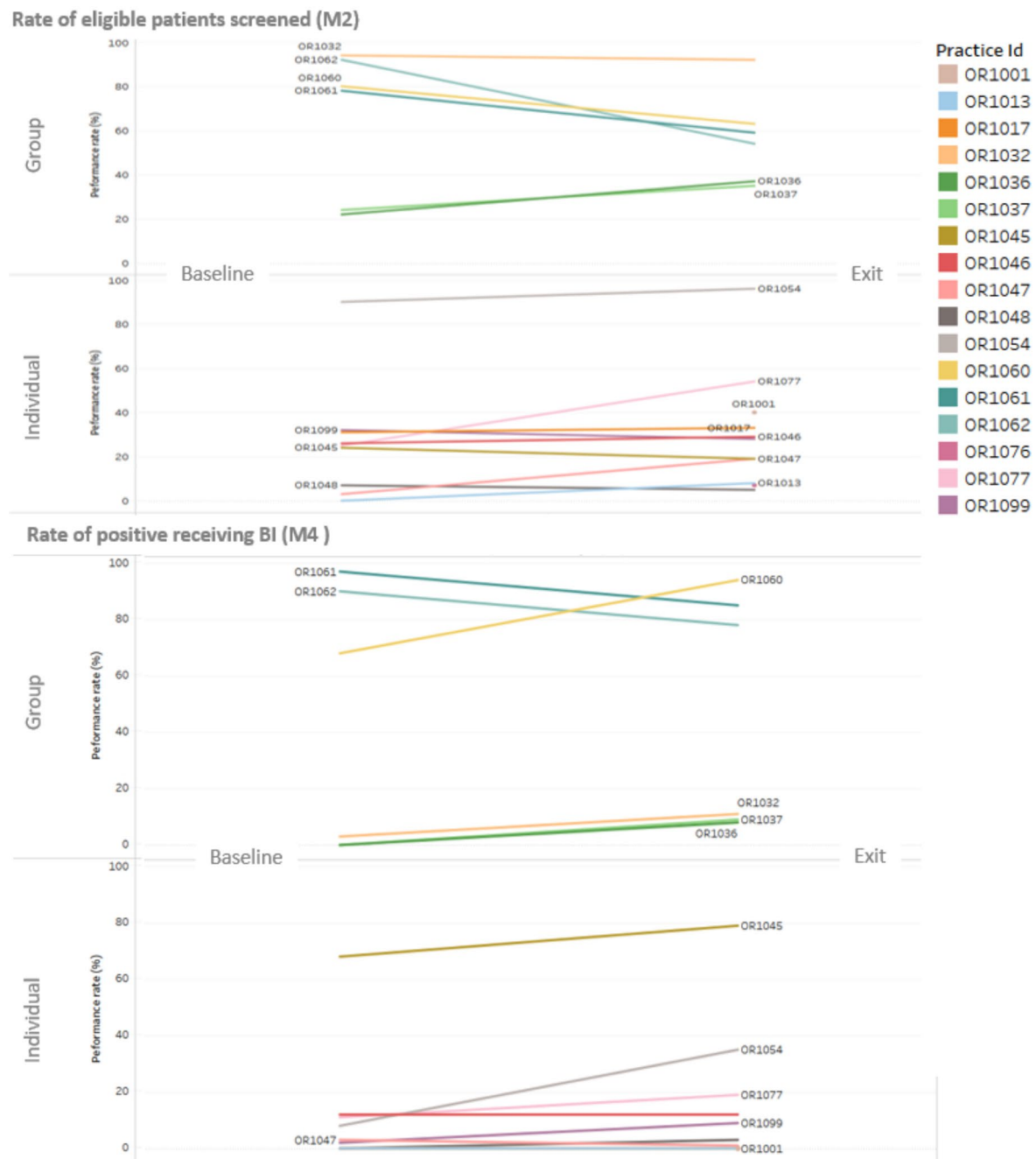
Fig. 2 SBIRT 30-day Baseline and Exit Performance using AHRQ Research Metric based on EHR data (*n* = 17)*. [1]The Figure includes only Data Source of EHR data used to directly calculate the custom research metrics. Metrics reported or estimated from CCO or MIPS measures are not shown. [2]Clinic OR1048 received only foundational support and no supplemental support

ANTECEDENT is one of the first studies to explore SBIRT and MAUD implementation in a range of primary care clinic setting types, rather than only in integrated systems [76]. We recruited primary care clinics agnostic to ownership, focusing on engaging small to medium-sized clinics. While over half of the participating clinics were small (< 10,000 patients), about half of the clinics engaged in ANTECEDENT participated as part of a group, rather than as an individual clinic site. This raises the question of how to organize practice-based research using clinics as the orienting level of intervention and highlights that clinics are now commonly embedded within health systems and networks [77, 78]. It also suggests different levels of support and resources might be needed for implementation success; specifically, some interventions may

require adding new staff positions, not just refining existing roles or programs [79]. Implementation support strategies better aligned with varied clinic contexts could encourage an equity rather than equality approach [80, 81]. Future research might also compare SBIRT screening for UAU versus for multiple health risk behaviors (e.g., alcohol, depression, tobacco use) [9].

Barriers to implementing and reporting on outcomes observed in ANTECEDENT resonate with prior research. Individual-level barriers to implementation emphasized community-level stigmas associated with UAU or the shifting social norms that made attitudes towards alcohol use more acceptable during the pandemic [82, 83]. Organizational barriers to SBIRT implementation were similar across participants, including competing priorities, staff capacity, and pandemic-related stressors [52, 84–86]. The open-ended nature of the intervention generally enabled the participating clinics to customize support, yet some clinics desired more prescriptive steps. Despite the concurrent COVID-19 pandemic, our 72% study completion rate was similar to prior practice-based research studies [87, 88]. Nine clinics were not able to engage after recruitment and 18 others withdrew throughout the study; however, we detected no significant differences in withdrawal patterns by clinic characteristics (e.g., size, type, geography). Additional research should explore withdrawal patterns and tailored implementation support when delivered by expert versus novice facilitators or to clinics with established versus new relationships with research teams [76]. Using an estimated patient panel of 2500 patients per provider [89, 90], study activities are anticipated to have reached over 600,000 people in the total patient population of the participating clinics annually.

SBIRT is a metric that uses several different ways to calculate performance outcomes, and the completeness and quality of the SBIRT data provided varied considerably across clinics. Many clinics needed support to produce SBIRT performance data (27% of clinics used HIT support and only 69% eventually provided performance data by the end of the study). The original goal was to have audit and feedback loops to review monthly performance data, but clinics and facilitators did not find this feasible in the context of the other stressors. These challenges of using EHR data for population-level reporting have been observed in other studies and warrant ongoing policy-, system-, and clinic-level interventions [91, 92]. To be able to evaluate performance outcomes in future studies like this, more investment is needed in technical support to improve EHR data collection and reporting or to budget for a manual chart audit [93].

This study had several strengths and limitations. First, we allowed clinics to elect which implementation wave to engage in, rather than to randomly assign in a step-wedge trial. While our data suggest statistically significant improvement in self-reported SBIRT process outcomes, we are unable to attribute these impacts to our intervention causally. However, flexibility in the starting time may have supported the retention of participating sites. Future studies could randomize participation while still allowing for flexibility in implementation strategies. Second, the original goal was to recruit 150 clinics for study activities; however, pandemic-related stressors affected recruitment efforts and clinical capacity to engage with the research team and study implementation. In response to these contextual stressors, we adjusted our clinic target [80], expanded our eligible region of participation (from Oregon to Northwestern states), and extended our enrollment time frame [52]. Our team also evolved our support strategies from in-person to remote facilitation and protocols to gather data to evaluate our research questions. Third, we designed the study to allow clinics with capacity to make UAU improvements by accessing resources from the SBIRT Oregon website in the foundational support arm, but we were unable to obtain individual site-level data on access and use of these public materials. We recommend a future assessment of the uptake and perceived value of this resource to build on these findings. Finally, given the challenges of acquiring SBIRT and MAUD process and outcomes data from diverse EHR systems, we could not perform regression analysis to tie implementation support to specific outcomes. Instead, we provide data on implementation and effectiveness using qualitative data, self-reported SBIRT/ MAUD process improvement, and EHR performance outcomes data when available from participating clinics. Future studies could examine specific gaps (both technological and other) in primary care clinics' ability to leverage EHRs for UAU screening improvement, and new interventions could focus on this need. In addition, new public health policy and infrastructure support in this area might be able to better support the ability of primary care to leverage EHRs for quality improvement [93].

Conclusion

Flexible, practice-facilitator-led implementation support increased implementation of SBIRT processes across diverse primary care clinics in ANTECEDENT. Flexible implementation approaches are important for enabling primary care practices to address unhealthy alcohol use as part of usual care, which has the potential to impact a large number of people. Of the

participating clinics, 88% chose to receive supplemental support. SBIRT performance data were challenging to extract from EHRs and required more technical support to be reliable for research measurement purposes. Our approach in ANTECEDENT was perceived as beneficial by clinics, enabled a diverse range of clinics to improve care for UAU, and presents opportunities for future research related to tailored implementation support.

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12913-024-11870-8.

Additional file 1. AHRQ UAU Process Measure Definitions. Detailed information about the AHRQ UAU process measure as discussed in the manuscript.

Additional file 2. Appendix: Supplemental Table A. Intervention Support Received by Participating Clinics. A supplemental table providing additional detailed information regarding the implementation support each clinic received.

Authors' contributions
MD and BH contributed to the plan and design of the ANTECEDENT project. JC and MD largely contributed to data interpretation, writing the original manuscript draft and subsequent revisions. JHL, JM and RD conducted all quantitative data analyses. EK, CB and TW conducted qualitative data analyses and interpretation. All authors (MD, JC, VS, EK, JHL, CB, JM, RD, TW, AR, MS, BH) provided substantial critical revision and approved the final manuscript.

Data availability
The datasets used and/or analyzed during the study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate
Study activities were approved by the Oregon Health & Sciences University Institutional Review Board (IRB) through an expedited review (STUDY00020592). The study obtained a waiver of HIPAA authorization for use of the EHR data on patient outcomes. All participants gave their informed consent to participate in the study after receiving a study information sheet. The IRB-approved information sheet included information describing the study including voluntariness, risks, benefits, and ability not to participate without penalty.

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

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