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SHORT REPORT

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A qualitative process evaluation of SBIRT implementation in pediatric trauma centers using the Science to Service Laboratory implementation strategy

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Abstract

Background Screening, Brief Intervention, and Referral to Treatment (SBIRT) is an evidence-based practice that can identify adolescents who use alcohol and other drugs and support proper referral to treatment. Despite an American College of Surgeons mandate to deliver SBIRT in pediatric trauma care, trauma centers throughout the United States have faced numerous patient, provider, and organizational level barriers to SBIRT implementation. The Implementing Alcohol Misuse Screening, Brief Intervention, and Referral to Treatment Study (IAMSBIRT) aimed to implement SBIRT across 10 pediatric trauma centers using the Science-to-Service Laboratory (SSL), an empirically supported implementation strategy. This manuscript aimed to assess trauma center staff preferences and experience with the didactic training, performance feedback, and ongoing coaching elements of the SSL via a retrospective qualitative process evaluation.

Methods Nurses, social workers, and site leaders that participated in IAMSBIRT were recruited to complete qualitative exit interviews guided by the Consolidated Framework for Implementation Research. Qualitative interviews were recorded, transcribed, and analyzed by two coders using a directed content analysis approach in NVivo software. Codes were then translated into frequently endorsed themes by the IAMSBIRT study research team.

Results Thirty-six exit interviews were conducted with site leaders, social workers, and nurses across the 10 IAMSBIRT pediatric trauma centers. Findings revealed key strengths as well as areas for improvement across the IAMSBIRT preparation phase and the three elements of the SSL: didactic training, performance feedback, and ongoing coaching. Trauma center staff generally reported that all three elements of the SSL were high quality and helpful for supporting SBIRT implementation. However, staff also noted that performance feedback and ongoing coaching were generally only available to center leadership or to individuals selected by leadership, making it challenging for non-leaders to troubleshoot SBIRT delivery.

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Conclusions Findings from the qualitative process evaluation revealed discrepancies in the experience of the SSL strategy between those in leadership roles and those involved in direct care delivery. These results suggest the need for several modifications to the SSL strategy, including increasing engagement of direct care staff in all elements of the SSL throughout the implementation process.

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Keywords SBIRT, Adolescents, Substance use, Pediatric trauma, Implementation science, Process evaluation

Contributions to the literature

- This article presents site leader, social worker, and nurse experiences with the implementation of Screening, Brief Intervention, and Referral to Treatment (SBIRT) across 10 pediatric trauma centers throughout the United States.
- Findings identified strengths as well as areas for improvement for the SBIRT implementation strategy, including modifications to didactic training, performance feedback, and ongoing coaching.
- Key differences emerged between the perspectives of leaders and other staff, suggesting that leadership buy-in is necessary but not sufficient for successful SBIRT implementation.
- This study highlights the value of post-study process evaluations to understand community partners' experiences and modify implementation strategies for future research.

Background

Screening, Brief Intervention, and Referral to Treatment (SBIRT) is an evidence-based approach for identifying and providing treatment referral for adolescents using alcohol and other drugs (AOD; [2, 22]). SBIRT involves screening adolescents with a validated tool, delivering a BI to teens who screen positive, and providing RT aligned with AOD use severity [3, 6]. Early screening and intervention for teens are particularly important as AOD use is likely to escalate across adolescence [9, 12] and increases the likelihood of injury [13, 14].

In 2006, the American College of Surgeons (ACS) established a guideline recommending that all level 1 trauma centers implement screening and BI for trauma patients with AOD use [1]. Despite this mandate, United States health care organizations serving adolescents continue to face barriers to SBIRT use at the agency (e.g., limited resources), provider (e.g., limited training), and patient levels (e.g., confidentiality concerns; [10, 21, 26]).

The Science to Service Laboratory (SSL)

The Implementing Alcohol Misuse Screening, Brief Intervention, and Referral to Treatment Study (IAMSBIRT) sought to address these barriers by evaluating an empirically supported implementation strategy, the Science to Service Laboratory (SSL), to implement SBIRT across 10 national pediatric trauma centers. The SSL was developed by the New England Addiction Technology Transfer Center, a SAMHSA-funded center that provides training and technical assistance to the substance use treatment and recovery workforce, as an effective strategy for enhancing evidence-based substance use treatment implementation. The SSL optimally combines multi-level implementation strategies targeted to front-line staff, leaders, and the overall organization to support new practice implementation [4, 11, 25, 27].

Outcomes of the IAMSBIRT study

The IAMSBIRT study evaluated the SSL via a stepped wedge, hybrid type 3 effectiveness-implementation study [19], and primary study outcomes have been published elsewhere [18]. In brief, the SSL increased screening reach across trauma centers (25.2% pre-implementation, 47.7% post-implementation), though screening rates remained below the 80% ACS benchmark. BI delivery was consistently high (85.3% pre-implementation and 90.7% post-implementation); however, no change was observed in RT among adolescents who screened positive for AOD use. Additionally, there was a decrease in referral to adolescents' primary care physicians for continued AOD discussions despite increased identification of adolescents who may have benefitted from referral [18].

Manuscript aims

Although the SSL has strong research support, findings from the IAMSBIRT study revealed limitations in SBIRT implementation within pediatric trauma centers. This manuscript presents results from a retrospective, qualitative process evaluation conducted with site leaders, social workers, and nurses regarding SSL use across the 10 participating pediatric trauma centers. Staff feedback will inform future SSL modifications to enhance its utility in pediatric trauma centers and further optimize SBIRT implementation. This manuscript will explore the following research questions: a) what themes emerged regarding trauma center staff preferences and experiences with the SBIRT preparation phase; and 2) what themes

emerged regarding the process of SBIRT implementation using the SSL?

Methods

This study was approved by the Lifespan Institutional Review Board (Study Number: 1092046). Study methods and results are presented in line with the Consolidated Criteria for Reporting Qualitative Research [28]. The full IAMSBIRT study protocol has been published elsewhere [19].

SSL implementation strategy

IAMSBIRT site leaders across 10 pediatric trauma centers engaged in a three-month preparation phase designed to promote pre-implementation SBIRT awareness and knowledge. Phase activities included posting SBIRT printed materials on trauma center units, research team consults regarding electronic health record (EHR) modifications, monthly emails describing the initiative, monthly site leadership calls, and delivery of initial SBIRT didactic training. The SSL was then delivered across a six-month SBIRT implementation phase at each trauma center and included additional didactic training, performance feedback, and monthly coaching.

Didactic training

The IAMSBIRT project engaged three staff roles (i.e., tracks); leadership responsible for implementation oversight, social workers engaged in BI and RT, and nursing staff responsible for screening. During the preparation phase, nurses completed a 30-min webinar training focused on screening, while social workers and leaders completed a one-hour online SBIRT orientation training followed by a two-hour live SBIRT training employing active learning methods and role play [5]. During the implementation phase, all three tracks were invited to complete optional webinars covering in-depth topics including screening adolescents for substance misuse, brief motivational interviewing, and an adolescent SBIRT toolkit.

Monthly coaching and performance feedback

Throughout the six-month implementation phase, leaders from each track participated in monthly coaching calls. Leaders were encouraged to conduct role plays and provide performance feedback to nurses and social workers using a standard set of practice cases and data monitoring tools. Monthly coaching calls focused on troubleshooting barriers to implementation and developing a quality improvement plan for each trauma center to facilitate sustained SBIRT delivery.

Qualitative study participants

Participants were recruited from the 10 pediatric trauma centers and were eligible if they were nurses, social workers, or study site leaders providing care to adolescent trauma patients during the IAMSBIRT study. Exclusion criteria were minimal to facilitate a representative staff sample. Purposive sampling was employed to ensure representation of each track across all participating centers. Trained research specialists invited participants to engage in a one-hour interview, for which they were compensated with a $75 gift card. All participants completed an informed consent process.

Qualitative interview guide

The qualitative interview guide was developed using the Consolidated Framework for Implementation Research (CFIR) universal interview guide, which contains questions designed to evaluate the implementation process (see Supplemental Materials for interview guide [7]). Questions focused on assessing the SSL process as well as participant feedback across the planning (awareness building), engaging (didactic trainings), executing (monthly coaching calls), and reflecting and evaluating (performance feedback) CFIR domains. Interviews were conducted by trained research specialists via video conference.

Qualitative data analysis

Qualitative interviews were recorded and transcribed for qualitative analysis. Data were analyzed using directed content analysis with NVivo 13 software [8, 15, 17]. The first author developed the qualitative coding dictionary using a priori CFIR domains and trained two analysts in coding dictionary application. The two analysts then coded a single transcript and met to establish initial inter-rater reliability. All coding discrepancies were resolved via discussion to attain 100% consensus, with the first author providing final disposition. The two coders then double coded 20% of the transcripts ($n=7$), to establish inter-rater reliability and then coded the remaining transcripts independently ($n=29$, 14–15 per coder). The first author reviewed the coded transcripts and organized codes into a preliminary set of themes. Identified themes were reviewed and approved by the research team. Queries were run in NVivo to identify the most frequently endorsed SBIRT implementation process themes.

Results

Table 1 presents participant demographics ($N=36$) for participating trauma center leaders ($n=16$), social workers ($n=10$), and nurses ($n=10$). Most interview

Table 1 Participant demographics

Demographic Variable	Frequency(%), *M*(*SD*)
Gender	
Male	3 (8.3%)
Female	33 (91.7%)
Race	
Asian	1 (2.8%)
Black or African American	3 (8.3%)
White	29 (80.6%)
More than One Race	2 (5.6%)
Other	1 (2.8%)
Highest Degree	
Bachelor's Degree	12 (33.3%)
Master's Degree	14 (38.9%)
Doctorate Degree	10 (27.8%)
Role	
Social Worker	10 (27.8%)
Nurse	10 (27.8%)
Leader	16 (44.4%)
Age	39.8 (11.7)
Years Working in Current Role	10.8 (9.67)
Years Working at Trauma Center	11.3 (7.4)

participants were Female (91.7%), non-Hispanic White (80.6%), and had either a bachelor's (33.3%) or master's degree (38.9%).

SBIRT preparation phase

Participants provided feedback on preparation phase timing as well as the implementation strategies deployed to increase SBIRT awareness (i.e., teaser emails, EHR changes, posters) and knowledge (i.e., initial didactic trainings). Table 2 presents comprehensive exemplar quotes across identified themes.

SBIRT preparation phase strengths

SBIRT awareness building

Trauma center staff indicated that key strengths of the preparation phase were the amount of time spent building awareness as well as the all-staff teaser emails, which included information about the IAMSBIRT study, the rationale for SBIRT, planned staff role changes, and how SBIRT data would be used. For example, one trauma center staff noted that, "*I think the conversations that were had with the teaser emails and then just the rollout to our department was the right amount of education." [Social Worker].*

SBIRT in person and webinar trainings

Staff from all trauma centers indicated that time spent in training, both live and online, was adequate to build SBIRT knowledge across tracks. Staff reported especially liking that online trainings could be accessed on demand; noting that, "*… The fact that [there was] ongoing access to the training, even for new staff, I think, was reasonable." [Leader]*. Staff from all trauma centers also reported that the live and webinar trainings were high quality and provided specific examples of SBIRT use. Staff found it particularly helpful to have information presented in both print and video and by engaging instructors with substance use treatment expertise (see Table 2).

SBIRT preparation phase areas for improvement

SBIRT awareness building

While some staff spoke favorably about the time spent in preparation, others indicated that there should have been more time allotted to SBIRT communication. Study leaders were responsible for hanging posters and providing lists of staff who should receive teaser emails, however feedback indicated that these activities were not completed effectively, as, *"There was some breakdown here where those of us who were expected to implement this had no idea what was going on…" [Social Worker].*

Staff also highlighted challenges related to receiving information via email, as emails got lost due to high volume or were only sent to some staff roles. One staff member reported that, *"yeah the teaser emails are good, but the teaser emails for the most part…they're directed [to the] project leaders." [Leader].*

SBIRT in person and webinar trainings

A smaller number of staff indicated that they would have liked more time in training and refresher trainings, tailored trainings for low resourced trauma centers, and trainings that were more inclusive of staff roles: these quotes again suggested a breakdown between those leaders identified as in need of training versus those who actually needed training. One staff member noted that, *"We definitely can use more training…I was trained in it. A few of my other coworkers were trained in it, but not everybody has been so…" [Social Worker].*

SBIRT implementation phase

As with the preparation phase, participants provided feedback regarding the timing and duration of the SSL strategies deployed during the implementation phase (e.g., performance feedback and monthly coaching calls).

SBIRT implementation phase strengths

SBIRT performance feedback

Several staff noted that performance feedback from the IAMSBIRT study team and from their internal team leaders was vital in improving SBIRT quality. One staff member noted, *"what they did was to make us pay attention*

Table 2 Identified themes and exemplar quotes

Theme	Exemplar Quotes
I. Preparation Phase	
Awareness Building	
Strengths	
Adequate time spent awareness building	*"I think there was a lot of awareness there's a lot of time given to the clinical staff who's going to undergo the training to prepare,"[Leader]* *"…yeah I mean I felt like it was good, we definitely did a lot of like education with staff about it and just send out a lot of like emails and reminders about it."[Nurse]*
Areas for Improvement	
More time needed for awareness building	*"I don't think it [awareness building] was good, it was it needed improvement, and I still think there's not very good awareness about the actual intervention [SBIRT] part of it."[Nurse]*
Need for better communication – better rationale, clarity around staff roles, challenges with email	*"There was some breakdown here where those of us who were expected to implement this had no idea what was going on, and we were just caught out of the blue in the midst of COVID when we were trying to um uh scramble, and you know, like everyone else, was doing, change our services to online services, et cetera. We were getting these emails out of the blue about this long training in SBIRT, which, like I said, we had already been doing, and so it was very confusing." [Social Worker]* *"I said what's what just works best for me is just understanding the rationale behind it, not just this is a new policy, we have to do this you're required…I just felt like we do so many screenings on our inpatient admission process and some of them I just I just don't understand what the info is used for…" [Nurse]* *"yeah the teaser emails are good, but the teaser emails for the most part… they're directed [to the] project leaders." [Leader]* *"I don't remember seeing any posters but there could have been." [Leader]*
Need to include more roles in awareness building	*"That was the feedback that we got mostly from like our nurse manager and supervisor and people that um we're hearing feedback from clinical nurses is they just had no idea what it was, despite you know the posters that we were given and emails being sent out" [Leader]*
Didactic Training	
Strengths	
Adequate time spent in training	*"I think adequate time was spent [in training]. The fact that [there was] ongoing access to the training, even for new staff, I think, was reasonable." [Leader]* *"I think it was adequate because it's going really well and the people who are responsible for doing the SBIRTs are really successful and they're also motivated to get them done and to not miss anyone as best they can. And I yeah, so I think that went really well." [Leader]*
High training quality – webinars and in person	*"…I'm only halfway through the third one [webinar], but they're engaging I think they give really good specific examples and they're very I mean they're very sensitive to the fact that we don't have all the time in the world, so there you know, I think the idea I would try to get across to my colleagues is you know, none of us is going to be an addiction expert overnight, but if you just get a few little phrases or tools or tricks, or you know just methods to work with the kids I think that that is very worth our time." [Nurse]* *"I think the quality of the training, especially for the social workers, as well as the non social work staff who are the leaders of the project has been has been excellent." [Leader]*
Helpful to have engaging instructors who are experts in substance use treatment	*"I enjoyed you know the presenters were good they were engaging, so I think it was it was definitely I think a good a good training and I yeah so I I did feel like I came away from it with some new knowledge." [Social Worker]* *"I thought it was really great I attended and I learned a lot, actually, and it was helpful that there was experts in substance use who kind of lead that training and led us through, but it was clear that they knew the process, in other words, they knew the things that were going to be barriers for us and kind of like were preemptively talking about those things and I really enjoyed the training." [Leader]*
Helpful to have printed and interactive videos	*"I think they were very good. I appreciated the information in print, and then also having the interactive videos showing demonstration so I was getting information in various ways. So I liked that." [Social Worker]*

Table 2 (continued)

Theme	Exemplar Quotes
SBIRT role plays were helpful	*"I think our staff struggled with the webinars finding time for that I think the live session was most helpful for them, I think, particularly the role plays. The typical learning modality for social work, so I think that that was something that worked well." [Social Worker]*
Areas for Improvement	
More time needed for training/need for training refreshers/need to incorporate more roles in training	*"We definitely can use more training. Ah, for it, I would say um I was trained in it. A few of my other coworkers were trained in it, but not everybody has been so. That's something that I think would be helpful." [Social Worker]* *"I think continued, as I said, I think that continued trainings would be helpful or continued refreshers would be helpful." [Social Worker]* *"um I mean I feel like we in the ICU didn't necessarily get any [training] time." [Nurse]"*
Some participants did not receive training/only received some training	*"I didn't go to any of the monthly trainings, but I did go to the original implementation meeting. But very brief, to the point didn't really expand on much I don't know if that's just because we already used a different screening tool and knew what the purpose of it was but it was just very brief." [Nurse]* *"I only attended the I guess that would have been the orientation webinar I didn't I wasn't able to go to any of the monthly ones, and I did not go to the live in person, one. I think that the. The orientation video webinar thing I watched was good, however, I don't feel like there was a good introduction to it or an explanation of what we were going to do with that information at our institution." [Nurse]*
Training could be strengthened by conducting in person rather than Zoom or via webinar	*"If that training were in person or over zoom where there were actually people talking to you, so I think if you wanted to strengthen those webinars it could be more. Kind of live webinars would help that I think you know it's just easy when you're watching webinars to be like oh I'm also going to work on this, you know." [Leader]*
Preference for more written resources to supplement training	*"…it was comparable to other things that we've gotten so good, it made sense, again, I would just add you know, maybe some more written resources that could have been left on the unit." [Nurse]*
Preference for training to be tailored to low resourced trauma centers	*"It was good, I think. We just wished it had been a little bit more specific to a trauma center. Um, especially a trauma center with very low resources, non-English speaking patients. And um, I think, having it geared towards patients. You know a typical trauma population of patients where they are Ah, lower resourced would have been good." [Social Worker]*
Preference to translate training materials into different languages	*"…or the materials can be in different languages. That would be great as well." [Social Worker]*
II. Implementation Phase	
Performance Feedback	
Strengths	
Helpful for getting feedback on SBIRT training materials being provided to staff	*"…they were helpful because what they did was to pay make us pay attention to stuff that needed to get done, and so that was really good Getting feedback on the materials that we were providing was important…" [Leader]*
Helpful for developing quality assurance procedures	*"…some of the things especially appreciated the additional information you have provided that helped us develop our quality assurance tool." [Leader]*
Helpful for monitoring progress/performance	*" Oh, I think they were great I think it was nice to be able to and get some good feedback, of how we were doing and how what we thought we were doing versus what they thought we were doing." [Leader]*
Areas for Improvement	
Some participants did not receive performance feedback due to not being invited or able to attend feedback meetings	*"…especially in the beginning I've missed, many of them because it's like it's a tough it's almost always a tough time in my schedule, but for everything I've been in I've made a point of being on the ones when there's kind of an announcement of a big change or transition and protocol they've been great." [Leader]*
Feedback would have been more helpful if social workers had BI consults to actually discuss	*"We didn't have a lot to offer because we didn't have a lot of consults yeah so you know it's hard to be coached on something that hasn't happened." [Social Worker]*

Table 2 (continued)

Theme	Exemplar Quotes
Monthly Coaching Calls	
Strengths	
Calls helpful for troubleshooting and coming up with creative strategies for addressing new and existing SBIRT barriers	*"Yeah I mean I think it's helpful I know we're doing the post coaching with the team, but also with our team like we just had a you know, a team meeting yesterday with just hospital staff so there's been a lot of you know information on how it's going if we're like missing adolescents, which was what our meeting was about yesterday and just how to always kind of improve the care we're providing, so I think it's been good." [Social Worker]* *"They are helpful because a lot of times the barriers that you and challenges you face are, you know individuals, or you know, focus on your institution and um re related to things that are hard to address…So those barriers are real, even though they're hard to fix, and that's been helpful to kind of come up with some creative strategies around that." [Leader]*
Calls helpful for keeping on task, moving implementation forward	*"Again, I thought that I thought that was very helpful for me in my role and it kept us again it kept us on task and it kept us they kept us moving in the implementation process, so I thought it was very good." [Leader]*
Calls helpful for on demand support for general and specific questions	*"Yeah I think those went fine and we when we would come on those the social workers would often have questions about things they were seeing. Mostly they had to deal with like what is a positive and how do we deal with a positive, because some of our positives are literally like my mom made me drink a sip of wine right and this question of like well how do I deal with that and then, and so I think they did have a lot of questions of the implementation team. But little questions like that there was nothing really major that came up." [Leader]*
Calls helpful for clarifying procedures for IAMSBIRT study protocol changes, data collection, and chart reviews	*"Yeah I did I did, especially in the beginning I've missed, many of them because it's like it's a tough it's almost always a tough time in my schedule, but for everything I've been in I've made a point of being on the ones when there's kind of an announcement of a big change or transition and protocol they've been great." [Leader]* *"So I like the meetings a lot and I felt like they were informative also for the [IAMSBIRT study] chart reviews, because that that's a big project and it is big part so having questions answered and then being able to know exactly what they're looking for each time." [Leader]*
Calls helpful for bringing together different disciplines to discuss SBIRT implementation	*"I think, so I think they helped identify it at least helped bring all the disciplines together to identify any barriers that were happening." [Leader]*
Areas for Improvement	
Some participants did not attend coaching calls	*"I did not attend. I think it was [Site PI]. Um, Yeah." [Leader]*
Calls less helpful because they could not solve broader trauma center resource challenges	*"I was frustrated because we didn't have any support to get this going. And so we were just continuing in the practice we had already been doing so. I was frustrated with that, and again, it has nothing to do with IAMSBIRT It was our own institution, not having buy-in to do this a different way than what we had already been doing it." [Social Worker]*

to stuff that needed to get done, and so that was really good…" [Leader]. Another staff member noted that ongoing supervisor feedback was critical in highlighting discrepancies between, "*how what we thought we were doing versus what they thought we were doing." [Leader].*

SBIRT monthly coaching calls

Staff generally had positive feedback about the monthly coaching calls during the implementation phase and noted eight distinct benefits: a) troubleshooting SBIRT implementation challenges; b) addressing SBIRT barriers; c) monitoring implementation progress; d) addressing on demand questions; e) clarifying SBIRT delivery procedures; f) bringing together different disciplines; g) getting feedback on staff training materials; and h) planning for quality improvement. One staff member reported that, "*…I thought that was very helpful for me in my role…they kept us moving in the implementation process…" [Leader].*

SBIRT implementation phase areas for improvement

SBIRT performance feedback

Several social workers reported that performance feedback was less effective due to a low number of adolescents screening positive for AOD, and therefore low numbers receiving BI, "*We didn't have a lot to offer because we didn't have a lot of consults…it's hard to be coached on something that hasn't happened." [Social Worker].* Notably, multiple staff were not able to comment on this

dimension because they did not recall receiving performance feedback, suggesting a disconnect between what leaders committed to and what was being done at some pediatric trauma centers.

SBIRT monthly coaching calls

Finally, staff highlighted two concerns with the monthly coaching calls. First, staff noted that calls were optional and leaders selected attendance, so some staff were either not invited or unable to join. Second, staff noted that the monthly coaching calls helped to problem solve systematic SBIRT barriers, but were insufficient to address pervasive issues such as limited institutional support. One staff member noted, *"I was frustrated because we didn't have any support to get this going…It was our own institution, not having buy-in…" [Social Worker].*

Discussion

Process evaluations are a vital step in understanding staff experiences with SBIRT implementation, contextualizing study findings, and addressing barriers for future studies [16]. Overall, the SSL promoted increased screening, however rates across trauma centers did not reach ACS benchmarks and findings revealed missed opportunities to refer adolescents for follow up discussions about AOD use upon discharge [18]. BI rates were consistently high pre- and post- SBIRT implementation, yet social workers perceived limited opportunities to deliver BI. Prior IAMSBIRT analyses, which aligned with the broader literature, suggested that 13.8% to 32.5% of adolescent trauma patients use AOD [20]. Taken together, these findings indicate that AOD use was indeed present among patients and BI was delivered at high rates when adolescents were effectively screened, however suboptimal screening rates likely limited social workers' opportunities to deliver BI and subsequent RT.

Our findings also demonstrated a disconnect between trauma center leadership and staff throughout the SBIRT implementation process. Although the SSL optimally includes both front-line staff and leader focused implementation strategies, many of the IAMSBIRT strategies used leaders as information conduits to front-line staff, which may have limited staff access to needed SBIRT information and resources. Our findings suggest that leadership buy in and support may be necessary but not sufficient for SBIRT scale up [23]. When using the SSL, it may be beneficial to incorporate a champion to promote and facilitate SBIRT among front-line staff [24], require confirmation of pre-implementation activity completion (e.g., promotional material distribution), integrate implementation activities into existing staff meetings to support staff involvement, and offer follow-up training specifically focused on increasing screening and RT.

Discrepancies also emerged between leaders and staff regarding implementation phase performance feedback and monthly coaching calls. Performance feedback was rated highly by leaders but many staff were unable to attend feedback meetings. Similarly, monthly coaching calls were rated as helpful for troubleshooting SBIRT implementation, but not all staff participated, and some implementation barriers were insurmountable. Although performance feedback and ongoing consultation are core elements of the SSL, they likely require additional tailoring to the context of busy trauma center settings [27].

There are some limitations that are important to consider. This study was done retrospectively, therefore recall bias, staff turnover, and unequal time since SBIRT implementation across sites may have influenced participant responses. Additionally, some sites only had a single nurse, leader, or social worker representative whose views may not represent the broader trauma center's experience with SBIRT implementation. Finally, the SBIRT implementation processes highlighted in this manuscript are specific to pediatric trauma and may require substantial tailoring for other settings, especially those without robust substance use treatment resources for adolescents (e.g., federally qualified health centers).

Conclusions

The SSL provided strong awareness building, high quality training, and beneficial performance feedback and coaching calls. Addressing growth areas highlighted in our process evaluation would further strengthen this well received strategy, particularly for further enhancing screening and RT. More research is needed to better understand the relationship among staff feedback about the SSL, participation in SSL core components, and delivery of the IAMSBIRT model.

Abbreviations

CFIR	Consolidated Framework for Implementation Research
EHR	Electronic Health Record
IAMSBIRT	Implementing Alcohol Misuse Screening, Brief Intervention, and Referral to Treatment
SBIRT	Screening, Brief Intervention, and Referral to Treatment
SSL	Science-to-Service Laboratory Implementation Strategy

Supplementary Information

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Supplementary Material 1.

Authors' contributions

KS contributed to the conceptualization, qualitative codebook development, training in qualitative analysis, data analysis and interpretation, drafting, and editing of the full manuscript. EAL and GA contributed to the qualitative interview coding and drafting of the manuscript "Methods" and "Results" sections. JRB, SJB, JB2, MRZ, AS, and MJM contributed to the manuscript and study

conceptualization, data analysis and interpretation, and full manuscript editing. RTM, JA, SR, KL, CP, ECL, IN, LL, BE, and AK contributed to full manuscript editing. All authors read and approved the final manuscript.

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Data availability
The datasets generated and analyzed during this study are not publicly available due to the data containing information that could compromise research participant consent. Data are available from the first author of this manuscript on reasonable request.

Declarations

Ethics approval and consent to participate
This qualitative study was reviewed and approved by the Lifespan Institutional Review Board (Study Number: 1092046).

Consent for publication
Not applicable.

Competing interests
The authors declare that they have no competing interests.

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