Improving Universal Suicide Risk Screening Rates at a Children's Hospital

Anna Lund, MSN, RN,[1] Kimberly Denicolo, MSN, RN,[1] Skyler Tomko, DNP, APRN,[1] Roderick C. Jones, MPH,[2] Rebecca J. Stephen, MD,[3,4] Michael Olsen, MS, RN,[1] John Sarmiento, MSN, RN,[1] Stephanie Jones, MS, RN,[1] Ellen DiVenere, BSN, RN,[1] Naomi Sullivan, MEd, MS, MBA, RN,[4] Agata Nytko, BA,[5] Jennifer Hoffmann, MD, MS[6]

abstract

BACKGROUND AND OBJECTIVES: Suicide is a leading cause of death among US youth. In hospital settings, screening for suicide risk enables assessment, brief interventions, and linkage to treatment. Our objective was to increase compliance with universal suicide risk screening for patients aged 10 years or older during acute care visits (to the emergency department [ED] and/or inpatient medical units) of a children's hospital from 27% to greater than or equal to 60% over 13 months.

METHODS: Using quality improvement methodology, a multidisciplinary team implemented interventions to increase compliance with universal suicide risk screening for patients aged 10 years or older at an academic children's hospital from June 2022 to June 2023, followed by a 7-month sustainment period. Interventions included a clinical care guideline and clinical decision support tools embedded in the electronic health record (EHR). We measured compliance with administration of Ask Suicide-Screening Questions (ASQ) during eligible visits, overall and stratified by care area, and positivity rates.

RESULTS: During the intervention and sustainment periods, there were 18 435 and 10 257 acute care visits by patients aged 10 years or older, respectively. Screening compliance rates increased from 27% to 80% overall, from 17% to 80% in the ED, and from 55% to 76% in inpatient medical units. Of acute care visits with screening performed during the sustainment period, 8.6% had positive ASQ screening (6.9% nonimminent risk and 1.7% imminent risk).

CONCLUSIONS: Implementing a clinical care guideline, accompanied by EHR-integrated clinical decision support, increased compliance with suicide risk screening at a children's hospital. Screening positivity rates reflect mental health needs among children receiving acute care.

INTRODUCTION

Suicide is a leading cause of death among US youth,[1] and 9% of US high school students in 2023 reported having attempted suicide during the past year.[2] When youth interact with the health care system, suicide risk often remains undetected.[3] Implementation of universal suicide risk screening in emergency departments (EDs) and hospitals can facilitate identification of unmet mental health needs and linkage to services.[3–5] The American Academy of Pediatrics recommends universal suicide risk screening for all patients aged 12 years or older who are medically and developmentally capable of answering questions at least annually, although EDs and inpatient settings may also elect to screen at every visit.[6,7]

[1]Department of Nursing, Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, Illinois; [2]Data Analytics and Reporting, Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, Illinois; [3]Division of Hospital Based Medicine, Ann & Robert H Lurie Children's Hospital of Chicago, Northwestern University Feinberg School of Medicine, Chicago, Illinois; [4]Center for Quality and Safety, Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, Illinois; [5]Clinical Informatics, Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, Illinois; and [6]Division of Emergency Medicine, Ann & Robert H. Lurie Children's Hospital of Chicago, Northwestern University Feinberg School of Medicine, Chicago, Illinois

Address correspondence to: Jennifer A. Hoffmann, MD, MS, Division of Emergency Medicine, Ann & Robert H. Lurie Children's Hospital of Chicago, 225 E Chicago Ave, Chicago, IL 60611. jhoffmann@luriechildrens.org

Ms Lund, Ms Denicolo, and Dr Tomko conceptualized and designed the study, acquired the data, substantially contributed to analysis and interpretation of data, and drafted the initial manuscript. Mr Jones led data analysis, contributed substantially to interpretation of data, and critically reviewed and revised the manuscript for important intellectual content. Dr Stephen substantially contributed to analysis and interpretation of data and critically reviewed and revised the manuscript for important intellectual content. Ms DiVenere, Mr Olsen, Mr Sarmiento, Ms Jones, Ms Sullivan, and Ms Nytko substantially contributed to interpretation of data and critically reviewed and revised the manuscript for important intellectual content. Dr Hoffmann substantially contributed to conceptualization and design of the study, supervised analysis and interpretation of data, and critically reviewed and revised the manuscript for important intellectual content. All authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work.

CONFLICT OF INTEREST DISCLOSURES: The authors have no conflicts of interest relevant to this article to disclose.

To cite: Lund A, Denicolo K, Tomko S, et al. Improving Universal Suicide Risk Screening Rates at a Children's Hospital. *Pediatrics*. 2025;155(5): e2024065901

Downloaded from http://publications.aap.org/pediatrics/article-pdf/155/5/e2024065901/1794922/pediatrics.2024065901.pdf
by Northwestern University, Jennifer Hoffmann

The Ask Suicide-Screening Questions (ASQ) consist of 4 to 5 suicide risk screening questions validated for children aged 10 years or older who present to an ED or medical inpatient unit.[5,8–10] Suicide risk screening in these settings is highly acceptable to youth and families.[11–13] Among youth in the ED, the ASQ has a sensitivity of 93% in predicting return ED visits for suicide-related complaints within 6 months.[14] Among youth in inpatient units, the ASQ has a sensitivity of 97% in detecting elevated suicide risk compared with a longer risk assessment.[5] Universal screening of all patients, regardless of presenting complaint, maximizes opportunities to detect suicide risk.[15–17] For instance, after universal ASQ screening was implemented in 1 pediatric ED, identification of patients at risk for suicide increased by 37% within 3 months.[18] Children identified at risk can receive evidence-based suicide prevention interventions, such as safety planning, which increase treatment linkage and reduce subsequent suicide attempts.[19,20] Nevertheless, implementation of universal screening must overcome barriers related to training, workflow integration, and follow-up of positive screens.[16,21]

In November 2019, our hospital instituted a universal ASQ screening policy for patients aged 10 years or older presenting for an acute care visit (to the ED and/or inpatient medical units), yet compliance with this policy remained low. Thus, our objective was to increase suicide risk screening compliance for patients aged 10 years or older in the ED and inpatient medical units of a children's hospital from a low baseline of 27% (from June 2021 to May 2022) to greater than or equal to 60% over 13 months, by June 2023.

METHODS

Context

This quality improvement initiative was conducted at an urban academic children's hospital with 360 inpatient beds, 55 000 annual ED visits, and 1500 annual psychiatric ED visits. In the ED, psychiatric social workers assist with mental health evaluations 24 hours per day, with oversight from child and adolescent psychiatrists and psychologists. A team of child and adolescent psychiatrists and psychologists provides consultation services for inpatient medical units.

ASQ screening occurs during ED triage, upon transfer from the ED to inpatient medical unit (if not completed in the ED), or upon direct admission to a medical unit. Nurses conduct screening verbally in the patient's preferred language, using a professional medical interpreter when indicated. For patients who are developmentally unable to answer ASQ questions, the nurse instead asks the caregiver, "Is your child demonstrating any self-harming behaviors?" with a positive response prompting further assessment by the medical team. For patients unable to answer questions due to medical acuity, the nurse documents "unable to assess," with screening performed after the patient's clinical status improves. In November 2021, during the baseline period, the ASQ was relocated from a section of ED triage documentation that required nurses to scroll down to view questions and document responses; it was instead moved into a new safety subsection that eliminated scrolling and improved visibility.

Planning the Interventions

In January 2022, a multidisciplinary team convened including nurses from the ED and each inpatient unit, emergency medicine physicians, hospitalists, child and adolescent psychiatrists, and quality improvement specialists. The team used our hospital-specific improvement framework that combines various methodologies,[22] which included a current state analysis, followed by planning and implementing interventions, accompanied by measurement.

To conduct the current state analysis, the team solicited barriers to screening in the ED and each inpatient unit through individual conversations and group meetings. In January 2022, ED nurses completed an anonymous baseline survey, distributed via email, on current practices and barriers to screening (Supplemental Figure 1). Next, unit-specific fishbone diagrams were developed to illustrate screening barriers and combined into a hospital-wide fishbone diagram (Supplemental Figure 2). Common barriers included knowledge gaps and nonstandardized processes for screening and follow-up.

A driver diagram cataloged proposed interventions (Figure 1), which were subsequently prioritized using a Possible, Implement, Challenge, Kibosh chart[23] (Figure 2). Sequential interventions (Table 1) included nurse education, printed and laminated ASQ tools, relocation of the ASQ in the electronic health record (EHR) workflow for inpatient admission documentation, clinical care guideline (CCG) implementation, and EHR-integrated clinical decision support.

Interventions

Nurse Education

From June 2022 to September 2022, nursing education was conducted in the ED and inpatient units. Educational materials from the National Institute of Mental Health (NIMH) ASQ toolkit[10] were adapted for local context. Content included the rationale for conducting screening, hospital policies, and sample scripts to introduce screening. Educational formats included lectures, emails, flyers, internal social media posts, and presentations during daily huddles.

Printed, Laminated ASQ Tool

In June 2022, printed, laminated ASQ tools were introduced in the ED to overcome privacy barriers when caregivers

Downloaded from http://publications.aap.org/pediatrics/article-pdf/155/5/e2024065901/1794922/pediatrics.2024065901.pdf
by Northwestern University, Jennifer Hoffmann

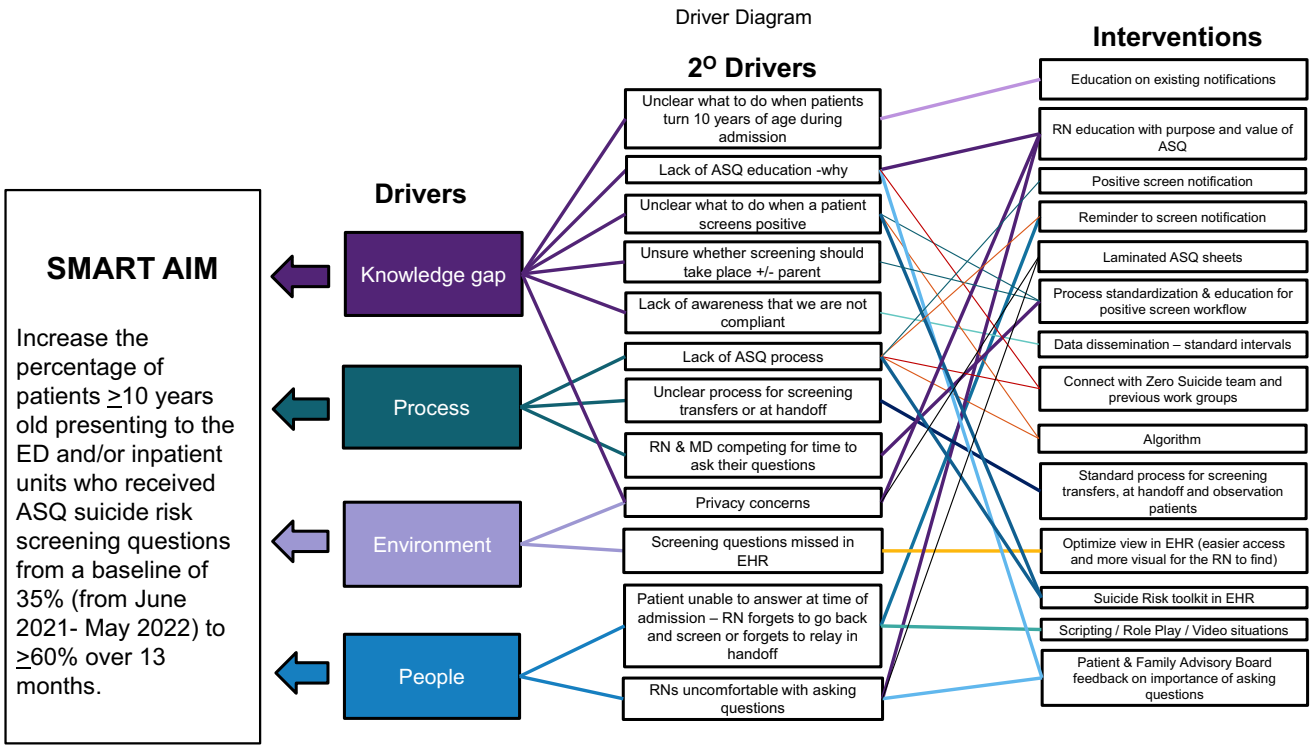

FIGURE 1.
Driver diagram.
Abbreviations: ASQ, Ask Suicide-Screening Questions; ED, emergency department; EHR, electronic health record; MD, doctor of medicine; RN, registered nurse.

were present. Laminated sheets with ASQ questions, printed in English and Spanish, were placed in each triage space, along with dry erase markers to circle answers. Nurses entered written responses into the EHR. In May 2023, laminated tools were implemented on 1 inpatient unit.

Relocation of ASQ Within Inpatient Admission EHR Workflow

In July 2022, within admission documentation used by inpatient nurses, the ASQ was relocated to a more prominent location to increase visibility, and questions were labeled as a required documentation task.

Clinical Care Guideline

In September 2022, a suicide prevention CCG adapted from the NIMH ASQ toolkit[10] was implemented in the ED and inpatient units (Supplemental Figure 3). For patients with positive screens, the CCG recommended completion of a Brief Suicide Safety Assessment for risk stratification. For all patients identified as imminent risk (and otherwise at the nurse's discretion), recommended steps included placement in an environmentally safe room, removal of personal belongings, and initiation of one-to-one observation. The CCG was accessible from an EHR menu, with embedded hyperlinks to hospital protocols, handouts for patients and families, and mental health resources.

Clinical Decision Support: Positive Screen Notification

In September 2022, several EHR prompts were implemented in the ED to promote follow-up actions aligned with CCG workflows. For positive ASQ screens, electronic alerts prompted ED nurses to page psychiatric social workers. For positive responses to ASQ item 5, indicating imminent suicide risk, electronic alerts prompted nurses to order one-to-one observation. Alerts also notified ED clinicians of positive ASQ screens as they assigned themselves to specific patients. In inpatient units, existing alerts were updated to prompt nurses to ensure environmental safety and to order one-to-one observation when indicated.

Suicide Risk Toolkit

In January 2023, a suicide risk toolkit was implemented to display completed and outstanding suicide prevention tasks in a single location in the EHR. The toolkit displayed ASQ results, Brief Suicide Safety Assessments, safety plans, and additional resources.

Downloaded from http://publications.aap.org/pediatrics/article-pdf/155/5/e2024065901/1794922/pediatrics.2024065901.pdf
by Northwestern University, Jennifer Hoffmann

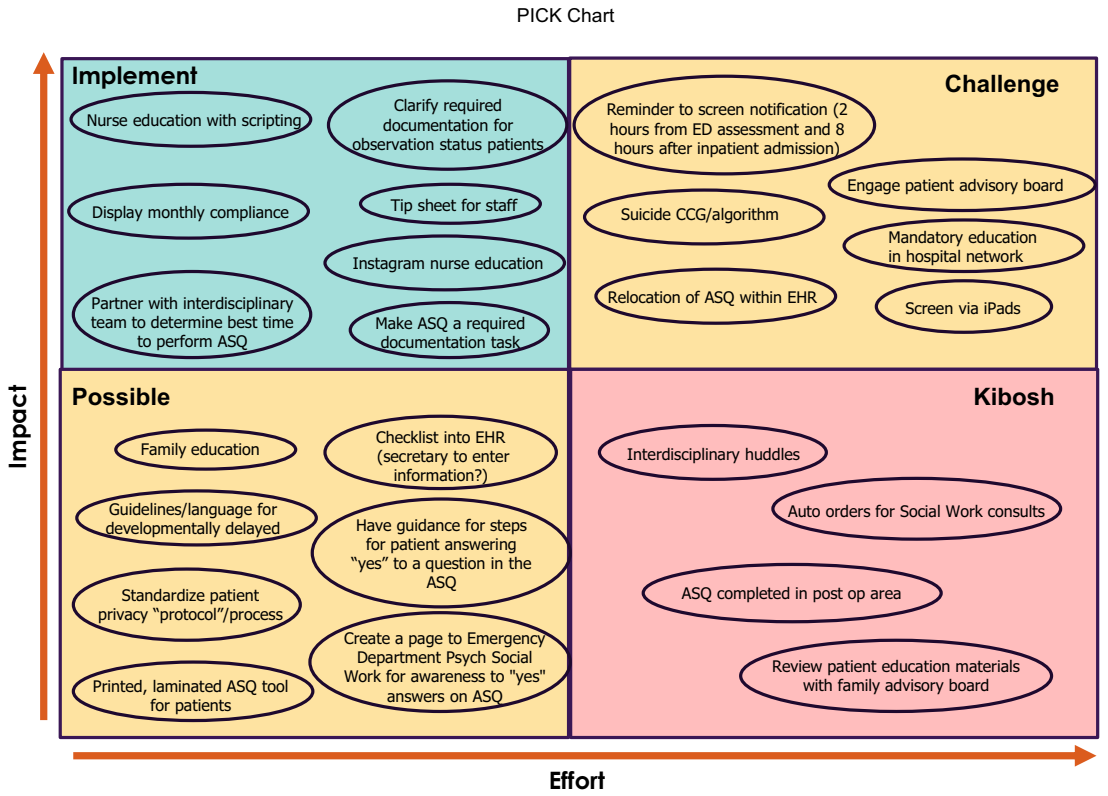

FIGURE 2.
Possible, Implement, Challenge, Kibosh (PICK) chart.
Abbreviations: ASQ, Ask Suicide-Screening Questions; EHR, electronic health record.

TABLE 1. Interventions to Improve Suicide Risk Screening Compliance

Intervention	Date and Location	Description
Nurse education	June 2022 (ED), September 2022 (Inpatient)	Suicide risk screening education was conducted via lectures, emails, flyers, internal social media posts, and presentations during daily huddles.
Printed, laminated ASQ tools	June 2022 (ED), May 2023 (One Inpatient Unit)	In June 2022, in the ED, a printed and laminated ASQ tool was created to overcome privacy barriers. In May 2023, laminated tools were implemented on 1 inpatient unit.
Relocation of ASQ within inpatient admission EHR workflow	July 2022 (Inpatient)	In July 2022, the ASQ was relocated within the admission EHR workflow used by nurses to increase visibility. Questions were labelled as a required documentation task.
Clinical care guideline	September 2022 (ED and Inpatient)	An evidence-based suicide prevention clinical care guideline was implemented in the ED and inpatient units.
Clinical decision support: positive screen notification	September 2022 (ED)	Several EHR prompts were implemented to promote follow-up of positive ASQ screens in the ED, in alignment with clinical care guideline workflows.
Suicide risk toolkit	January 2023 (ED and Inpatient)	A toolkit was implemented in the EHR to display completed and outstanding suicide prevention tasks in a single location, including ASQ screening, follow-up risk assessments, and safety planning.
Clinical decision support: reminder to screen notification	May 2023 (Inpatient), June 2023 (ED)	In May 2023, electronic alerts were implemented to remind inpatient nurses to conduct suicide risk screening if not completed within 8 h of admission. In June 2023, electronic alerts were implemented to remind ED nurses to conduct suicide risk screening if not completed within 2 h of initial nurse assessment.

Abbreviations: ASQ, Ask Suicide-Screening Questions; ED, emergency department; EHR, electronic health record.

Downloaded from http://publications.aap.org/pediatrics/article-pdf/155/5/e2024065901/1794922/pediatrics.2024065901.pdf
by Northwestern University, Jennifer Hoffmann

Clinical Decision Support: Reminder to Screen Notification

In May 2023, electronic alerts were implemented during specific hours to remind inpatient nurses to conduct screening 8 hours after admission, if not yet completed. In June 2023, electronic alerts were implemented in the ED for patients who had not been screened 2 hours after initial nurse assessment. Alert panels were designed to enable completion of ASQ questions directly within the panels.

Study of Interventions

Measures

The primary measure was the percentage of visits by patients aged 10 years or older in the ED or inpatient medical units who received ASQ screening at any time before discharge. Visits involving a care transition from the ED to an inpatient medical unit were considered compliant if ASQ screening was performed in either setting. From the measure denominator, we excluded visits by patients with intellectual disabilities, defined by a nonmissing response to the alternative screening question, "Is your child demonstrating any self-harming behaviors?" EHR prompts for nurses conducting screening and CCG guidance specified that this question was to be asked only if patients were not developmentally capable of answering ASQ questions. Secondary measures included compliance rates by care area (ED, inpatient units) and, in the ED, by chief complaint (psychiatric, nonpsychiatric). As process measures reflecting appropriate follow-up for positive screens, we measured the percentage of visits with imminent risk identified (Yes to ASQ item 5) that had (1) psychiatric consult orders and (2) one-to-one observation orders placed. As a balancing measure, we measured median ED visit length. In October 2022, a follow-up survey was administered to ED nurses to assess screening practices and ongoing barriers. In December 2022 and February 2023, we completed case reviews of acute care visits with imminent risk identified but no psychiatric consultation order placed.

Analysis

Descriptive statistics were used to characterize acute care visits (to the ED and/or inpatient medical units) during the baseline, intervention, and sustainment periods with respect to patient sex, age group, preferred language, insurance payor, and visit type (ED only, admission from ED, direct admission to inpatient unit). Of acute care visits with screening performed, we described the percentage with positive screens (Yes to any item or refusal to answer), nonimminent risk detected (Yes to any of items 1 to 4 and No to item 5, or refusal to answer), and imminent risk detected (Yes to item 5).[8,10,24] Positivity rates were described overall and during baseline, intervention, and sustainment periods.

We used statistical process control methodology to examine changes in measures monthly. Instances of special cause variation were identified, with centerline and control limits revised according to established rules.[25,26] We compared median ED visit length for patients aged 10 years or older during the baseline and intervention/sustainment periods using a Mann-Whitney U test. We compared the length of ED visits with positive and negative screening results during the sustainment period for all patients aged 10 years or older, and for nonpsychiatric ED visits specifically, using Mann-Whitney U tests. Descriptive statistics were used to characterize survey responses and case review outcomes. Statistical process control charts were generated using QI Charts (Process Improvement Products, version 2.0.23) and Microsoft Excel 2021 MSO (version 2310 Build 16.0.16924.20054).

Ethical Considerations

This study was determined to be quality improvement (not human subjects research) by the hospital's institutional review board.

RESULTS

Acute Care Visit Characteristics

Of 47 654 total acute care visits by patients aged 10 years or older from June 2021 to January 2024, 493 (1%) were excluded because of intellectual disability; of those, caregivers endorsed self-harming behaviors in 73 (15%). We included 47 161 acute care visits by patients aged 10 years or older: 18 469 during the 12-month baseline period (June 2021–May 2022), 18 435 during the 13-month intervention period (June 2022–June 2023), and 10 257 during the 7-month sustainment period (July 2023–January 2024). Of included acute care visits, 51% were by females, 34% were by adolescents aged 13 to 15 years, and 14% were direct admissions to an inpatient medical unit (Table 2).

Suicide Risk Screening Positivity Rates

Among acute care visits with screening performed, screens were positive (for either nonimminent or imminent risk) in 12.6%: 20.4% (1211/5934) in the baseline period, 11.3% (1248/11083) in the intervention period, and 8.6% (709/8201) during the sustainment period. Nonimminent risk was identified in 2358 (9.3%) visits: 858 (14.4%) in the baseline period, 934 (8.4%) in the intervention period, and 566 (6.9%) during the sustainment period. Imminent risk was identified in 810 (3.2%) visits: 353 (5.9%) in the baseline period, 314 (2.8%) in the intervention period, and 143 (1.7%) during the sustainment period.

Suicide Risk Screening Compliance Rates

Screening compliance rates for visits by patients aged 10 years or older in the ED and inpatient medical units

Downloaded from http://publications.aap.org/pediatrics/article-pdf/155/5/e2024065901/1794922/pediatrics.2024065901.pdf
by Northwestern University, Jennifer Hoffmann

TABLE 2. Characteristics of Eligible Acute Care Visits by Patients Aged 10 Years or Older During Baseline, Intervention, and Sustainment Periods

Acute Care Visit Characteristic[a]	Overall, n (%)	Baseline (June 2021–May 2022), n (%)	Intervention (June 2022–June 2023), n (%)	Sustainment (July 2023–January 2024), n (%)
Overall	N = 47 161	N = 18 469	N = 18 435	N = 10 257
Sex				
Female	24 251 (51)	9698 (53)	9387 (51)	5166 (50)
Male	22 907 (49)	8771 (47)	9045 (49)	5091 (50)
Unknown	3 (0)	0 (0)	3 (0)	0 (0)
Age category, years				
10–12	15 564 (33)	5704 (31)	6391 (35)	3469 (34)
13–15	15 931 (34)	6468 (35)	6060 (33)	3403 (33)
16–18	12 111 (26)	4830 (26)	4602 (25)	2679 (26)
≥19	3555 (8)	1467 (8)	1382 (7)	706 (7)
Preferred language				
English	34 729 (74)	13 916 (75)	13 521 (73)	7292 (71)
Spanish	11 390 (24)	4197 (23)	4510 (24)	2683 (26)
Other	1039 (2)	355 (2)	404 (2)	280 (3)
Insurance				
Private	16 079 (34)	6460 (35)	6172 (33)	3447 (34)
Public	30 502 (65)	11 795 (64)	12 042 (65)	6665 (65)
Self-pay and other	580 (1)	214 (1)	221 (1)	145 (1)
Acute care encounter type				
Emergency department visit				
With admission to psychiatric unit	389 (1)	86 (0)	199 (1)	104 (1)
With admission to medical unit	8118 (17)	3208 (17)	3104 (17)	1806 (18)
Discharge or other disposition	31 865 (68)	11 913 (65)	12 775 (69)	7177 (70)
Transfer to outside psychiatric facility	193 (0)	92 (0)	69 (0)	32 (0)
Direct admission to inpatient medical unit	6596 (14)	3170 (17)	2288 (12)	1138 (11)

Abbreviation: N, total population size; n, subgroup of total population.
[a] Eligible acute care visits were defined as those by patients aged 10 years or older occurring in the emergency department and/or inpatient medical unit, excluding visits by patients with intellectual disabilities who were unable to answer suicide risk screening questions.

increased from 27% to 80% (Figure 3). Four centerline shifts occurred during the intervention period, with the first corresponding to implementation of the laminated ASQ tool and ED nurse education and the last corresponding to reminders to screen in the ED and inpatient settings.

In the ED, compliance rates increased from 17% to 80%, with 4 centerline shifts during the intervention period (Figure 4). The largest centerline shift occurred shortly after CCG implementation and positive screen notifications in the ED. In inpatient units, compliance rates increased from 55% to 76%, with 3 centerline shifts. The largest centerline shift occurred following CCG implementation and education in the inpatient setting.

Among ED visits for nonpsychiatric complaints, compliance rates increased from 12% to 80%, with 3 centerline shifts during the intervention period, with the largest shift following CCG implementation and positive screen notifications in the ED (Figure 5). Another large shift occurred with implementation of reminders to screen in the ED. Among ED visits for psychiatric complaints, compliance rates increased from 88% to 94%, with 1 centerline shift, which occurred shortly after CCG implementation and positive screen notifications in the ED.

Psychiatric Consultation and One-to-One Observation Orders

Of visits with imminent risk identified, the percentage with psychiatric consults decreased from 93% to 69%, with a centerline shift, and then increased to 84%, with a second centerline shift (Figure 6). Chart reviews of visits without a psychiatric consult order reflected appropriate care in all instances; the most common scenario was completion of psychiatric consultation without a corresponding order (Supplemental Table 1). Of acute care visits with imminent risk identified, the percentage with a one-to-one observation order increased from 45% to 69%, with 1 centerline shift, as the suicide risk toolkit became available (Figure 7).

ED Length of Stay

Among ED visits by patients aged 10 years or older (including those presenting for both psychiatric and nonpsychiatric reasons), median visit length was 4 hours 43 minutes

Downloaded from http://publications.aap.org/pediatrics/article-pdf/155/5/e2024065901/1794922/pediatrics.2024065901.pdf
by Northwestern University, Jennifer Hoffmann

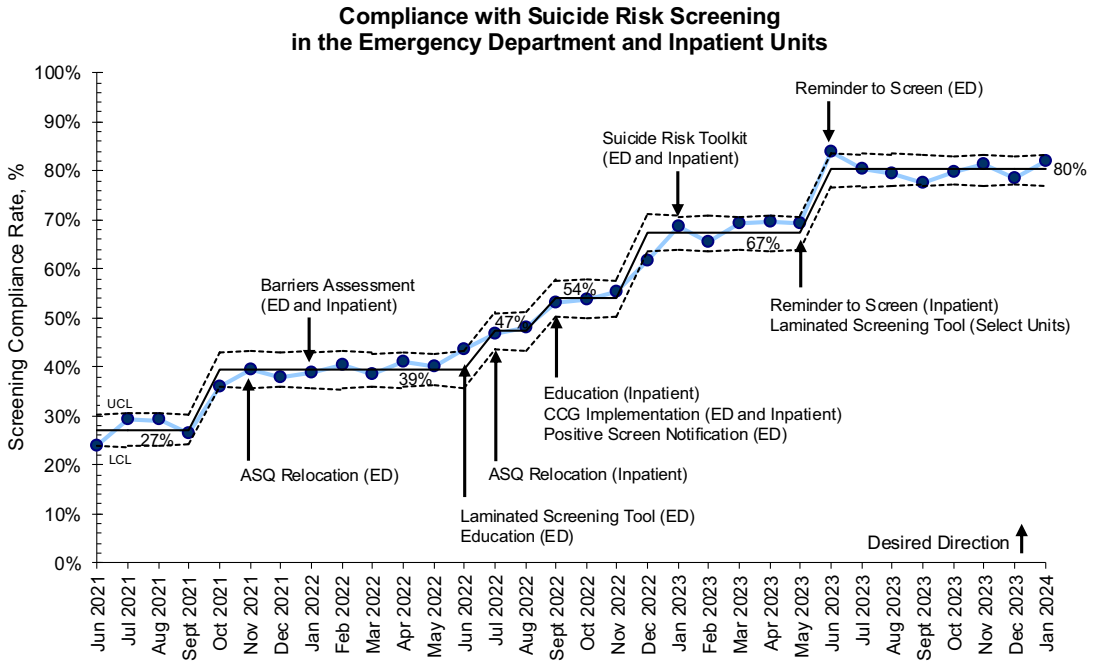

FIGURE 3.

Compliance with suicide risk screening in the ED and inpatient units. P-chart. Numerator: Percent of visits with suicide risk screening completed using the ASQ. Denominator: Visits by patients aged 10 years or older to the ED and/or inpatient medical units.
Abbreviations: ASQ, Ask Suicide-Screening Questions; CCG, clinical care guideline; CL, center line; ED, emergency department; LCL, lower control limit; UCL, upper control limit.

during the baseline period and 5 hours 0 minutes during the combined intervention/sustainment period ($P < .001$). During the sustainment period, median ED length was 6 hours 0 minutes for visits with positive screening and 5 hours 5 minutes for visits with negative screening ($P < .001$). Among nonpsychiatric ED visits during the sustainment period, median visit length was 5 hours 45 minutes for visits with positive screening and 5 hours 5 minutes for visits with negative screening ($P < .001$).

Nurse Survey Results

The baseline survey was completed by 30 of 40 ED nurses (75% response rate). Of respondents, 96% reported knowing who to screen and 40% reported screening all patients aged 10 years or older. The follow-up survey was completed by 25 of 31 ED nurses (81% response rate). Of respondents, 100% reported knowing who to screen and 68% reported screening all patients aged 10 years or older.

DISCUSSION

In this quality improvement initiative at a children's hospital, sequential interventions increased suicide risk screening compliance rates in the ED and inpatient medical units to 80%, with evidence of sustainment. Sequential interventions included CCG implementation, EHR modifications (inclusive of clinical decision support), and nurse education.

Although prior efforts to increase hospital-based suicide risk screening compliance rates have also employed clinical pathways[27] and staff education,[27,28] a novel aspect of our approach was extensive use of EHR-integrated clinical decision support. Within EHR workflows for nurses, we embedded guidance on screening eligibility, screening questions, prompts to place observation orders, and screening reminders. For ED clinicians, we incorporated timely notifications about positive screens, prompts to follow clinical pathway recommendations, and a comprehensive suicide risk toolkit. In a systematic review that included 8 studies of suicide risk screening in the pediatric ED, compliance rates varied widely from 17% to 86%.[16] Our results, falling near the high end of this range, demonstrate how EHR-integrated clinical decision support can promote guideline adherence and sustained process improvements.[29,30]

Nevertheless, barriers to implementation of universal screening persisted. Because some children could not be screened due to medical acuity upon presentation, we incorporated reminders to screen and a second designated opportunity to screen upon admission. To overcome privacy-related barriers, we implemented laminated, printed sheets with written screening questions. However, these sheets were not available in all languages, and additional work is needed to understand which format (verbal, paper, or electronic) is preferred by patients and optimizes suicide

Downloaded from http://publications.aap.org/pediatrics/article-pdf/155/5/e2024065901/1794922/pediatrics.2024065901.pdf
by Northwestern University, Jennifer Hoffmann

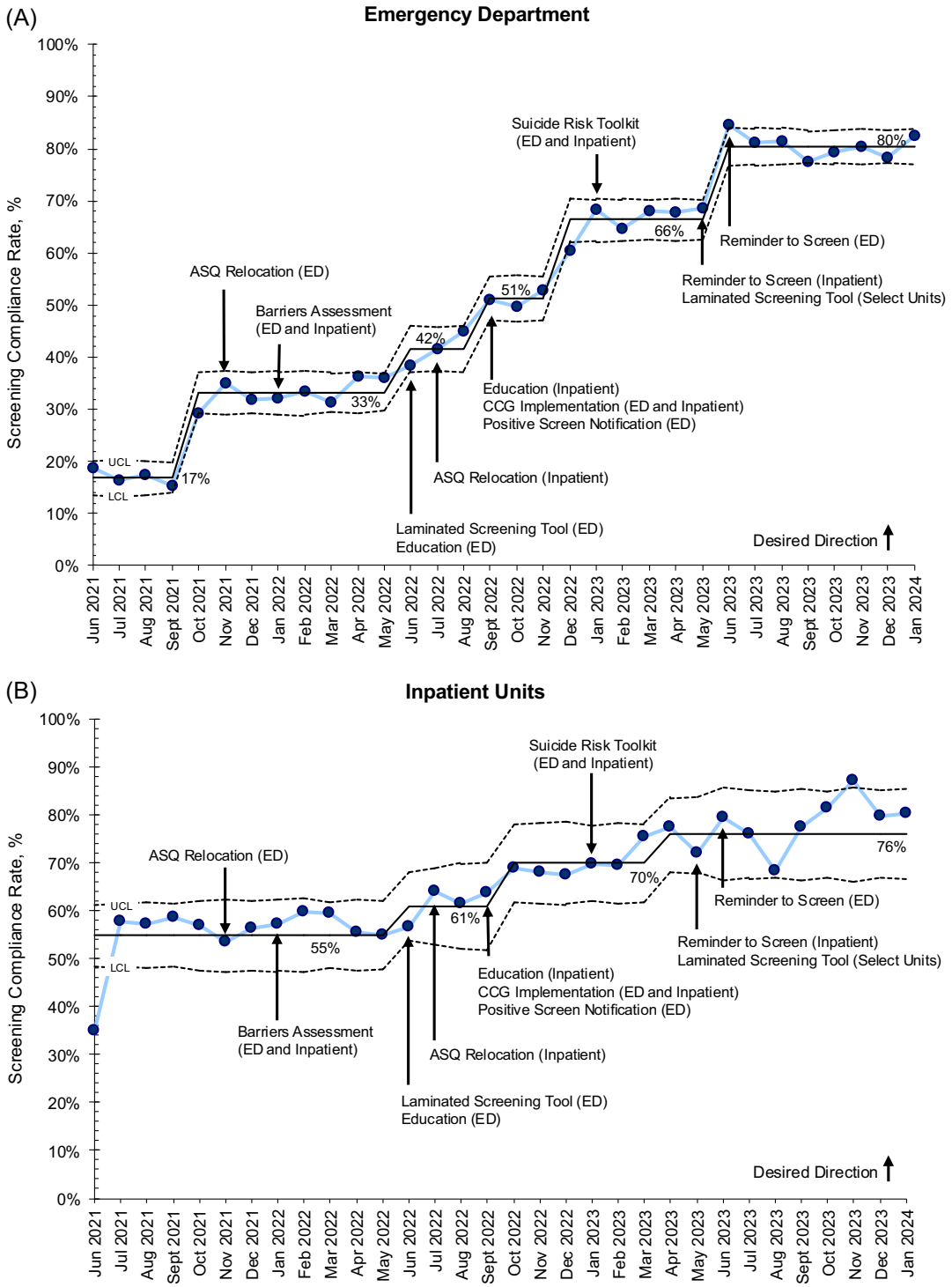

FIGURE 4.

Compliance with suicide risk screening stratified by care area. (A) P-chart. Numerator: Percent of visits with suicide risk screening completed using the ASQ. Denominator: Visits by patients aged 10 years or older to the ED. (B) P-chart. Numerator: Percent of admissions with suicide risk screening completed using the ASQ. Denominator: Admissions by patients aged 10 years or older to an inpatient medical unit.

Abbreviations: ASQ, Ask Suicide-Screening Questions; CCG, clinical care guideline; CL, center line; ED, emergency department; LCL, lower control limit; UCL, upper control limit.

Downloaded from http://publications.aap.org/pediatrics/article-pdf/155/5/e2024065901/1794922/pediatrics.2024065901.pdf
by Northwestern University, Jennifer Hoffmann

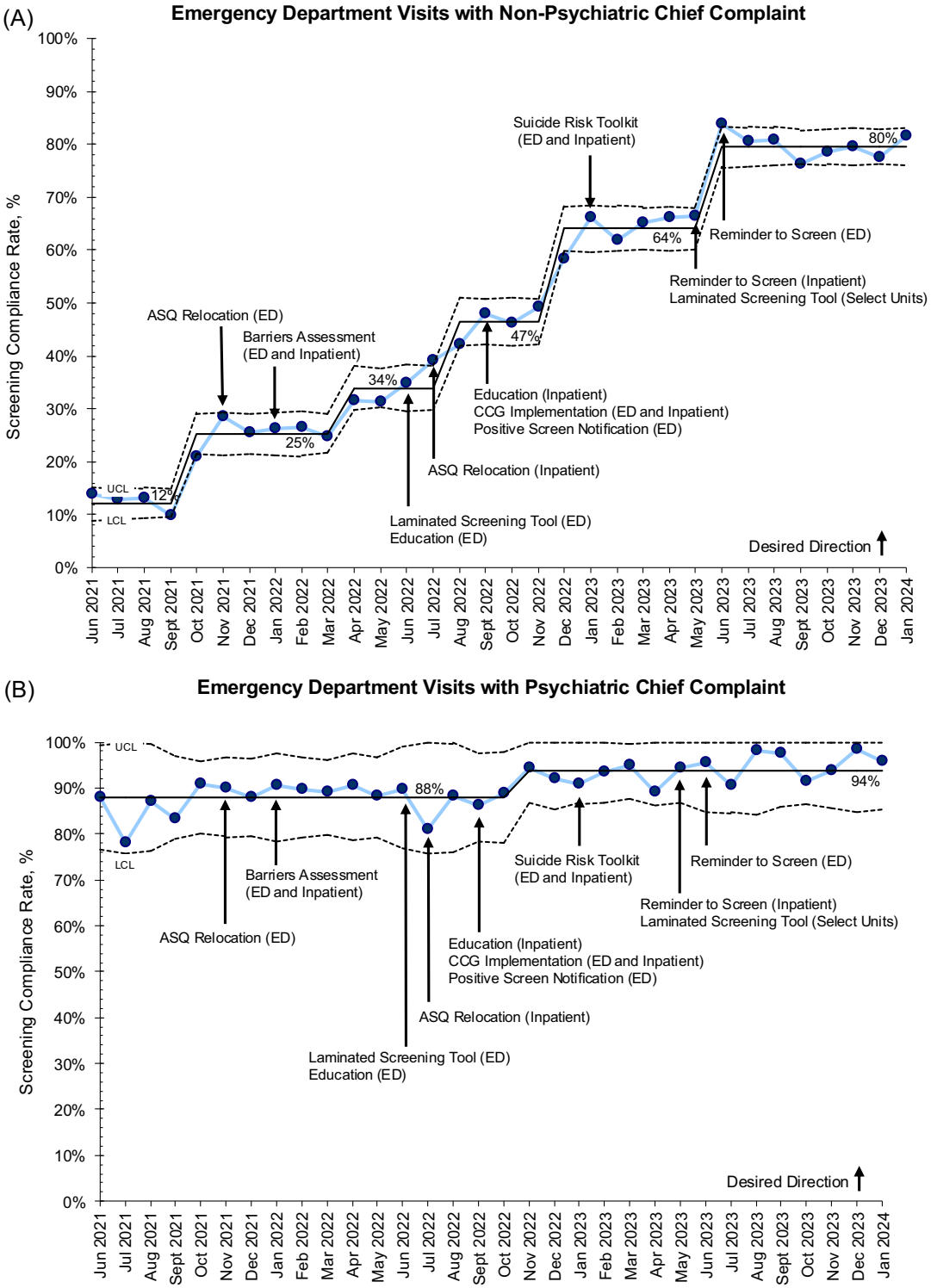

FIGURE 5.

Compliance with suicide risk screening by chief complaint. (A) P-chart. Numerator: Percent of ED visits with suicide risk screening completed using the ASQ. Denominator: Visits by patients aged 10 years or older with a nonpsychiatric chief complaint to the ED. (B) P-chart. Numerator: Percent of ED visits with suicide risk screening completed using the ASQ. Denominator: Visits by patients aged 10 years or older with a psychiatric chief complaint to the ED.

Abbreviations: ASQ, Ask Suicide-Screening Questions; ED, emergency department; CCG, clinical care guideline; CL, center line; LCL, lower control limit; UCL, upper control limit.

Downloaded from http://publications.aap.org/pediatrics/article-pdf/155/5/e2024065901/1794922/pediatrics.2024065901.pdf
by Northwestern University, Jennifer Hoffmann

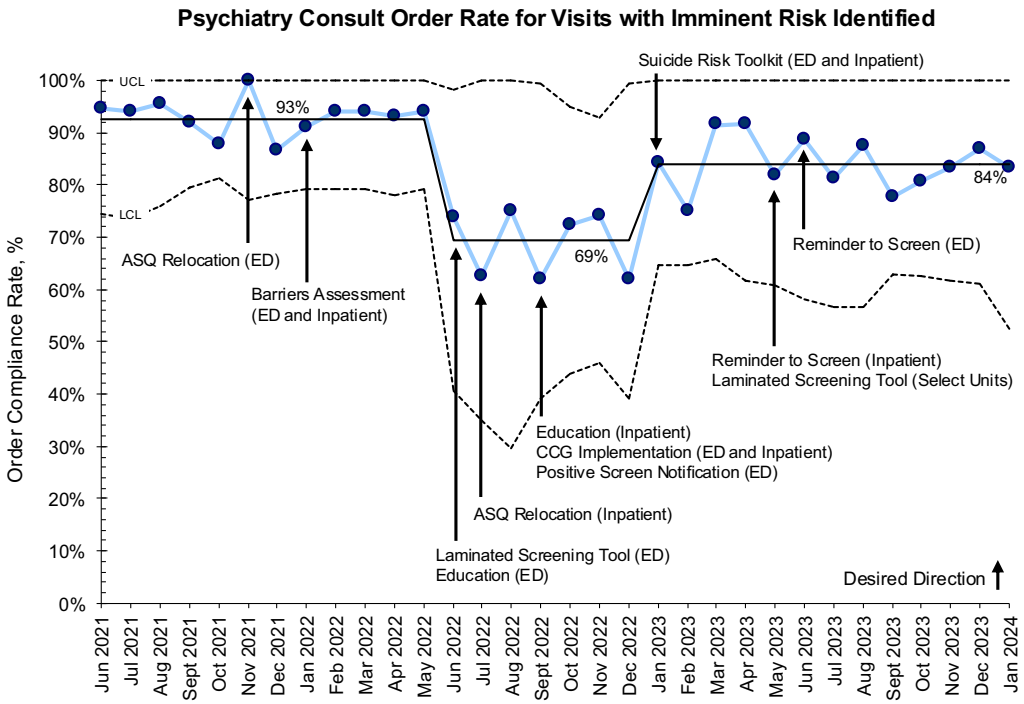

FIGURE 6.

Psychiatry consult order rate for visits with imminent risk identified. P-chart. Numerator: Psychiatric social work or inpatient psychiatry consult order placed. Denominator: Acute care visits (to the ED and/or inpatient medical unit) by patients aged 10 years or older with imminent risk identified on suicide risk screening.

Abbreviations: ASQ, Ask Suicide-Screening Questions; ED, emergency department; CCG, clinical care guideline; CL, center line; LCL, lower control limit; UCL, upper control limit.

risk detection.[16,31] Another barrier to screening occurs among children with intellectual disabilities.[32] In outpatient neurodevelopmental disabilities clinics, universal ASQ screening has been implemented with a positivity rate of 6.8%, but parents of children with cognitive impairment were more likely to decline screening.[33] Our workflow was designed to ask caregivers of patients with intellectual disabilities an alternative question about self-harm behaviors so that unmet psychiatric needs could still be detected and addressed even when ASQ questions were not developmentally appropriate.

During the sustainment period, among acute care visits with ASQ screening performed, 8.6% (1 in 12) of visits had positive screens and 1.7% (1 in 59) of visits had imminent risk detected. These positivity rates are consistent with prior work; a systematic review found ASQ positivity rates among pediatric ED patients ranged from 8% to 29%,[34] whereas positivity rates among patients presenting with nonpsychiatric complaints have ranged from 3% to 10%.[8,16] Universal screening identifies some patients who would not have been detected with selective screening alone, enabling linkage to mental health services.[15,35]

Follow-up of positive screens required resources, including psychiatric consultation and one-to-one observation. Among visits with imminent risk identified, psychiatric consultation orders initially decreased and then increased. However, case reviews revealed that appropriate care had been performed, despite absence of order placement. Placement of one-to-one observation orders increased over time, yet approximately one-third of visits with imminent risk identified did not have an observation order placed at the conclusion of the sustainment period. Although this most likely reflects inconsistencies between order placement and actual observer presence, leaving high-risk patients without direct observation could present substantial safety risks.[36] As a future step, an ED track board icon will be added as a visual cue to indicate which patients require observation.

We found that the median ED visit length increased by 17 minutes during the intervention/sustainment period relative to the baseline period, although multiple factors aside from implementation of suicide risk screening (such as ED volume and staffing) may have contributed to this change. Consistent with our findings, a study that used discrete event simulation to model hospital-wide suicide risk screening implementation estimated that ED visit length would increase by 36 minutes,[37] whereas other studies found no change in ED visit length with implementation of suicide risk screening.[8,12] During the sustainment period, the median length of ED visits with positive screens was

Downloaded from http://publications.aap.org/pediatrics/article-pdf/155/5/e2024065901/1794922/pediatrics.2024065901.pdf
by Northwestern University, Jennifer Hoffmann

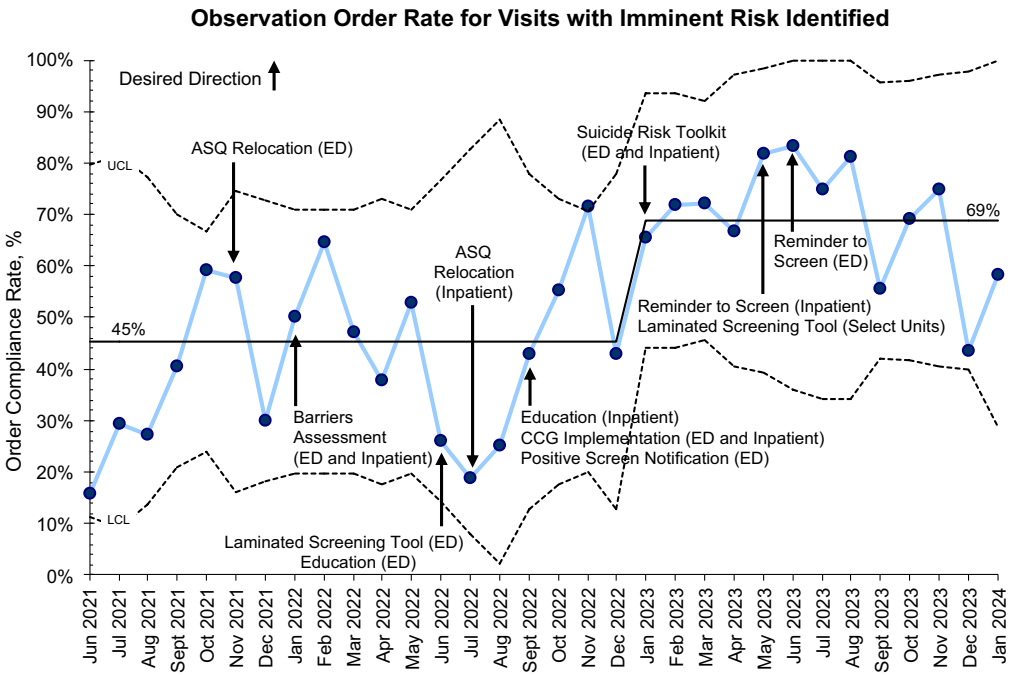

FIGURE 7.

Observation order rate for visits with imminent risk identified. P-chart. Numerator: One-to-one observation order placed. Denominator: Acute care visits (to the ED and/or inpatient medical unit) by patients aged 10 years or older with imminent risk identified on suicide risk screening. Abbreviations: ASQ, Ask Suicide-Screening Questions; ED, emergency department; CCG, clinical care guideline; CL, center line; LCL, lower control limit; UCL, upper control limit.

55 minutes longer than those with negative screens, with this difference narrowing to 40 minutes among the subgroup of nonpsychiatric ED visits. In part, the longer ED visit length may be related to characteristics of patients who screen positive. For instance, children presenting with psychiatric chief complaints may be both more likely to screen positive and more likely to require time-intensive psychiatric assessments and disposition planning. Additionally, children with medical complexity may have both higher rates of psychiatric comorbidity (increasing the likelihood of positive screens) and increased need for medical interventions that prolong ED length of stay.[38] Although screening itself takes approximately 1 minute,[28] additional time may be required to address positive screens through completion of comprehensive assessments, provision of brief suicide prevention interventions (eg, safety planning), and arrangement of follow-up care. Consistent with this hypothesis, 1 study found that costs of suicide risk screening are driven primarily by the time and personnel required for evaluation of positive screens.[39]

Although we attained high suicide risk screening compliance rates, future work should assess for inequities in screening compliance and differences in screening positivity rates across population subgroups, such as patients with varying language preferences and patients with medical complexity. Completeness and quality of Brief Suicide Safety Assessments and fidelity to safety planning in the ED and inpatient medical settings should also be assessed.[40] Given that most US children receive emergency care at non-children's hospitals,[41] where fewer pediatric-specific resources may be available, future work should assess feasibility of implementing suicide risk screening for youth in non-children's hospital EDs.[42] Partnering with regional and national quality improvement collaboratives may enhance dissemination of strategies to implement suicide risk screening across institutions.[43]

LIMITATIONS

Some measures may be subject to misclassification; for instance, placement of orders for psychiatric consults and one-to-one observation may not correspond with actual completion of consults or observer presence at bedside. As this study used EHR data, we were unable to assess financial costs, nurse-specific compliance rates, or personnel time spent performing screening or follow-up of positive screens. We were also unable to measure changes in suicide rates among patients served by our hospital.

CONCLUSIONS

At an academic children's hospital, compliance with suicide risk screening improved after implementation of multiple interventions, including CCG implementation and EHR-integrated clinical decision support. Despite barriers to

Downloaded from http://publications.aap.org/pediatrics/article-pdf/155/5/e2024065901/1794922/pediatrics.2024065901.pdf
by Northwestern University, Jennifer Hoffmann

implementation, compliance rates continued to increase over time, demonstrating the feasibility of suicide risk screening, while appropriate follow-up for positive screens also increased. These strategies may be considered by hospitals who wish to optimize opportunities for youth suicide prevention in the ED and medical inpatient units.

FUNDING: This publication was supported by the National Institute of Mental Health of the National Institutes of Health under award number K23MH135206 (to J.A.H.) and by the Children's Research Fund Junior Board (to J.A.H.). The funders had no role in the design and conduct of the study. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.

Accepted for Publication Date: January 9, 2025

https://doi.org/10.1542/peds.2024-065901

Copyright © 2025 by the American Academy of Pediatrics

REFERENCES

1. Hua LL, Lee J, Rahmandar MH, et al. Committee on Adolescence, Council on Injury Violence, and Poison Prevention. Suicide and Suicide Risk in Adolescents. *Pediatrics.* 2024;153(1): e2023064800. PubMed doi: 10.1542/peds.2023-064800
2. Centers for Disease Control and Prevention. *Youth Risk Behavior Survey Data Summary & Trends Report: 2013–2023.* US Department of Health and Human Services; 2024. https://www.cdc.gov/yrbs/dstr/index.html
3. Alrisi K, Alnasif N, Nazeer A, Shareef J, Latif F. Risk of suicide in children and adolescents in the emergency department—is universal screening the answer? *Arch Dis Child.* 2023;108(12): 970–974. PubMed doi: 10.1136/archdischild-2022-325122
4. Hoffmann JA, Grupp-Phelan J. Advocacy opportunities for pediatricians and emergency physicians to prevent youth suicide. *Clin Pediatr Emerg Med.* 2020;21(2):100776. PubMed doi: 10.1016/j.cpem.2020.100776
5. Horowitz LM, Wharff EA, Mournet AM, et al. Validation and feasibility of the ASQ among pediatric medical and surgical inpatients. *Hosp Pediatr.* 2020;10(9):750–757. PubMed doi: 10.1542/hpeds.2020-0087
6. American Academy of Pediatrics and American Foundation for Suicide Prevention. Suicide: blueprint for youth suicide prevention. Accessed March 6, 2022. https://www.aap.org/en/patient-care/blueprint-for-youth-suicide-prevention/
7. Hua LL, Lee J, Rahmandar MH, Sigel EJ; COMMITTEE ON ADOLESCENCE; COUNCIL ON INJURY, VIOLENCE, AND POISON PREVENTION. Suicide and suicide risk in adolescents. *Pediatrics.* 2024;153(1):e2023064800. PubMed doi: 10.1542/peds.2023-064800
8. Horowitz LM, Bridge JA, Teach SJ, et al. Ask Suicide-Screening Questions (ASQ): a brief instrument for the pediatric emergency department. *Arch Pediatr Adolesc Med.* 2012;166(12):1170–1176. PubMed doi: 10.1001/archpediatrics.2012.1276
9. Lanzillo EC, Horowitz LM, Wharff EA, Sheftall AH, Pao M, Bridge JA. The importance of screening preteens for suicide risk in the emergency department. *Hosp Pediatr.* 2019;9(4):305–307. PubMed doi: 10.1542/hpeds.2018-0154
10. National Institute of Mental Health. Ask Suicide-Screening Questions toolkit. Accessed September 5, 2020. https://www.nimh.nih.gov/research/research-conducted-at-nimh/asq-toolkit-materials/index.shtml
11. Grupp-Phelan J, McGuire L, Husky MM, Olfson M. A randomized controlled trial to engage in care of adolescent emergency department patients with mental health problems that increase suicide risk. *Pediatr Emerg Care.* 2012;28(12):1263–1268. PubMed doi: 10.1097/PEC.0b013e3182767ac8
12. Horowitz L, Ballard E, Teach SJ, et al. Feasibility of screening patients with nonpsychiatric complaints for suicide risk in a pediatric emergency department: a good time to talk? *Pediatr Emerg Care.* 2010;26(11):787–792. PubMed doi: 10.1097/PEC.0b013e3181fa8568
13. Ross AM, White E, Powell D, Nelson S, Horowitz L, Wharff E. To ask or not to ask? Opinions of pediatric medical inpatients about suicide risk screening in the hospital. *J Pediatr.* 2016;170:295–300. PubMed doi: 10.1016/j.jpeds.2015.11.052
14. Ballard ED, Cwik M, Van Eck K, et al. Identification of at-risk youth by suicide screening in a pediatric emergency department. *Prev Sci.* 2017;18(2):174–182. PubMed doi: 10.1007/s11121-016-0717-5
15. Bridge JA, Birmaher B, Brent DA. The case for universal screening for suicidal risk in adolescents. *Pediatrics.* 2023;151(6): e2022061093. PubMed doi: 10.1542/peds.2022-061093
16. Cervantes PE, Seag DEM, Baroni A, et al. Universal suicide risk screening for youths in the emergency department: a systematic review. *Psychiatr Serv.* 2022;73(1):53–63. PubMed doi: 10.1176/appi.ps.202000881
17. DeVylder JE, Ryan TC, Cwik M, et al. Assessment of selective and universal screening for suicide risk in a pediatric emergency department. *JAMA Netw Open.* 2019;2(10):e1914070–e1914070. PubMed doi: 10.1001/jamanetworkopen.2019.14070
18. Hackfeld M. Implementation of a pediatric/adolescent suicide risk screening tool for patients presenting to the emergency department with nonbehavioral health complaints. *J Child Adolesc Psychiatr Nurs.* 2020;33(3):131–140. PubMed doi: 10.1111/jcap.12276
19. Stanley B, Brown GK, Brenner LA, et al. Comparison of the safety planning intervention with follow-up vs usual care of suicidal patients treated in the emergency department. *JAMA Psychiatry.* 2018;75(9):894–900. PubMed doi: 10.1001/jamapsychiatry.2018.1776

Downloaded from http://publications.aap.org/pediatrics/article-pdf/155/5/e2024065901/1794922/pediatrics.2024065901.pdf
by Northwestern University, Jennifer Hoffmann

20. Doupnik SK, Rudd B, Schmutte T, et al. Association of suicide prevention interventions with subsequent suicide attempts, linkage to follow-up care, and depression symptoms for acute care settings: a systematic review and meta-analysis. *JAMA Psychiatry*. 2020;77(10):1021–1030. Published online 2020 PubMed doi: 10.1001/jamapsychiatry.2020.1586

21. Milliman CC, Dwyer PA, Vessey JA. Pediatric suicide screening: a review of the evidence. *J Pediatr Nurs*. 2021;59:1–9. PubMed doi: 10.1016/j.pedn.2020.12.011

22. Coughlin K, Posencheg MA. Common quality improvement methodologies including the Model for Improvement, Lean, and Six Sigma. *Clin Perinatol*. 2023;50(2):285–306. PubMed doi: 10.1016/j.clp.2023.02.002

23. Badiru AB, Thomas MU. Quantification of the PICK chart for process improvement decisions. *J Enterpr Transform*. 2013;3(1):1–15. doi: 10.1080/19488289.2013.784221

24. Hengehold T, Boyd S, Liddy-Hicks S, Bridge J, Grupp-Phelan J. Utility of the "no response" option in detecting youth suicide risk in the pediatric emergency department. *Ann Emerg Med*. 2019;74(1):11–16. PubMed doi: 10.1016/j.annemergmed.2018.10.029

25. Provost LP, Murray SK. *The Health Care Data Guide: Learning from Data for Improvement*. 2nd ed. John Wiley & Sons, Inc; 2022.

26. Winckler B, McKenzie S, Lo HY. A practical guide to QI data analysis: run and statistical process control charts. *Hosp Pediatr*. 2024;14(1):e83–e89. PubMed doi: 10.1542/hpeds.2023-007296

27. Latif F, Patel S, Badolato G, et al. Improving youth suicide risk screening and assessment in a pediatric hospital setting by using The Joint Commission guidelines. *Hosp Pediatr*. 2020;10(10):884–892. PubMed doi: 10.1542/hpeds.2020-0039

28. Sullivant SA, Brookstein D, Camerer M, et al. Implementing universal suicide risk screening in a pediatric hospital. *Jt Comm J Qual Patient Saf*. 2021;47(8):496–502. PubMed doi: 10.1016/j.jcjq.2021.05.001

29. Patterson BW, Pulia MS, Ravi S, et al. Scope and influence of electronic health record-integrated clinical decision support in the emergency department: a systematic review. *Ann Emerg Med*. 2019;74(2):285–296. PubMed doi: 10.1016/j.annemergmed.2018.10.034

30. Chen Z, Liang N, Zhang H, et al. Harnessing the power of clinical decision support systems: challenges and opportunities. *Open Heart*. 2023;10(2):2432. PubMed doi: 10.1136/openhrt-2023-002432

31. Pickett ML, Krentz C, Nimmer M, Servi A, Schmitz A, Drendel AL. Implementation of a tablet-based suicide screening tool in an emergency department. *Am J Emerg Med*. 2021;42:256–257. PubMed doi: 10.1016/j.ajem.2020.06.033

32. Ludi E, Ballard ED, Greenbaum R, et al. Suicide risk in youth with intellectual disabilities: the challenges of screening. *J Dev Behav Pediatr*. 2012;33(5):431–440. PubMed doi: 10.1097/DBP.0b013e3182599295

33. Rybczynski S, Ryan TC, Wilcox HC, et al. Suicide risk screening in pediatric outpatient neurodevelopmental disabilities clinics. *J Dev Behav Pediatr*. 2022;43(4):181–187. PubMed doi: 10.1097/DBP.0000000000001026

34. Scudder A, Rosin R, Baltich Nelson B, Boudreaux ED, Larkin C. Suicide screening tools for pediatric emergency department patients: a systematic review. *Front Psychiatry*. 2022;13:916731. PubMed doi: 10.3389/fpsyt.2022.916731

35. Horowitz LM, Roaten K, Pao M, Bridge JA. Suicide prevention in medical settings: the case for universal screening. *Gen Hosp Psychiatry*. 2020;63:7–8. PubMed doi: 10.1016/j.genhosppsych.2018.11.009

36. Stricker FR, O'Neill KB, Merson J, Feuer V. Maintaining safety and improving the care of pediatric behavioral health patients in the emergency department. *Child Adolesc Psychiatr Clin N Am*. 2018;27(3):427–439. PubMed doi: 10.1016/j.chc.2018.03.005

37. McKinley KW, Rickard KNZ, Latif F, et al. Impact of universal suicide risk screening in a pediatric emergency department: a discrete event simulation approach. *Healthc Inform Res*. 2022;28(1):25–34. PubMed doi: 10.4258/hir.2022.28.1.25

38. Ramgopal S, Goodman DM, Kan K, Smith T, Foster CC. Children with medical complexity and mental and behavioral disorders in the emergency department. *Hosp Pediatr*. 2023;13(1):9–16. PubMed doi: 10.1542/hpeds.2022-006835

39. Grazier KL, Grupp-Phelan J, Brent D, et al. The cost of universal suicide risk screening for adolescents in emergency departments. *Int J Environ Res Public Health*. 2023;20(19):6843. PubMed doi: 10.3390/IJERPH20196843

40. Ewell Foster C, Smith T, Magness C, et al. Collaborative safety planning with youth during a suicide-related emergency: developmental and family considerations. *Evid Based Pract Child Adolesc Ment Health*. 2024;1–16. doi: 10.1080/23794925.2024.2344475

41. Remick K, Gausche-Hill M, Joseph MM, et al; AMERICAN ACADEMY OF PEDIATRICS Committee on Pediatric Emergency Medicine and Section on Surgery; AMERICAN COLLEGE OF EMERGENCY PHYSICIANS Pediatric Emergency Medicine Committee; EMERGENCY NURSES ASSOCIATION Pediatric Committee. Pediatric readiness in the emergency department. *Pediatrics*. 2018;142(5):e20182459. PubMed doi: 10.1542/peds.2018-2459

42. Cree RA, So M, Franks J, et al. Characteristics associated with presence of pediatric mental health care policies in emergency departments. *Pediatr Emerg Care*. 2021;37(12):e1116–e1121. PubMed doi: 10.1097/PEC.0000000000001920

43. Emergency Medical Services for Children Innovation and Improvement Center; Emergency Department Screening and Treatment Options for Pediatric (STOP) Suicide Quality Improvement Collaborative. Accessed January 9, 2024. https://emscimprovement.center/collaboratives/suicide

Downloaded from http://publications.aap.org/pediatrics/article-pdf/155/5/e2024065901/1794922/pediatrics.2024065901.pdf
by Northwestern University, Jennifer Hoffmann