Feasibility of implementing a screening tool for risk of opioid misuse in a trauma surgical population

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Abstract

Background

As the opioid crisis continues to affect communities across the United States, new interventions for screening and prevention are needed to mitigate its impact. Mental health diagnoses have been identified as a risk factor for opioid misuse, and surgical populations and injury survivors are at high risk for prolonged opioid use and misuse. This study investigated the implementation of a novel opioid risk screening tool that incorporated putative risk factors from a recent study in four trauma units across Wisconsin.

Method

The screening tool was implemented across a 6-month period at four sites. Data was collected via monthly meeting notes and "Plan, Do, Study, Act" (PDSA) forms. Following implementation, focus groups reflected on the facilitators and barriers to implementation. Meeting notes, PDSA forms, and focus group data were analyzed using the consolidated framework for implementation research, followed by thematic analyses, to generate themes surrounding the facilitators and barriers to implementing an opioid misuse screener.

Results

Implementation facilitators included ensuring patient understanding of the screener, minimizing staff burden from screening, and educating staff to encourage engagement. Barriers included infrastructure limitations that prevented seamless administration of the screener within current workflows, overlap of the screener with existing measures, and lack of guidance surrounding treatment options corresponding to risk. Recommended solutions to address barriers include careful timing of screener administration, accommodating workflows, integration of the screening tool within the electronic health record, and evidence-based interventions guided by screener results.

Conclusion

Four trauma centers across Wisconsin successfully implemented a pilot opioid misuse screening tool. Trauma providers and unit staff members believe that this tool would be a beneficial addition to their repertoire if their recommendations were adopted. Future research should refine opioid misuse risk factors and ensure screening items are well-validated with psychometric research supporting treatment responses to screener-indicated risk categories.

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Plain Language Summary: As the opioid crisis continues to affect communities across the United States, new interventions for early screening and prevention are needed to minimize the related harms. Prior research has identified risk factors associated with opioid misuse among a trauma surgical patient population, with the highest risk associated with distress-related posttraumatic stress disorder symptoms. A pilot screening tool was created based on this prior research, which was then administered at four trauma surgical units across the state of Wisconsin. Each of the four trauma units successfully implemented the pilot screening tool, and each identified a number of facilitators and barriers to the implementation process. Recommendations for improvement of the implementation process were also gathered. If their recommended changes were to be adopted, trauma providers and trauma unit staff members believed that such a screener for opioid misuse would be a beneficial addition to their current workflow among traumatic injury patients. Future research should refine opioid misuse risk factors and develop a psychometrically sound, validated screener to detect varying levels of risk and tailor treatment approaches based on a patient's risk score. Additionally, future research in the field of opioid misuse prevention should prioritize the recruitment of a more diverse population to support the translation of study findings across populations.

Introduction

The opioid crisis continues to permeate the United States (U.S.), as the annual death toll ascends despite continued efforts to abate this crisis (U.S. Department of Health and Human Services, 2021). Prescription opioid use is a pernicious vehicle of this epidemic, evidenced by the 9.5 million people aged 12 or older who misused opioids (U.S. Department of Health and Human Services, 2021) and over 16,000 deaths involving prescription opioids (CDC, 2021) in 2020 alone.

Known risk factors for prescription opioid misuse include past or present mental health diagnoses and substance misuse (Cragg et al., 2019). Another demonstrated risk factor for prescription opioid misuse is surgery; approximately 70% of patients prescribed opioids keep their excess opioids (Feinberg et al., 2018), and the risk of misuse increases with perioperative opioid prescription (Gangavalli et al., 2017; Malik et al., 2020; Neuman et al., 2019). Opioid prescribing upon hospital discharge contributes to increases in opioid refills and chronic opioid use 12 months postdischarge (Calcaterra et al., 2016). One surgical population particularly at risk for chronic, prolonged opioid use, misuse, and use disorder are those receiving surgery for traumatic injury.

A systematic review encapsulating over 30,000 trauma patients in the U.S. found that opioid prescriptions are more common following trauma surgery (Rowe et al., 2022), despite the finding that patients receiving opioids were more likely to report decreased satisfaction with pain relief, compared to other analgesic methods (Bot et al., 2014). Prolonged opioid use has been shown to be particularly elevated in trauma settings (Mohamadi et al., 2018), with 35% of patients continuing to use opioids 4 months after traumatic injury (Rosenbloom et al.,

2017). Approximately 25% of individuals receiving opioids either misuse their medication or are inappropriately prescribed opioids (Liu et al., 2013), and this rate of misuse appears to rise to nearly 50% for Emergency Department patients (Beaudoin et al., 2014). These risks extend beyond the individual patient through improper disposal methods (Lamplot et al., 2021) and contribute to the harrowing 70% of individuals disclosing nonmedical opioid use reporting that they obtained those opioids from close friends or family members (Jones et al., 2014; Rigg et al., 2018). The rapid spread of opioid misuse from improperly disposed prescription opioids and nonprescribed opioids such as heroin is an ominous warning that improving prescription practices is a necessary but insufficient response to the opioid crisis (Volkow et al., 2019).

Additionally, while the Center for Disease Control and Prevention released a new set of opioid prescribing guidelines in 2022, they failed to specifically address opioid prescribing in the setting of trauma and acute care (Dowell et al., 2022). Therefore, trauma prescribers are forced to extrapolate from acute care and chronic pain prescribing guidelines for their patient population, leaving room for variations in provider interpretations and patterns of under- or overprescribing. Despite the risks associated with opioid prescribing in the setting of traumatic injury, at the time of writing, the authors are not aware of a validated measure used to screen for opioid misuse risk specific to the setting of trauma and acute care. Screening, brief intervention, and referral to treatment (SBIRT) is a common early intervention approach to address at-risk and problem alcohol use; however, it does not identify risk factors associated with the potential for future misuse and has not been shown to be particularly effective in the setting of use disorder or misuse of drugs other than alcohol as yet (Fuster et al., 2016; Office of National Drug

Control Policy, 2012; Otto et al., 2009; Saitz et al., 2014). Traumatic injury patients also have trouble recalling SBIRT measures administered during their hospitalization, suggesting that the use of SBIRT in this setting requires further optimization for successful implementation (Gormican & Hussein, 2017). Likewise, while the Prescription Drug Monitoring Program (PDMP) can be beneficial in identifying opioid use patterns among patients, it is not specific to the traumatic and acute care population. Surgical prescribers, in particular, have noted that the time-consuming nature and lack of automated integration within electronic health records serve as barriers to universal implementation among their patient population (Leas et al., 2019). The complexities of treatment and subsequent opioid prescribing within this population warrant a specific focus in which current validated substance use screening measures do not provide.

Research has begun to pivot toward preventive interventions to identify and treat populations at risk of opioid misuse. Preventive strategies such as care management and screening, brief intervention, and referral to treatment are promising approaches that historically failed to achieve optimal improvements in clinical populations (Aseltine, 2010; Baker et al., 2018; Bogenschutz et al., 2022). A possible explanation for these shortcomings lies in targeting clinical populations with established diagnoses of OUD instead of focusing on populations at risk of developing a clinical diagnosis of OUD.

The present study is part of a larger initiative investigating the possibility of screening in trauma populations for opioid misuse prevention (referred to as the STOMP study). The project consisted of three initial phases that culminated in the identification of potential predictors of vulnerability to opioid misuse in individuals receiving surgery following a traumatic injury (Brown et al., 2022). The present study constitutes the fourth phase of the parent study, which focused on the implementation components of incorporating a screener within existing trauma and acute care workflows rather than validation of the screening tool. The authors hypothesized that a brief four-item screener assessing for factors predictive of opioid misuse would successfully be incorporated into real-world hospital settings with minimal burden on hospital staff or inpatients. Furthermore, the study authors sought to uncover facilitators and barriers to screener implementation and overall opioid management in order to optimize the future incorporation of a brief screener such as this into hospital settings. Specifically, the present research seeks to answer the following questions related to the implementation of a brief pilot screener for opioid misuse risk:

1. Can a brief screener assessing risk for opioid misuse successfully be implemented in a real-world hospital setting with a population acutely at risk for misuse?

2. What are the facilitators and barriers to the implementation of such a screener?
3. What are the facilitators and barriers to successful opioid management for hospital healthcare workers working with patients receiving surgery following traumatic injury?

Method

Study Design

The four-item opioid screening tool was developed based on results from the pilot study (Brown et al., 2022) and converted into a digital application to be administered on computer tablets to trauma patients at each of the four implementation sites. Phase IV focused on the feasibility of implementing the screening tool within the trauma team's workflow and assessed ongoing facilitators and barriers to implementation. The reader is referred to this study for a full description of methods and results. The study identified the strongest associations between opioid-related risk and both distress-related PTSD symptoms and pain catastrophizing (Brown et al., 2017; Brown et al., 2022). The study was approved by the Health Sciences Institutional Review Board at the University of Wisconsin-Madison. Change team members at each of the four implementation sites (Table 1) completed an informed consent process before beginning Phase IV study activities.

The Intervention

Partnered with a biostatistician, the study team analyzed the Phase III data of the STOMP study—surveys and electronic health records collected from 295 traumatic injury patients—and translated the results into a simplified, four-question screening tool to be implemented within four trauma centers through systems thinking consultation approach using the Plan, Do, Study, Act (PDSA) method. While piloting the four-item screening tool, each of the four trauma units was assigned two tablets which hosted the screening tool in an application format. The application collected responses to each of the four Likert scale questions but did not collect any identifying information, as this phase of this study focused on identifying the feasibility of implementation of such a tool in these centers rather than specific scores and associated outcomes for patients. Each of the four sites identified a change team leader who oversaw the day-to-day implementation process within the unit and served as the point of contact between the trauma unit and the research team.

During an all-site summit, each change team was partnered with a research team member and began the intervention by conducting a walk-through exercise identifying the unit's workflow processes for administering the Alcohol Use Disorders Identification Test, a validated alcohol use

Table 1
Change Team Sample Sizes and Associated Roles

Site	Sample size	Roles of change team members present at focus group
North	4	Alcohol and other drug inpatient specialist Director of substance-abuse services General surgery resident (PGY-2) Trauma surgeon
South	7	Performance improvement nurse ($n = 2$) Trauma and acute care clinical nurse specialist Trauma and acute care nurse Trauma and acute care nurse manager Trauma and acute care nurse practitioner ($n = 2$)
East[a]	7	Social work educator Social work manager Trauma and acute care nurse Trauma and acute care nurse/pain resource contact Trauma and acute care nurse practitioner and faculty Trauma and acute care pharmacist Trauma and acute care research coordinator
West	4	Trauma and acute care manager Trauma and acute care nurse practitioner Trauma and acute care physician assistant Trauma surgeon

[a]East's change team did include a trauma surgeon, but they were unable to attend the focus group due to scheduling conflicts and therefore, their recommendations and feedback were not included in this analysis.

screen (Bush et al., 1998). Flowcharts were created to visualize these processes, which would assist each team in identifying facilitators and barriers to implementing the pilot screening measure. Following the summit, the research team traveled to each of the four study sites to review the Phase III results and describe the process of creating the pilot screening tool. Using a nominal group technique, the change teams identified and prioritized ways to implement the screening tool into their workflow. Finally, the research team introduced PDSA change cycles, an iterative, four-step method for improving processes which were to be updated on a monthly basis by the change teams during the implementation process.

Upon introducing the pilot screening tool, the investigators reviewed the screening tool questions, directions, and timeframes for screener question responses, and technological considerations for administering the screener on portable electronic tablets. The sites were encouraged to determine administration logistics, including the timing of administration, population screened (e.g., intubated patients, patients with traumatic brain injury), which staff members would administer the screener, and tracking of screening completions among other implementation considerations. Having change teams to determine their

screener administration strategies allowed for a comprehensive analysis of implementation efforts. The research team's hands-off approach expectedly led to variation within implementation styles and efforts at each of the four sites. However, such variation provided an opportunity for investigators to determine how trauma centers compare in their workflows and current abilities to adopt a novel screening tool into their processes, including similarities and differences in both facilitators and barriers at each of the four sites.

In addition to the initial visit, the investigators met with each individual study site five more times on a monthly basis, for a total of six study visits per site. At each visit, the change team engaged in bidirectional feedback and identified incremental steps toward implementing the pilot screening tool, which they attempted to accomplish before the next visit. Each incremental step allowed the trauma teams to adjust their workflows in order to streamline the screening tool administration and reach a large percentage of trauma patients.

Following the monthly visits, each site participated in a semistructured focus group led by a member of the research team unknown to participants. This ensured that change teams could provide candid feedback on the implementation process, research team involvement, and general thoughts regarding the pilot screening tool itself.

Setting

Four Wisconsin hospitals implemented the opioid risk screening tool in their trauma units. These included two Level 1 trauma centers (referenced as South and East) and two Level 2 trauma centers (referenced as North and West). Start dates for all four sites were staggered between September and October 2019, followed by five monthly check-ins and a conclusionary focus group during the 6th month. Investigators provided minimal guidance throughout the discussion to allow for qualitatively rich dialog and collaboration at each site.

Data Collection

Several methods of qualitative data collection were utilized, including document review, field notes, and focus groups. Each of the four sites completed a PDSA change form, which documented the incremental changes proposed by the change-team members themselves at their respective sites across the implementation period. The PDSA change form was updated by the change team at each of the monthly meetings. Additionally, at each of the six meetings with the four sites, a research coordinator attended and took discussion notes. Following the intervention period, each change team participated in a site-specific focus group lasting 60 min conducted by a research team member previously unknown to the participants. The focus groups explored an overview of the

current FDA and hospital-specific opioid prescribing guidelines available, facilitators and barriers to implementing the pilot screening tool at their site, general thoughts regarding the pilot screening tool itself, and recommendations for implementation improvement.

Data Analysis

Two independent coders reviewed the qualitative data collected at each of the four sites—including monthly meeting notes taken by research team members, PDSA forms completed at each of the monthly meetings, and transcripts of the focus group. The data was compiled for one comprehensive thematic analysis, as the content of each of the three data sources focused on the same goal of implementing a pilot screening tool. The two independent coders consulted an expert in qualitative and mixed methods approaches for guidance on analysis design. The Consolidated Framework for Implementation Research (CFIR) model was selected for analysis, as it promotes a consistent and organized approach for implementation studies (Damschroder et al., 2009). Each coder independently completed each round of data analysis to ensure coding reliability. The two coders compared and consolidated findings during each round of analyses. A first round of thematic analyses was completed and categorized according to the CFIR model. A second round of thematic analyses was completed to consolidate identified subthemes into broader categories, producing a gamut of broad themes relating to the many subthemes identified in Round 1. The second round of analyses generated themes that could not be constrained within a single CFIR category. The study team met with both implementation and qualitative expert consultants to discuss this finding, where it was agreed that while CFIR was an appropriate model to ground the project, it should be augmented by a thematic analysis that better represents the dimensions of the data collected that did not fit readily in existing CFIR categories. Finally, a third round of thematic analysis was completed to further amalgamate Round 1 and 2 findings. The themes reported in this article are representative of

stakeholder feedback from the entirety of the implementation period at each site.

Results

Pilot Screener Administration Results

Table 2 and Figure 1 display a summary of the pilot screener administration results among all four trauma sites. The screening tool was administered a total of 264 times, with 74.2% completed surveys, 17.0% declined surveys, and 8.7% incomplete surveys. Of the completed surveys, the average score across all four sites was 2.05, with scores ranging from 0 to 16. Zero was the lowest achievable score and 16 was the highest achievable score, with higher scores depicting increasing risk of potential opioid misuse following hospital discharge. Notably, pilot screening tool scores have not been validated to predict specific outcomes, stratified risk of opioid misuse, or treatment recommendations. This portion of the study focused on the implementation of a tool itself, rather than developing and refining the questions included within the tool or outcomes associated with scores.

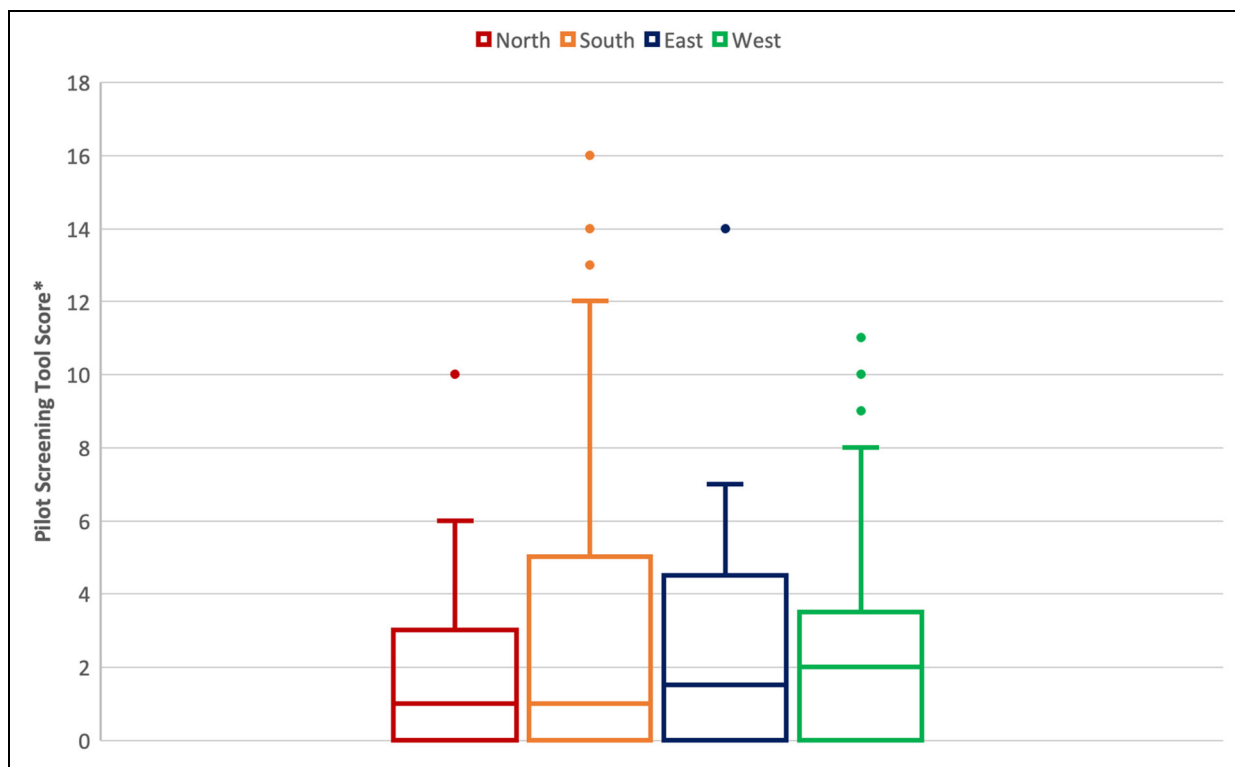### Pilot Screener Administration Experiences

Experiences surrounding screener administration can be found in Table 3. Three sites set parameters around which patients would be screened and chose to exclude patients for a variety of reasons, including individuals who could not communicate reliably, individuals with dementia or a head injury, individuals being transferred to palliative care, or individuals who were intubated. One site chose to administer the screener only to patients who clinician's perceived to be at risk for opioid misuse. However, this identification system was not recommended by the research team as it carries its own selection and confirmation biases. Methods for screening differed among sites. Electronic tablets, which contained a custom-made

Table 2

Screener Administration Among Sites

Site	Total surveys administered	Completed surveys	Declined surveys	Incomplete surveys	Score of completed
		n (%)			*M* (range)
North	47 (17.8)	33 (70.2)	12 (25.5)	2 (4.3)	1.81 (0, 10)
South	118 (44.7)	100 (84.7)	3 (2.5)	15 (12.7)	2.93 (0, 16)
East	38 (14.4)	22 (57.9)	14 (36.8)	2 (5.3)	2.77 (0, 14)
West	61 (23.1)	41 (67.2)	16 (26.2)	4 (6.6)	2.76 (0, 11)
Total	264 (100.0)	196 (74.2)	45 (17.0)	23 (8.7)	2.69 (0, 16)

Note. Dates of data collection for the pilot screening tool results at each site were as follows: North: December 2019 to May 2020 South: October 2019 to March 2020 East: October 2019 to March 2020 West: January 2020 to April 2020.

Figure 1
Pilot Screening Tool Score Distribution Among Sites

Note. Total score of pilot screening tool ranged from 0–16.

survey administration application, were provided to the four sites. However, some sites opted for oral delivery of the screener for patients who were unable to read and/or use the provided tablet. One site opted for paper administration of the screener, primarily because this site chose to screen patients in several areas of the hospital and the two tablets served as a time constraint when screening patients admitted to several units. Two sites had experience with administering the screener over the phone, with the hopes of increasing the number of patients reached. Additionally, each change team chose to select a specific role to administer the pilot screening tool, but the role of these individuals varied by site, including social workers, pharmacists, nurses, and providers.

Stakeholder Experiences

Stakeholder experiences with the screening implementation process are summarized in Table 4. Stakeholders include change team members (Table 1), additional trauma unit staff (e.g., nursing staff), and patients who were offered the pilot screening tool to complete. Seven common themes were identified among the four trauma units, including patient comprehension of screener items, patient burden, the importance of staff buy-in,

infrastructure limitations, COVID-19 limitations, the feasibility of implementation, and site-specific treatments available. Each of these commonalities contributed to the overall experiences that change team members, trauma unit staff members, and patients had when implementing this screener at their respective sites.

First, patients noted difficulties in comprehending screening questions based on wording and meaning, as well as difficulties focusing on the questions themselves. The pilot screening tool questions focused on symptoms related to post-traumatic stress disorder (PTSD), as these were identified to be crucial concepts in recognizing the risk of opioid misuse per Phase III of the parent STOMP study (Brown et al., 2022). The pilot screener questions aimed to identify the severity of PTSD symptoms associated with traumatic events that occurred prior to their traumatic injury. However, given the nature of these questions, some participants may have conflated the trauma associated with their injury and traumatic events they may have experienced preinjury when responding to the screener questions. Likewise, patients indicated that the wording of the questions themselves was confusing and added an additional complication to survey responses. Notably, these four questions were directly adopted from the PTSD Checklist for DSM-5,

Table 3

Experiences With Screener Logistics

Theme subtheme	Presence at site				
	North	South	East	West	Total
Population screened					
Patients admitted to the trauma unit only	-	X	X	X	3
All trauma patients and consults	X	-	-	-	1
Patients perceived as able to complete screener only	X	X	-	X	3
Patients at clinician-perceived risk of misuse only	-	-	-	X	1
Timing of screener					
Screener administered proximal to patient admission	X	X	X	-	3
Screener administered whenever possible, predischarge	-	-	-	X	1
Method of screening					
Verbal administration of the screener	X	X	X	X	4
Paper/pencil administration of the screener	X	-	-	-	1
Tablet administration of the screener	X	X	X	X	4
Phone administration	X	-	X	-	2

a validated screening tool, without changes to language or wording (Belvins et al., 2015). These barriers may have produced inaccurate screener results for some patients. These findings highlight the importance of clear, concise questions with ample patient guidance to ensure accurate measurement.

Another factor that potentially contributed to patient confusion, as identified by nursing staff, was the timing of screener administration. Three out of the four sites initially chose to administer the screener as part of the hospital admissions questionnaires until later deciding to delay administration until admissions processes were completed and patients were settled into care routines. Patients were described as exhausted after completing the existing battery of hospital admissions measures, with the screening pilot tool serving as another point of potential fatigue. Likewise, trauma staff members expressed feelings of being overburdened by adding yet another measure to complete at admissions, particularly as nonchange team staff members (a) did not comprehensively understand the purpose of screener administration due to lack of disseminated education by change teams and (b) lacked a set of tailored interventions to implement based on screener

scoring results. Together, staff overburden seemed to contribute to attitudes surrounding screener administration. Of note, change teams were allowed to choose when the screening tool would be administered and did find that administering the screening tool post-admission but prior to starting the discharge process was helpful in preventing associated tribulations.

Infrastructure limitations included the lack of screening tool integration within the electronic health record (EHR). The survey was administered via a custom-made application on an electronic tablet. Change teams and unit staff members identified these tablets as burdensome, noting that it was an additional tool that did not fit into current workflows. The lack of EHR integration also posed a barrier to tracking completion rates for the pilot screener. Two sites used encrypted Excel documents to track patient completion, while providers at other sites chose to enter an order into the EHR for nursing staff to complete. Feedback for improving these implementation barriers included integration of questions within the existing EHR, or potentially creating an algorithm to combine preexisting questions from other admissions questionnaires to formulate an opioid misuse risk score. Integration within the EHR would also allow for easier confirmation of survey completion.

COVID-19 presented unique challenges for each of the sites. Regarding alterations made to implementation, some sites identified an increase in staffing workload due to employee furloughs while others experienced changes in the method in which the screening tool was administered. Following COVID-19 hospital protocol changes, one hospital noted that the screening tool was phased out as it was considered nonessential, while another hospital noted that screening tool administration changed from face-to-face to over the phone.

While each site recognized the importance of screening for opioid misuse risk among their patient populations, change teams found it challenging to differentiate between studying the implementation of this tool versus the actual validation of such a screening tool. Potential conflation of implementation versus validation among change team members and unit staff proved to be an additional challenge to overcome, while also further underscoring the need for a validated tool. Within the first months of implementation, some sites noted that implementing this screening tool was very feasible and were ready to move beyond the implementation phase. Similarly, change teams emphasized the importance of having multimodal analgesic treatments available in addition to proper patient education and expectation setting. Having an algorithm available for treatment approaches, as well as the ability to have resources and/or procedures in place, as they relate to scoring outcomes to provide support to at-risk individuals, was noted as a potential area for improvement upon validation.

Table 4

Experiences With Screener Administration

Theme	Subtheme(s)	Subtheme description	Illustrative participant quote
Patient comprehension of screening items	Comprehension of screener questions; focusing on traumatic event(s) prior to admitting trauma	Patient reported confusion regarding focusing on preexisting trauma symptoms, as well as meaning of the questions themselves.	"We do a lot of clarifying with the fact that this was pre-your trauma, because, again, that was top of the mind. And so, that was a huge sticking point, even with staff and explaining it was to reference those 30 days before this trauma."
Patient burden	Administering at admission; administering with other screeners; private nature of questions being asked	Administering the screener at admission was reported to be difficult for patients due to recency and reasons for admission. Moreover, patients were described as too exhausted to complete yet another screener after completing preexisting clinical measures.	"It was sometimes challenging to get, I guess, participation or willingness to answer questions when we know that we're already asking so many other sensitive things, in addition to the STOMP screen that we had done."
Staff buy-in	Staff overworked; staff did not understand the purpose of the study; staff wanted to see outcomes attached to the screener; staff buy-in is important	Participants reported being overworked to the point that administering another screener was burdensome. Reports also indicated that staff buy-in was low due to a lack of tailored interventions based on screener scores. Participants indicated that staff buy-in is important to successful implementation.	"If I lose sight of the vision then I'm less likely to continue doing this. We all want two things: less work and more money. Welcome to being human. So, I appreciate (this implementation process) being explained of how this will fit into the bigger picture because it all makes a lot more sense now."
Infrastructure limitations	Lack of EMR integration; staff work on multiple units; tracking screener completion; task-oriented nature of nurses; use of tablets for screening	The screener was perceived as not adequately being implemented into hospital infrastructure in terms of work-flow-oriented nature of staff; screener completion tracking; and screening with tablets.	"Patients are on multiple—three or four—different floors. (There's) not enough tablets for each of the social workers who will be administering the screen …. Social workers often complete the majority of their work at the nurse's station, but because the social workers are on multiple floors, they do not want to keep the tablet at one specific nursing station."
COVID-19	Staffing workload; change in patient interactions	Hospitals experienced a rapid influx of new patients with COVID-related cases. COVID-19 resulted in less face-to-face in-person patient contacts.	"On the trauma service, they do not have support staff (NP or PA). It's just basically one trauma surgeon for full trauma service. Residents come to active traumas but no other ancillary staff. Certain trauma surgeons may not remember to administer the STOMP survey. Trauma census has not dropped at all; census has increased as of May (2020). Given these staffing and COVID-related barriers, it's hard to capture all of the consults."

(Continued)

Table 4
(Continued)

Theme	Subtheme(s)	Subtheme description	Illustrative participant quote
Feasibility of implementation	Similar measures already being administered at site; implementing a validated screener indicated as feasible	Staff reported that they could implement the screener upon validation.	"I think the infrastructure at our facility is actually pretty good in terms of providing people resources and having resources for pain management and that sort of thing available. So, I think having a good tool that's validated that's specific to the problem, I think it would be helpful. I think it would be implementable."
Site-specific treatments available	Patient education; multimodal analgesic treatments; expectation-setting	Site staff indicated that they have resources and/or procedures in place at their sites to provide some support to at-risk individuals.	"If I knew who the at-risk populations were, then we would be able to target more education and proactive interventions during hospitalization and at discharge in terms of counseling."

Stakeholder Feedback

Four common themes were identified in which stakeholders provided recommendations for improvement methods: patient comprehension of screening items, minimizing patient burden, staff buy-in, and infrastructure (Figure 2). Stakeholders recommended that screening questions be modified to a sixth-grade reading level in order to ensure proper comprehension by patients. Staff should be provided with a script for ease of both staff and patient education, as well as answers to commonly asked questions about the screening tool itself. Patients noted confusion about the correlation between PTSD symptoms and potential opioid misuse, as well as how this particular tool could predict such misuse. A script for unit staff members administering the screener could help respond to these questions. Similarly, the questions asked as a part of this screener were sensitive in nature and could cause patients to become frustrated. In order to combat this, it was recommended that patient education surrounding the screener purpose was emphasized and that the staff member administering the screener take time to establish rapport prior to administration.

Given that screening tool administration during the admission process proved burdensome, stakeholders recommended avoiding this time period and instead, administering the tool postadmission but before the discharge process was started. Careful timing of screener administration will likely increase completion rates and prevent additional burdens on unit staff members. Similarly, implementing the screening tool in a manner that accommodates the task-oriented nature of nurses' work, while avoiding duplicating questions from other admission surveys will also minimize staff burden. One

way of responding to these concerns would be to incorporate the screening tool into the existing EHR and thus, into the current staff workflow. In doing so, additional work is minimized and staff members are easily able to complete the screener and track patient completion rates.

Another barrier related to staff buy-in included the lack of perceived impact of screener results. Because this portion of the study aimed to investigate the implementation process of the screener rather than to validate the screener itself, there was no determination of risk level associated with different scores and there were no clinical outcomes associated with the scores obtained. Stakeholders identified this as an area for improvement, where EHR integration would further lend the ability to tying stratified screener outcomes with potential interventions (e.g., trauma-informed care, consultation for health psychology) for providers to follow.

Lastly, stakeholders identified several infrastructure barriers, including the ineffective use of tablets and the disconnected nature of the screener from the EHR. Allowing for multimodal administration of the screeners (e.g., via EHR, via phone) increased completion rates. Integration of the screener within the EHR could increase feasibility by blending with existing work orders, allowing for easier tracking of patient completion, and, potentially, allowing for the creation of an algorithm to generate a risk score from other pre-existing measures administered at the hospital site.

Discussion and Conclusion

Primary Findings

Implementation of a screening tool to identify opioid misuse risk among traumatic injury patients is desired

Figure 2
Stakeholder Feedback of Perceived Barriers and Recommendations

Barrier Themes	Barrier Subthemes	Stakeholder Recommendations
Patient Comprehension of Screener Items	Patients struggled to comprehend screener questions *(n=3)*	Staff should have a script for clarifying screener administration *(n=1)*
		Questions should be 6th grade reading level *(n=1)*
	Patients struggled to focus on symptoms prior to admitting trauma *(n=3)*	Avoid screening during admission *(n=1)*
Patient Burden	Screening at admission is too burdensome on patients *(n=2)*	Administration following admission completion, before discharge initiation *(n=4)*
	Screening with existing admissions screens is burdensome *(n=3)*	Careful timing of screener will increase completion rate *(n=2)*
	Patients get frustrated with screener questions *(n=3)*	Improve patient education on purpose of screener *(n=3)*
		Ensure rapport is established prior to administering screener *(n=1)*
Staff Buy-in	Pre-existing staff burden/workload *(n=3)*	Accommodate task-oriented nature of nurses *(n=1)*
		Avoid duplicating questions from other surveys *(n=3)*
		Embed screener into hospital workflow *(n=4)*
	No perceived impact of screener *(n=3)*	Improve staff education on purpose of screener *(n=2)*
		Screener outcome should be tied to intervention *(n=4)*
		Screener should differentiate level of risk *(n=3)*
Infrastructure	Screening with tablets is ineffective *(n=4)*	Multi-modal administration of screeners increases completion rate *(n=3)*
	Screener separate from EHR creates excess burden *(n=4)*	Integrating screener into EHR would increase feasibility *(n=4)*
	Staff workflow *(n=4)*	Tracking screener completion is important *(n=3)*
		Insert screener into work orders *(n=1)*
		Identify the appropriate staff at each site to administer screener *(n=4)*
		Generate risk score from existing measures administered at the hospital site *(n=2)*

among traumatic injury providers. Four trauma units across Wisconsin implemented a pilot screening tool to identify opioid misuse risk in their workflow and provided feedback on how to improve implementation. Should their feedback on implementation factors be addressed and incorporated into future iterations of the opioid misuse risk screening tool, it could successfully be implemented in the trauma and acute care setting. Facilitators identified for implementation include ensuring patients have a comprehensive understanding of how to complete the screening questions, minimizing staff burden in relation to tool administration, and earning staff buy-in and support for administration. Barriers identified for implementation include infrastructure limitations preventing seamless administration of the screener with current workflows, overlap of the pilot screener with existing measures

creating undue burden, and the lack of guidance and associated treatment plans surrounding screening tool outcomes. Stakeholders recommended several solutions to address implementation barriers, including careful timing of screener administration to prevent additional staff and patient burden, accommodating nursing workflows and task-oriented nature by integrating the screening tool into the EHR and supplementing screener results with associated interventions based on risk level.

Implications for Clinical Practice

There currently are no screening tools available to identify traumatically injured patients at risk for opioid misuse risk, specifically for opioid naïve patients. The use of both SBIRT techniques and PDMP implementation have proven inadequate within the context of trauma and acute care given the lack of specificity toward addressing needs within this patient population and the time-consuming nature of such tools preventing insufficient integration within existing care models (Gormican & Hussein, 2017; Leas et al., 2019; Office of National Drug Control Policy, 2012). Given that this patient population has many risks for the development of opioid misuse and use disorders such as high risk for depression, PTSD, chronic pain, exposure to surgery, and discharge opioid prescriptions (Trevino et al., 2014; Cragg et al., 2019; Feinberg et al., 2018; Gangavalli et al., 2017; Malik et al., 2020; Neuman et al., 2019), having a screener to identify those at risk for opioid misuse after trauma prior to hospital discharge could allow clinicians to carefully prescribe necessary opioids for acute pain yet identify those that should have close follow up in order to potentially prevent chronic opioid use and ultimately OUD. A screener specific to identifying opioid-related risk in this population has the potential to address the screening gaps that currently exist among this population.

Similarly, implementing supplemental provider education surrounding opioid use and misuse associated with the aforementioned risks would likely bolster the effects of a screening measure. Educating providers on opioid use and misuse has the potential to mitigate those who are unwilling to address substance use disorders due to their lack of confidence in treating these complex disorders (Gordon & Harding, 2017) and address the needs of patients with opioid use disorders and cooccurring mental health disorders (Levin et al., 2016). In combination with provider education, efficient screening is essential for adequate screening adaptation into current workflows. In line with our findings, a limited time for screening and a lack of training have been found to be barriers to implementing screening measures in other healthcare settings (Johnson et al., 2011; McNeely et al., 2018; Weitzman & Leventhal, 2006). In combination, provider education surrounding opioid misuse risk factors and treatment course options with an efficient screening tool that

did not duplicate preexisting admissions questions would serve as phenomenal resources in the trauma and acute care setting for identifying patients at risk for opioid misuse and informing both inpatient and discharge treatment plans.

While several barriers were identified when implementing the pilot screening tool, results indicate that screeners are widely used in the setting of traumatic injury. Oftentimes, the burden of screening measures currently administered to traumatic injury patients is seen as justifiable, provided that they accurately detect risk and direct interventions and follow-up care. Ensuring future iterations of the screening tool incorporate stakeholder feedback and undergo the validation process would provide the rationale behind potential staff burden and allow for the guidance of inpatient and discharge care plans. Likewise, with the adaption of stakeholder feedback, this screening measure would address the concerns that providers currently have regarding the SBIRT model and use of PDMP, such as specificity toward their patient population and lack of integration with the EHR (Gormican & Hussein, 2017; Leas et al., 2019).

Limitations

A number of factors were present that limit the interpretability of findings. One limitation was the suboptimal buy-in from hospital staff administering the screener. Site staff indicated during monthly meetings and focus groups that enthusiasm for the project was low, due to the project implementing an unvalidated measure for misuse risk that, from their perspective, did not demonstrate adequate face validity. Staff stated that they wished the screener was able to generate guidance for prevention treatment tailored by categorization of risk. Taken together, these findings suggest that site staff may have benefited from a clearer distinguishment of the differences between implementation research and survey validation studies. Likewise, this stakeholder feedback emphasizes the need for a validated measure addressing opioid misuse within the setting of trauma and acute care. Providers and patients alike would benefit from the prioritization of the validation of a screening tool in this setting. Additionally, we did not collect feedback directly from patients taking the pilot screening measure. Feedback from patients was provided to the investigators secondhand through nursing staff and change team members at monthly meetings, limiting our ability to verify and thoroughly integrate this into a future screening tool.

Additionally, the analysis revealed inadequate considerations of integrating the screening tool into each site's EHR. Sites indicated that other screeners are prompted and managed within the EHR and that the present project could not adequately test implementation feasibility if the screener is not embedded in the EHR. While investigators did discuss the potential of integrating the pilot screening

tool into the EHR early in the study design phase, it was not feasible under these circumstances due to multiple different electronic medical record platforms being used at the four trauma sites and the potential to severely delay the study timeline. Because of this limitation, the research team opted to administer the screener on portable electronic tablets to simulate an electronic administration of the screener and for ease of long-distance data collection and real-time analysis. Another limitation lies in the lack of heterogeneous trauma types and the low percentage of non-White populations included in the study. Wisconsin-based research often has underrepresentation in minority study participation due to the state's disproportionately white population.

Yet another limitation of the present study was the onset of the COVID-19 pandemic, which disrupted hospital workflow across the world and overfilled, overworked employees, minimized unnecessary patient contact, and reduced enthusiasm from patients to participate in research studies. The effects of COVID-19 were especially apparent at one of the four sites, which was forced to prematurely end their participation in the study. COVID-19 quarantine parameters and changes to hospital workflows were implemented within 1 month of the expected study conclusion; therefore, the authors did not pursue updates to either the protocol or study design, as approval of any protocol changes would not have been completed in the time needed to implement such changes at the one remaining study site. Similarly, all activities related to research deemed not medically necessary, such as this study phase, were halted temporarily at the four study sites following the announcement of COVID-19, making updates to protocols a futile effort.

Future Directions

The results and limitations stated above outline a clear path toward future research directions. Results indicate that a brief screener for opioid misuse can feasibly be administered in a hospital setting. Notably, the items included in this brief screener were selected based on findings from a previous study (Brown et al., 2022) and have not undergone any empirical validation. Future research should refine the risk factors for opioid misuse and ensure screening items are well-validated with efficacy research supporting treatment responses to screener-indicated risk categories. As the findings mentioned, care teams would greatly benefit from a battery of care options associated with screening results. Therefore, an emphasis should be placed on determining and validating opioid misuse risk stratification based on screening results and coinciding treatment modality options for providers to base care plans on.

At the time of writing this article, UW Madison is applying for grant funding to support a sequential, multiple-assignment randomized trial testing an adaptive intervention to prevent opioid misuse in individuals hospitalized for traumatic injury. The proposed project will also include exploratory measures of constructs that appear predictive of misuse (e.g., distress-related PTSD symptoms; pain coping; social support) to refine the field's understanding of risk factors and develop an appropriate screening tool to undergo validation procedures. Additionally, future research in the field of opioid misuse prevention should prioritize the recruitment of a more diverse population to support the translation of study findings across populations. Results indicated that a particular challenge of traumatic injury research lies in the multifactorial nature of trauma. We conclude by recommending that future research should emphasize the inclusion of diverse trauma types, analgesic requirements, and diverse patient demographics to unravel potential variations in treatment needs and considerations.

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