

Pediatric Trauma and Posttraumatic Symptom Screening at Well-child Visits

Stephen S. DiGiovanni, MD*; Rebecca J. Hoffmann Frances, LMFT†; Rebecca S. Brown, LCSW‡; Barrett T. Wilkinson, MPP‡; Gillian E. Coates, BS§; Laura J. Faherty, MD, MPH, MSHP*¶; Alexa K. Craig, MD, MSc, MS*; Elizabeth R. Andrews, MPH*; Sarah M. B. Gabrielson, MPH, BSN*

ABSTRACT

Introduction: Adverse childhood experiences (ACEs), including abuse or neglect, parental substance abuse, mental illness, or separation, are public health crises that require identification and response. We aimed to increase annual rates of trauma screening during well-child visits from 0% to 70%, post-traumatic stress disorder (PTSD) symptom screening for children with identified trauma from 0% to 30%, and connection to behavioral health for children with symptoms from 0% to 60%. **Methods:** Our interdisciplinary behavioral and medical health team implemented 3 plan-do-study-act cycles to improve screening and response to pediatric traumatic experiences. Automated reports and chart reviews measured progress toward goals as we changed screening methods and provider training. **Results:** During plan-do-study-act cycle 1, a chart review of patients with positive trauma screenings identified various trauma types. During cycle 2, a comparison of screening methods demonstrated that written screening identified trauma among more children than verbal screening (8.3% versus 1.7%). During cycle 3, practices completed trauma screenings at 25,287 (89.8%) well-child visits. Among screenings, 2,441 (9.7%) identified trauma. The abbreviated Post Traumatic Stress Disorder Reaction Index was conducted at 907 (37.2%) encounters and identified 520 children (57.3%) with PTSD symptoms. Among a sample of 250, 26.4% were referred to behavioral health, 43.2% were already connected, and 30.4% had no connection. **Conclusions:** It is feasible to screen and respond to trauma during well-child visits. Screening method and training implementation changes can improve screening and response to pediatric trauma and PTSD. Further work is needed to increase rates of PTSD symptomology screening and connection to behavioral health. (*Pediatr Qual Saf* 2023;8:e640; doi: 10.1097/pq9.000000000000640; Published online May 29, 2023.)

From the *Barbara Bush Children's Hospital at Maine Medical Center, Department of Pediatrics, Portland, Maine; †Maine Behavioral Healthcare, Portland, Maine; ‡City of Portland, Public Health Division, Portland, Maine; §Tufts University School of Medicine, Boston, Massachusetts; and ¶RAND Corporation, Boston, Massachusetts.

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*Corresponding author. Address: Stephen S. DiGiovanni, MD, Maine Medical Center, 22 Bramhall Street, Portland, ME 04102
PH: 207-662-2911; Fax: 207-662-6006
Email: stephen.digiovanni@mainehealth.org

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INTRODUCTION

A landmark 1998 study defined categories of potentially traumatic events known as Adverse Childhood Experiences (ACEs).¹ ACEs, such as exposure to violence, abuse, or neglect, parental substance abuse, parent incarceration, mental illness, or parental separation/divorce, impact a child's development and affect long-term health. ACEs represent a public health crisis, with over 16% of adults reporting exposure to 4 or more ACEs.² Pediatricians in ambulatory settings see an average of 4 patients with 4 or more ACEs daily.³ According to a 2014 meta-analysis, 16% of children and adolescents exposed to a potentially traumatic event met diagnostic criteria for lifetime post-traumatic stress disorder (PTSD), supporting the need for pediatricians to screen for posttraumatic symptoms.⁴

Multiple studies have replicated the dose-response relationship of ACEs to a wide range of negative outcomes, including developmental delay, anxiety and depression, substance use, diabetes, and homelessness.⁵ Identifying and intervening in traumatic events during childhood can improve health and wellness while reducing health-care costs.^{6,7} Research on the mitigating effects of positive childhood experiences highlights the opportunity



to improve outcomes for children by preventing and responding to adversity early in life.⁸ Pediatricians are well positioned to address trauma and support positive childhood experiences when parents support ACEs screening and view the pediatrician as a trusted individual who could provide responsive support to their children.⁹

Over the past decade, researchers and professional associations such as the American Academy of Child and Adolescent Psychiatry and the American Academy of Pediatrics have advised primary care pediatricians to assess for trauma and respond with trauma-informed care.¹⁰ While there is a growing body of literature on screening for social needs such as food insecurity in pediatric ambulatory and inpatient settings,^{11,12} there is a lack of studies examining the implementation of trauma-PTSD symptomology screening in pediatric care settings.¹³

Our objectives were to use plan-do-study-act (PDSA) cycles to (1) develop and implement a model for identifying and responding to pediatric traumatic experiences and posttraumatic symptomology during routine well-child visits, and (2) to evaluate the feasibility and effectiveness of the model to identify trauma exposure and posttraumatic symptomology and connect patients with behavioral health resources.

Aims

We aimed, by December 31, 2019, to (1) increase annual completion rates of a 2-question trauma screener from 0% to 70% at well-child visits for patients 0 up to 18 years of age; (2) increase the annual percentage of children with a positive trauma screen who completed a PTSD symptom screener from 0% to 30%; and (3) increase the annual percentage of children with a positive PTSD screen who were connected to behavioral health resources from 0% to 60%.

METHODS

Context

Before January 1, 2016, there were no consistent approaches to screening and responding to pediatric traumatic experiences at Maine Medical Partners' (MMP) primary care practices. In response to this gap, we formed an interdisciplinary team to increase collaboration between behavioral and medical health services, including planning and implementing the described processes. This primary care behavioral health model we created has continued to engage stakeholders in the health system and the community.¹⁴

Model Development

Before the initiation of PDSA cycles, our team developed a 2-step process to screen and respond to pediatric traumatic experiences.

Step 1: The trauma questions were designed to be asked

of parents of newborns through 10-year-olds and be asked of patients ages 11 to 18 years old. To capture experiences outside the home environment, we replaced the standard MMP safety question used at the time, "Do you and your child feel safe in your home?" with "Do you and your child feel safe in your home, school, and community?" Based on the work of Cohen et al,¹⁵ we added a second question: "Has anything bad, sad, or scary happened to you or your child recently or in the past year?" To align with documentation workflows for adolescent depression screening, we added the 2 trauma questions to the electronic medical record (EMR) screening section. The clinical rooming staff were instructed to update the provider if the screening was positive to prevent missed opportunities to discuss the traumatic experience(s).

Step 2: If either of the trauma screening questions identified the presence of trauma, providers administered the UCLA abbreviated Post Traumatic Stress Disorder Reaction Index (aPTSDRi). The aPTSDRi is a brief, easy-to-score questionnaire that identifies core PTSD symptomology.¹⁶ As shown in Figure 1, if the aPTSDRi indicated a risk for symptomology, the workflow recommended connection with MMP's on-site integrated behavioral health providers. Additional recommended interventions included discussing resiliency-building parenting or self-skills, distribution of printed educational materials, close follow-up with the primary care provider, referral to community-based mental health treatment, referral to child psychiatry, mandated child abuse/neglect report, and referral to other community resources.

Training

During PDSA cycle 1, the team provided 3 1-hour educational sessions to all providers and staff at 5 pediatric primary care practices. The team provided 2 1-hour training sessions to all participating practices during PDSA cycle 2 and again during cycle 3. Topics included an overview of ACEs, screening tools, team-based workflows (Fig. 1), EMR (Epic, Epic Systems, Verona, WI) updates, behavioral health treatments, community supports, and data reports. We trained providers to respond to all positive screenings using the trauma-informed concepts of choice, collaboration, and empowerment in determining the next steps to take with patients/parents. In addition, the team trained the staff/providers on mandated reporting rules and safety planning if abuse or ongoing risk was present. The team collected feedback on implementation barriers through discussions with staff, providers, and leadership during site visits 1 to 2 months after implementing the screening tools. Many providers and staff expressed concern about addressing issues of trauma and adversity, citing a lack of training in effective response models that avoid retraumatization. In response to this feedback, the team's content experts developed trauma-informed language scripts for

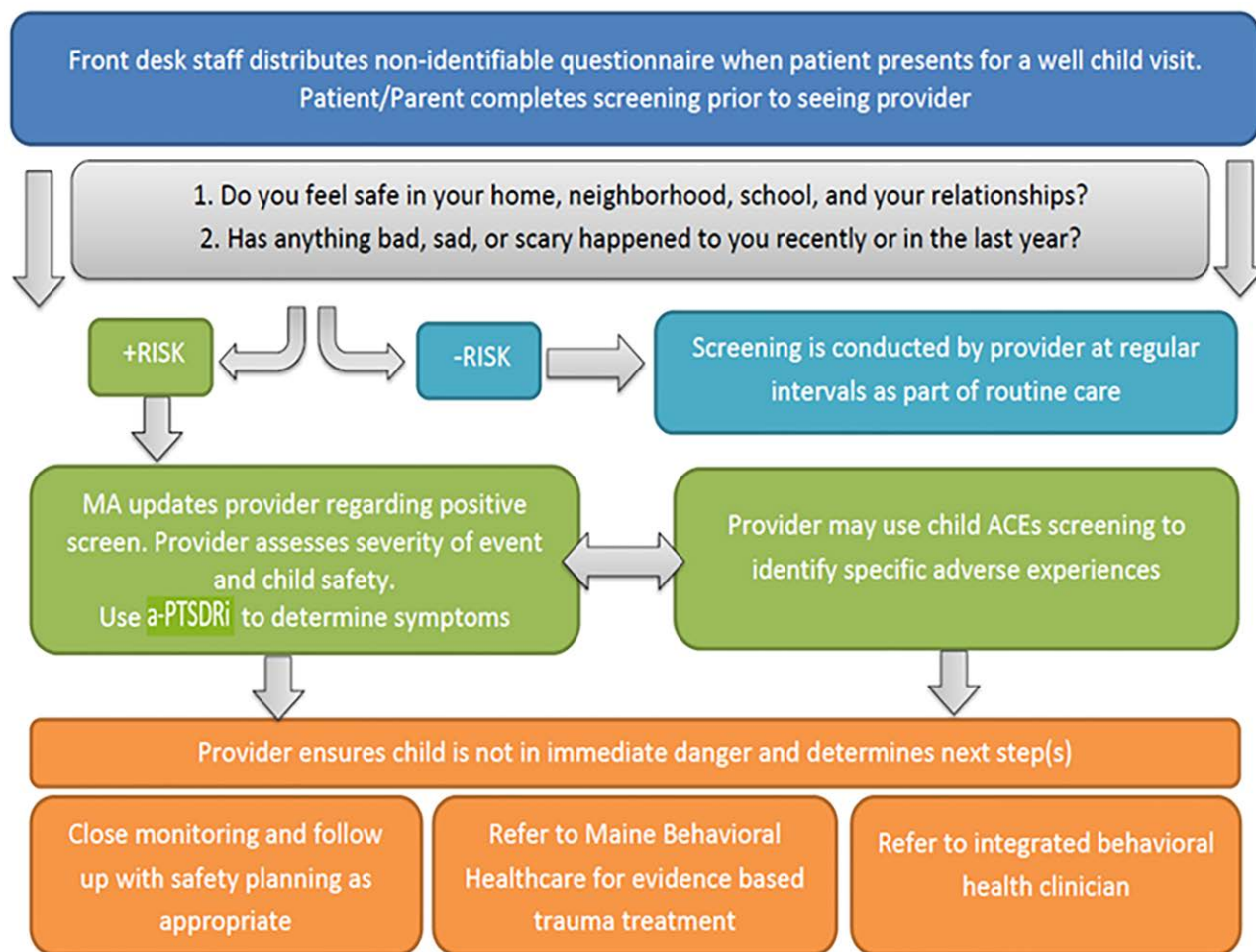


Fig. 1. Pediatric trauma screening workflow.

providers and staff to use when introducing each trauma screening tool. (Supplementary Digital Content 1, which shows Materials and Methods: trauma-informed scripts for staff and providers, <http://links.lww.com/PQ9/A471>.)

Data Collection and Reporting

The study team worked with health system informatics to create data-reportable documentation tools embedded within the standard EMR workflow. Clinical staff/providers entered the results of the 2 trauma questions and the aPTSDRi, if completed, into the patient’s EMR at each well-child visit. To assess feasibility and effectiveness, we reported screening and positivity rates for the trauma questions and the aPTSDRi monthly for the individual practices and the health system. (Figure, Supplementary Digital Content 2, which shows Pediatric Trauma Screening Monthly Automated Report (January 1, 2019–December 31, 2019), <http://links.lww.com/PQ9/A472>.) The report of positivity rates of the 2 trauma questions allowed the team to track their efficacy in identifying traumatic experiences. Furthermore, the team conducted chart reviews

to count trauma types and connections to behavioral health resources.

Measures: Evaluating the Feasibility and Effectiveness of the Intervention

Our primary process measures were completion rates of the 2-question trauma screener and aPTSDRi among patients with a positive trauma screen. The primary outcome measure was the percentage of patients with a positive aPTSDRi connected to behavioral health resources. Descriptive measures included the positivity rates of the trauma questions, the aPTSDRi, and the reported trauma types. All measures were used during the PDSA cycles to support screening model changes and to build understanding and support for the program.

Plan-Do-Study-Act Model

With primary care, behavioral health, and community involvement, MMP began implementing a screening and response model at MMP’s pediatric primary care practices starting in January 2016. We describe the initial 3 PDSA cycles of a quality improvement

(QI) study at primary care practices in the Portland, Maine, metropolitan area. Cycles 1 (January 1, 2016–September 30, 2016) and 2 (June 1, 2017–February 28, 2018) were conducted at 5 MMP pediatric practices. During cycle 3 (April 1, 2018–December 31, 2019), the model was expanded to fourteen MMP primary care practices caring for children (7 pediatric, 2 internal medicine-pediatric, and 5 family medicine practices). The key driver diagram (Fig. 2) presents an overview of the aims, drivers, and interventions used in this QI study.

PDSA Cycle 1: Initial Implementation

PDSA cycle 1 focused on the initial implementation of the 2-step screening process to identify potentially traumatic events and posttraumatic symptomology that required a response. All practices were provided a written patient questionnaire with the 2 trauma questions on the front and the aPTSDRi on the back. To increase engagement in the model, we allowed the initial 5 practices to choose between 2 workflows at the well-child visit: (1) front desk staff hand the 2 written trauma questions to the caregiver (≤10 years old) or patient (≥11 years old) during the check-in process or (2) the medical assistant or nurse ask the 2 trauma questions during the rooming process. The team studied the effects of the different workflows on trauma question positivity rates. The study team completed a chart review to identify types of trauma recorded in the EMR when a trauma screening question was positive. We calculated

frequencies and percentages of trauma types documented in patient charts and arrayed them from most common to least common.

PDSA Cycle 2: Workflow Changes

Using data from PDSA Cycle 1, the team recommended the practices that used the verbal method of screening switch to the written workflow to increase the identification of traumatic experiences. Automated data reports tracked the completion and positivity rates for the 2 trauma questions during the 4 months before and after the switch to using the written questionnaire. Also, favorable trauma screening rates for each practice were compared before and after the switch using a Chi-square test (*P* value < 0.05).

PDSA Cycle 3: Scale-up and Assessing Connection to Resources

Using feedback from prior PDSA cycles, the team deployed the screening and response model across all fourteen MMP primary care practices serving children. The initial phase (April 1, 2018–May 31, 2018) examined positivity rates for version 2 of the trauma questions. Based on low positivity rates identified during cycles 1 and 2, the safety question was replaced with “*Has anyone hurt or frightened you or your child recently or in the last year?*” (Supplementary Digital Content 3, which shows Materials and Methods: pediatric trauma screening patient questionnaire, <http://links.lww.com/PQ9/A473>.) The 2019 screening and connection rate objectives were

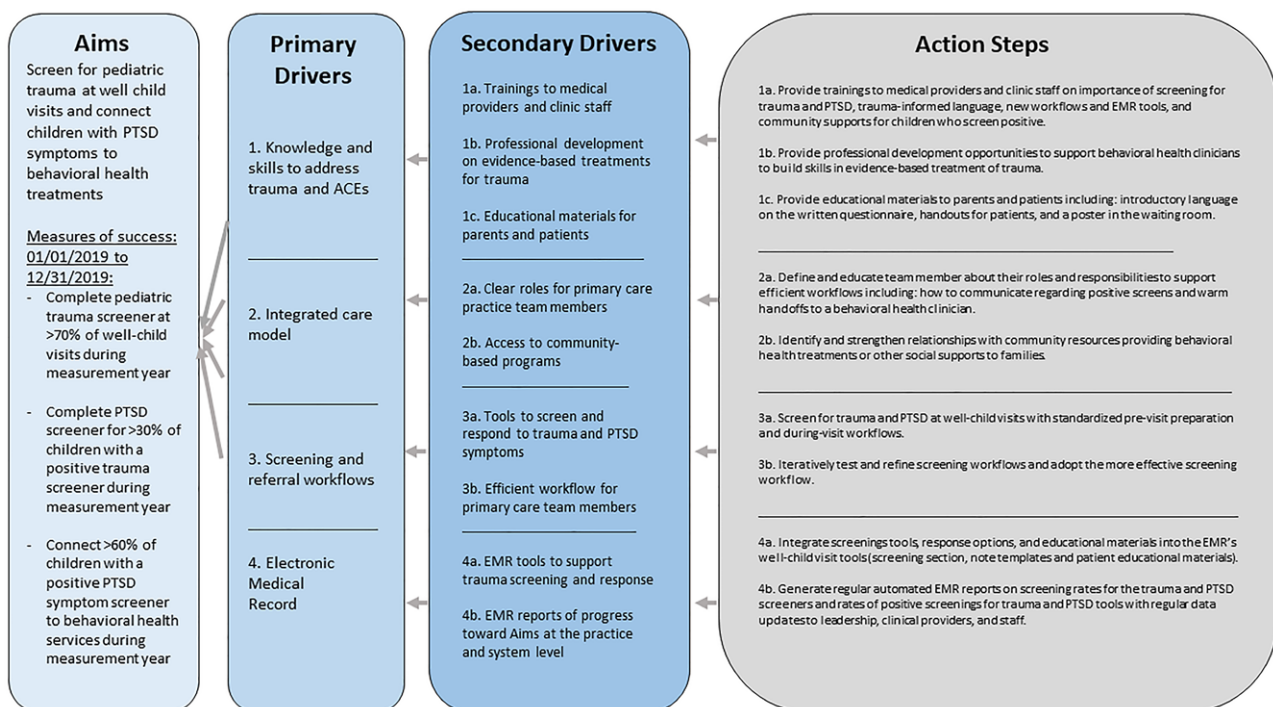


Fig. 2. The key driver diagram identifies action steps, primary drivers, and secondary drivers utilized to achieve the aims of the QI project.

Table 1. Pediatric Trauma Screenings by Site Characteristics, Screening Method, and Rate of Positivity (January 1, 2016–September 30, 2016)

Site Number	Medicaid Insurance %	Screening Method	Well-Child Visits: N	Screenings Completed: N (%)	Positive Screenings: N (%)	aPTSDRi Completed: N (%)	Positive aPTSDRi: N (%)
1	85	Questionnaire	2,149	716 (33.3)	52 (7.3)	5 (9.6)	1 (20)
2	39	Questionnaire	2,704	1,812 (67.0)	239 (13.2)	66 (27.6)	7 (10.6)
3	25	Verbal	4,217	1,720 (40.8)	57 (3.3)	10 (17.5)	1 (10)
4	24	Verbal	2,337	1,953 (83.6)	62 (3.2)	1 (1.6)	1 (100)
5	28	Verbal	3,768	1,333 (35.4)	51 (3.8)	1 (2.0)	1 (100)
		Totals	15,175	7,534 (49.6)	461 (6.1)	83 (18.0)	11 (13.3)

set collaboratively with medical group leadership based on feedback from providers/staff and the reported metrics from the PDSA cycles. The training sessions completed during the first 3 months of 2019 were focused on determining and overcoming barriers to using the aPTSDRi, and connecting patients with trauma symptomology to behavioral health resources. During the last 2 months of the 12-month cycle, to support increased utilization of the aPTSDRi, the following patient instructions were added to the handed-out questionnaire, “If you answered YES to either of the 2 questions, please consider filling out the back of the form.” The key driver diagram presents the aims and action steps supporting the system-wide implementation (Fig. 2).

Each quarter during the study period, we reviewed a sample of consecutive charts of patients who screened positive on the aPTSDRi to determine connection rates to behavioral health resources. The 250 chart reviews identified whether patients at the time of the positive aPTSDRi were already connected to a behavioral health clinician, newly referred to behavioral health, or neither connected nor referred.

This study follows the SQUIRE v.2.0 publication guidelines for reporting.¹⁷

Ethical Considerations

This study was not human subjects research as determined by the MaineHealth institutional review board. The developers of the UCLA aPTSDRi Screening Tool granted written permission for its use.

RESULTS

PDSA Cycle 1: Initial Implementation

During the first PDSA cycle, the 5 sites completed 15,175 well-child visits for patients from birth to 18 years old. Overall, the 2-question trauma screener was completed at 49.6% (n = 7,534) of the well-child visits, with variability between sites. A mean of 6.1% (n = 461) of these screenings resulted in positive trauma risk, varying from 3.2% to 13.2% across sites. The 2 practices that used the written workflow reported a higher average positivity rate on the trauma screener (11.5%) than the 3 that used the verbal method (3.4%) (Table 1). Among the

461 positive trauma screenings, there was a low rate of positivity for question 1 (8%) compared with question 2 (95%). Three percent of screeners were positive for both questions. When the 2-question trauma screener was positive, the average aPTSDRi completion rate was 18.0% (n = 83/461) with a positivity rate of 13.3% (n = 11/83) with variability between sites.

Among the 412 encounters in which the trauma screener was positive, and trauma was documented, 589 traumatic experiences were identified. While most patients had 1 documented trauma, some had as many as 4 types. Family separation, bereavement, illness/medical trauma, impaired caregiver, intimate partner violence, and behavioral health difficulties were the most common traumatic experiences recorded (Table 2).

PDSA Cycle 2: Workflow Changes

A significant increase in positivity rates on the trauma screener was identified in all 3 practices that transitioned from the verbal to the written questionnaire workflow ($P < 0.0001$ for all comparisons). In contrast, the 2 sites that used the written questionnaire workflow during the entire PDSA cycle 2 either experienced a nonsignificant change or decreased positivity rates during the corresponding period (Table 3).

PDSA Cycle 3: Scale-up and Assessing Connection to Resources

The overall positivity rate for version 2 of the trauma questions (Supplementary Digital Content 3, which shows Materials and Methods: pediatric trauma screening patient questionnaire, <http://links.lww.com/PQ9/A473>) was 6.9% (342/4,960). Among the positive trauma screeners, the rate of positivity for the *Hurt or Frightened* question was 18% compared with 76% for the “*Bad, Sad, or Scary*,” and 6% of screeners were positive for both questions.

During the 12 months of 2019, the 14 practices completed 25,287 trauma screeners during well-child visits. (Figure, Supplementary Digital Content 2, which shows Pediatric Trauma Screening Monthly Automated Report (January 1, 2019–December 31, 2019), <http://links.lww.com/PQ9/A472>.) Of those, 2,441 (9.7%) screened positive for trauma. Among positive screens, 907 (37.2%)

Table 2. Trauma Categories and Rates Identified by Chart Review

Trauma Category	Number	Percentage*
Other†	139	24
Separation	114	19
Bereavement	95	16
Illness/medical trauma	48	8
Impaired caregiver (substance use)	40	7
Stress, anxiety, depression, suicidality, and PTSD	29	5
Intimate partner violence	28	5
School bullying	21	4
Psychological, emotional, and verbal abuse	12	2
Neglect	11	2
Community violence	11	2
Not reported, but provider reports concern	11	2
Homelessness	7	1
Sexual abuse	7	1
Natural disaster	6	1
Parent high stress	5	1
Physical abuse	4	1
Forced displacement (refugee)	4	1
School violence	4	1
Media violence	4	1

*Categories with <1%: sexual assault, physical assault, kidnapping, homicide, war-terrorism, and serious accidental injury.
 †Other events were not easily classified in a defined trauma category. Other events include ending romantic relationships; the death of a pet; self-esteem challenges; difficulties at home such as fighting with parents or siblings; friend stress but not bullying; parental job loss, nonparental family members with mental health conditions; or substance abuse or criminal history.

completed the aPTSDRi, and among those, 520 (57.3%) identified PTSD symptomology. Corresponding to practice training completed during months 1 to 3 of PDSA Cycle 3, the monthly aPTSDRi completion rates increased from a baseline of 16.3%–35.0% by month 4. During months 11 and 12 of this PDSA cycle, when patient instructions to complete the aPTSDRi were added to the handed-out form, the monthly completion rate increased to 47.9% and 57.1% (Fig. 3).

The chart review of 250 children with a positive aPTSDRi identified 108 of 250 (43.2%) children already receiving care from a behavioral health clinician, 66 of 250 children (26.4%) newly referred to a behavioral health clinician, and 76 of 250 (30.4%) children with no current connection or referral entered. Removing the children who were already seeing a behavioral health clinician at the time of

screening, the referral rate during this QI project was 46.5% (66/142).

DISCUSSION

In this QI study, we implemented a trauma and post-traumatic symptomology screening model consistent with expert recommendations.^{15,18} We evaluated its feasibility and effectiveness in identifying and responding to childhood trauma. The major changes over the 3 PDSA cycles were the screening and response workflows, the updated trauma question, and the training model. During the final 12 months of this improvement project, 25,287 trauma screenings were completed for nearly 90% of pediatric patients across 14 primary care practices. Educational sessions and the addition of patient instructions on the handed-out form during cycle 3 increased the aPTSDRi rates from 16.3% in month 1 to 57.1% in month 12. The most common reason providers cited for not completing the aPTSDRi was the clinical decision not to use the screening tool when they judged the traumatic experience to be minor. The chart review examining connection rates to behavioral health for children with PTSD symptomology identified 43.2% of children already connected to behavioral health. This finding aligns with the literature and is not surprising considering the strong association between ACEs and behavioral health diagnoses.¹⁹ With 46.5% of previously unconnected patients receiving new referrals to behavioral health resources, we achieved a higher connection rate than those reported in similar trauma screening studies.^{20–23}

Screening and Referral Approach

There are significant differences between our approach and results compared with other trauma screeners and workflows published in the literature.^{19–24} Our model asks about recent trauma in the past year and is linked to a PTSD symptomology screener when trauma is identified. Other screening models, such as the Whole Child Assessment, CYW-ACEQ, the Juvenile Victimization Questionnaire, and the SEEK, utilize a longer screening method with multiple categories of adversity and do not screen for PTSD symptomology. A potential implementation advantage of our model is the alignment with other efficient 2-step behavioral health screenings commonly

Table 3. Pediatric Trauma Screening Results Comparing the Verbal Screening Workflow with the Written Questionnaire Workflow (June 1, 2017–February 28, 2018)

Site	Verbal Screening			Written Questionnaire			P
	Well-Child Visits: N	Screenings Completed: N (%)	Positive Screenings/Completed: N (%)	Well-Child Visits: N	Screenings Completed: N (%)	Positive Screenings/Completed: N (%)	
3	1,843	1,685 (91.4)	21 (1.2)	1,629	1,573 (96.6)	150 (9.5)	<0.00001
4	986	890 (90.3)	16 (1.8)	1,071	954 (89.1)	81 (8.5)	<0.00001
5	1,271	911 (71.7)	23 (2.5)	1,233	1,082 (87.8)	67 (6.2)	0.00009
Total	4,100	3,486 (85.0)	60 (1.7)	3,933	3,609 (91.8)	298 (8.3)	

Sites 1 and 2 used the written questionnaire workflow during PDSA cycle 2. Sites 1 and 2 did not experience a corresponding change in positivity rates between the first and last 4 months of the study period (site 1: 2.8%–3.0% and site 2: 14.6%–10.5%).

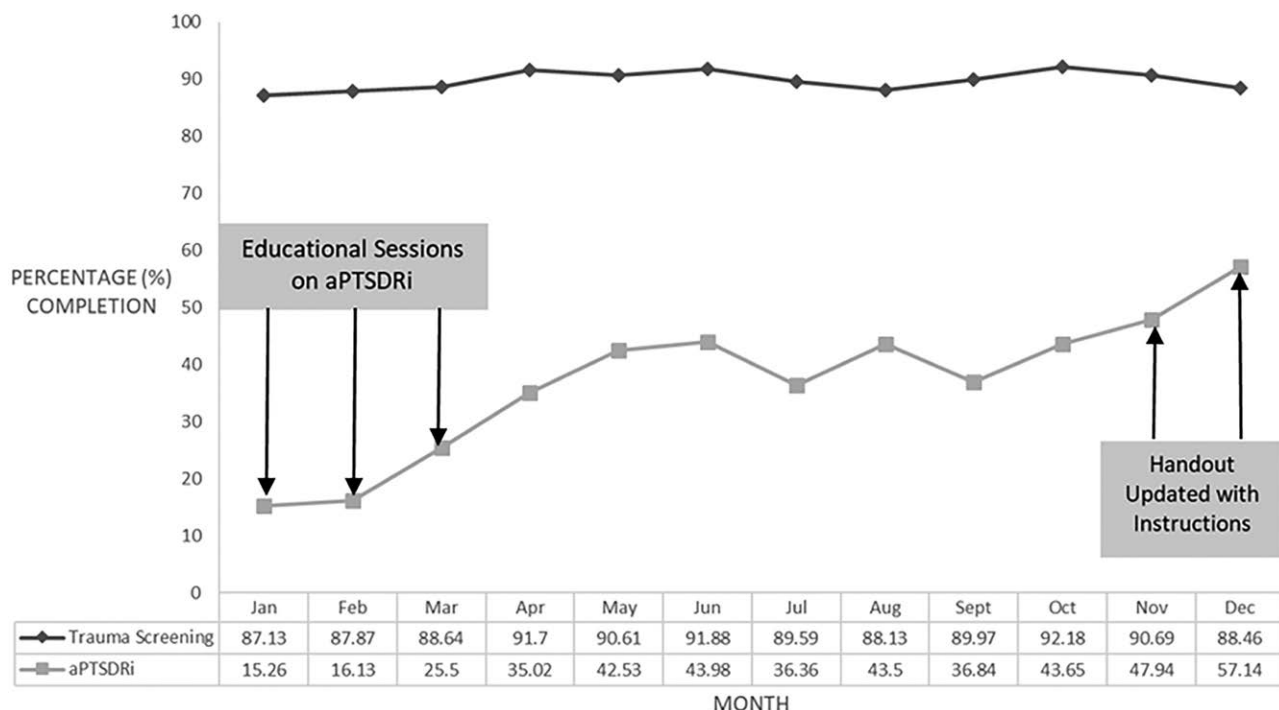


Fig. 3. Run chart depicting trauma and aPTSDri screening completion by month (PDSA 3: 2019).

utilized in pediatric primary care, such as the PHQ-9 and the CRAFFT.^{25,26} An essential factor in practice site buy-in and implementation was the short length of the 2 trauma screening questions. Our stepwise workflow then facilitates the utilization of symptomology as a connection point at which the provider and patient (or parent) can collaboratively determine the next steps.²⁷ The identification of PTSD symptomology is 1 potential reason for our higher referral rates when compared with other studies in primary care settings.²⁰⁻²³ Advantages of the other trauma screening tools over our model are their ability to measure cumulative adversity, ask about specific trauma categories, and identify social drivers of health.

Written Trauma Screening Method

Providing a written questionnaire increased the rate of positive trauma identification significantly compared with a verbal screening workflow from 1.7% to 8.3%. These findings align with existing literature on effective trauma screening workflows.^{22,28} A benefit of the written screening method is the standardization of the patient experience compared with the variability of verbal screening by staff. Of note, our written questions included a trauma-informed introduction designed to increase the patient’s sense of safety; in alignment with expert recommendations, the language included the right of the patient or parent to choose to answer the questions or skip them.²⁹ The rate of positive trauma identification may be higher with the written screening workflow because the

patient or parent was more comfortable with the reporting method.

Trauma Screening Questions

The *bad, sad, or scary* question had the highest positivity rates among the 3 trauma questions we studied and, therefore, was not altered throughout the PDSA cycles. The safety question’s low positivity rate informed our decision to replace it with the *hurt or frightened* question during PDSA cycle 3. Based on the results, our team plans to continue to promote the use of the 2 trauma questions used in cycle 3. Although we do not know the true prevalence of trauma and PTSD symptoms in our patient population, the chart review demonstrated the effectiveness of the trauma questions for identifying children and families who had experienced a wide range of traumatic experiences.²⁴ Providers frequently documented the specific trauma types in their notes; this finding illuminates that important clinical conversations regarding traumatic experiences were occurring in many of these primary care visits with the potential to open the door to supports focused on preventing negative long-term outcomes.

Limitations

While we developed smart aims and key driver diagrams during the planning and implementation of the program, we did not systematically assess patient and family acceptability or unintended consequences of trauma screening,

including the balancing factors of the time needed for conversations about traumatic experiences or traumatic symptomology or increased clinician psychological burden. In addition, due to the lack of baseline data on connection rates for behavioral health services, we could not determine whether connection rates increased, stayed the same, or decreased with the implementation of our model.

CONCLUDING SUMMARY

Our findings demonstrate that screening and responding to trauma and posttraumatic symptomology in pediatric primary care practices in a large health system is feasible using 2 trauma screening questions linked to a brief PTSD symptomology screener. This approach has significant advantages over longer screening tools for practice site buy-in and ease of implementation. In addition, identifying symptomology creates an opportunity for providers to collaboratively build resilience and determine the next steps with patients and guardians. With institutional support from leadership and pediatric providers in place, we will expand the project to all 42 primary care practices within the health system. Future QI cycles will focus on increasing the utilization of the aPTSDRi and connection rates to behavioral health clinicians when there is a documented need.

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