

Implementation of a Pediatric Delirium Screening Program in a Pediatric Intensive Care Unit

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BACKGROUND Knowledge of and screening for delirium are important to patient care. As bedside caregivers, nurses are in a strategic position to observe changes that may indicate delirium.

OBJECTIVE To institute a delirium screening protocol in a pediatric intensive care unit using the Cornell Assessment of Pediatric Delirium.

METHODS Implementation strategies included cycles of education and repeated, timed compliance and accuracy assessments. Surveys administered before and 6 months after implementation were used to identify nurses' perceptions of screening. Compliance with and accuracy of screening were measured over 3 years. During the second and third years, text messages to bedside nurses' telephones served as screening reminders.

RESULTS Responses on the nursing surveys before ($n = 89$) and after ($n = 74$) implementation were compared. After implementation, time to complete the assessment, medical providers, and procedures were less likely to be perceived as obstacles to screening. Nurses' confidence in delirium screening improved over time. Accuracy increased from 60% during the first year to 100% during the second and third years ($P < .05$). Unit-wide compliance with delirium screening was 68% in the first year, 51% in the second year, and 72% in the third year, a trend toward improvement that was statistically significant ($P < .05$).

CONCLUSIONS Although unit-wide compliance with the screening protocol decreased without regular monitoring, it subsequently improved after the institution of reminders and reeducation of nursing staff. Nursing perceptions evolved to view screening as an important component of patient care that did not disrupt daily workflow. (*Critical Care Nurse*. 2022;42[3]:37-46)

Delirium is defined as an acute and fluctuating change in attention and cognition from a baseline state of awareness resulting from a general medical condition.¹ Delirium is marked by changes in psychomotor activity, ranging from delayed responsiveness to agitation. Delirium has 3 motoric subtypes: hypoactive, hyperactive, and mixed.² The hypoactive variant is characterized by decreased responsiveness, withdrawal, and apathy, whereas the hyperactive subtype is marked by agitation, restlessness, and emotional lability. The mixed subtype has attributes of both hypoactive and hyperactive delirium.³ The hypoactive and mixed types are most common in pediatric patients.⁴ Delirium has been well studied in adult patients and is an independent predictor of increased mortality, prolonged mechanical ventilation, and prolonged hospital length of stay.⁵ Delirium appears to be a major clinical



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issue for critically ill children as well; all subtypes have been associated with increased mortality, duration of mechanical ventilation, and length of hospitalization, as well as higher health care costs.^{4,6,7}

Because the hypoactive and mixed types of delirium are the most common as well as the most difficult to recognize, prompt and accurate screening is fundamental to the diagnosis and management of delirium.^{8,9} However, there continues to be a paucity of mandated delirium screening in pediatric intensive care units (PICUs). Delirium prevalence rates are as high as 66% in the critically ill pediatric population.^{4,8,9} However, in an international study, 71% of respondents reported that their institution did not screen for delirium despite the avail-

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ability of validated pediatric delirium assessment tools.¹⁰ The

Pediatric Confusion Assessment Method for the ICU is a point-in-time assessment of delirium for patients aged 5 years and older, whereas the Preschool Confusion Assessment Method for the ICU expands delirium assessment to critically ill infants and preschool-aged children from 6 months to 5 years of age.¹¹⁻¹³ Both tests require patient cooperation or interaction and have not been validated in patients with developmental delay. The Cornell Assessment of Pediatric Delirium (CAPD) is an observational bedside tool that provides a longitudinal assessment of a patient over the course of a 12-hour

nursing shift.¹⁴ It is validated in children of all ages and in those with developmental delay.

Local Problem

The objective of this quality improvement study was to achieve consistent and accurate delirium screening with the CAPD once every 12 hours in an academic, tertiary-care PICU. The implementation strategy consisted of nursing education, compliance checks and accuracy assessment of bedside delirium screening scores, and text message reminders to perform daily screening. We administered surveys before and 6 months after implementation of the screening protocol to determine nurses' attitudes toward and perceived barriers to delirium screening.

Knowledge of delirium and the ability to perform accurate and efficient screening for it are important to patient care.^{15,16} As bedside caregivers, nurses are in a strategic position to observe physical and mental status changes that may herald delirium. Nurses also play a pivotal role in the patient care team with regard to the modifiable risk factors for delirium, such as maintenance of day-night routines, clustering of care, and minimizing interruptions of sleep.¹⁶ Clustering of care, ie, coordinating care (such as phlebotomy procedures, respiratory treatments, medication administration, and patient hygiene) among nursing, physician, and ancillary staff at similar times, can serve as an important environmental intervention to manage and prevent delirium.¹⁷ Therefore, nurses would benefit from an educational intervention on delirium recognition, assessment, and management. Studies have shown that delirium education for nurses is effective in increasing compliance with and accuracy of delirium screening, as well as facilitating the diagnosis of delirium.¹⁸⁻²⁰

Materials and Methods

A pediatric delirium screening program was implemented in an academic, tertiary care, combined medical/surgical unit of a children's hospital in an urban setting from February 2018 to February 2020. The PICU is composed of 48 single and multiple-patient rooms for patients receiving active trauma, neurosurgery, and transplant surgical services, as well as medical patients from numerous subspecialties with acute and chronic diseases. Nurse-to-patient ratios were 1:1 or 1:2, depending on patient acuity. The medical team on site was present during all

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day and night shifts and was composed of an attending intensive care unit (ICU) physician, fellow and resident physicians, and advanced nurse and hospitalist practitioners. Before implementation of the screening protocol, the unit did not screen for delirium; therefore, no baseline delirium prevalence data were available.

Nurses in the PICU performed bedside delirium screening using the CAPD. The CAPD uses 8 questions based on the definition of *delirium* provided in the *Diagnostic and Statistical Manual of Mental Disorders* (Fifth Edition). The questions were designed to be completed by the bedside nurse on a 5-point Likert scale ranging from “always” to “never.” Developmental anchor points are used as reference points to screen children younger than 2 years old. A score on the CAPD greater than or equal to 9 indicates a positive delirium screening. The CAPD was administered in conjunction with a sedation scale, the Modified Motor Activity Assessment Scale (MMAAS).²¹ Screening with the CAPD requires an MMAAS score greater than -2, which indicates a level of arousal greater than comatose.

One month before delirium screening implementation, we distributed a voluntary, anonymous paper questionnaire to all bedside nurses assigned to the PICU, as well as nurses in the float pool with prior ICU experience who frequently work in the PICU as needed, with the purpose of establishing nurses’ attitudes toward and perceived obstacles to delirium screening. The questionnaire consisted of 2 questions on nurses’ characteristics (career duration and primary ICU assignment), 5 questions assessing attitudes toward delirium screening, and 4 questions on perceived obstacles to delirium screening. The survey was assessed by a group of bedside nurses before its distribution to ensure interrater reliability and consistent comprehensibility of content. We designed the survey independently to best capture the specific cultural and workflow conditions faced by the ICU bedside nursing staff relating to pediatric delirium screening.

After the completion of the surveys over a 2-week period, we disseminated online educational modules as mandatory training for all nurses with primary and float pool PICU assignments. The modules consisted of didactic slide-based lectures focused on the definition, diagnosis, consequences, and management of delirium combined with interactive case-based modules demonstrating how to screen for delirium in PICU patients. The physician care team received live lecture-based training focused on

how to respond to delirium scores reported during bedside rounds. One month after completion of the survey and CAPD training, delirium screening was mandated once every 12-hour nursing shift in the PICU. Scores on the CAPD were entered into the electronic health record (EHR). One month after implementation of delirium screening, we performed bedside compliance and accuracy assessments on randomly selected days during 9 daytime and 4 evening shifts over a 6-week period. Daytime shifts were defined as 7 AM to 7 PM, and evening shifts were defined as 7 PM to 7 AM. Compliance was measured as the number of patients with a completed CAPD in the EHR divided by the total number of patients eligible for delirium screening (defined as having an MMAAS score greater than -2) and expressed as a percentage. Accuracy was measured by means of simultaneous CAPD assessments completed by study staff and nursing staff on the same patient during a designated shift. Study staff consisted of 2 physicians and a critical care nurse practitioner. An accurate screening was defined as a CAPD performed by nursing staff and study staff with the same absolute result (a negative or positive delirium screening). We randomly sampled an equal proportion of patients who were diagnosed with and without delirium for accuracy assessments. To prevent bias in accuracy assessments, we were blinded to the nursing assignment for each patient.

Six months after the survey was initially distributed, after consistent unit-wide delirium screening, the survey was readministered to PICU nurses over a 2-week period to assess for change in nursing attitudes toward and perceived obstacles to delirium screening. Following completion of the surveys, we performed a second round of education

over a 2-week period during daytime and evening nursing sign-out.

Content for the second round of education focused on specific case studies of delirium screening for patients with developmental delay; this subject matter was developed on the basis of nurses’ written comments on the postimplementation survey. These case studies were in the format of a live presentation to the nurses during the morning and evening nursing shift exchange of patient information

An accurate screening was defined as a CAPD performed by nursing staff and study staff with the same absolute result (a negative or positive delirium screening).

Table Demographic characteristics of survey respondents

Characteristic	Before implementation (n = 89) No. (%)	After implementation (n = 74) No. (%)
Duration of nursing career, y		
< 1	3 (3)	0
1-5	46 (52)	48 (65)
6-10	20 (22)	13 (18)
11-20	15 (17)	7 (9)
> 20	5 (6)	6 (8)
Primary ICU assignment		
Medical	67 (75)	64 (86)
Cardiac	1 (1)	0
Medical and cardiac	6 (7)	3 (4)
NICU	2 (2)	0
Float pool ^a	8 (9)	6 (8)
Crisis ^b	5 (6)	0
No response	0	1 (1)

Abbreviations: ICU, intensive care unit; NICU, neonatal intensive care unit.

^a *Float pool* is defined as a population of nurses who may work in any ICU within the institution.

^b *Crisis nurses* are defined as nurses who do not have a patient assignment but provide extra assistance to unit nurses.

and consisted of a case presentation, step-by-step screening instructions, and a question-and-answer session on delirium screening in the medically complex patient population. One year after delirium screening implementation and 6 months after reeducation, we performed a second round of bedside accuracy and compliance checking over 9 daytime shifts and 4 evening shifts over a 6-week period.

Two years after initial delirium screening implementation, the institution initiated a program for early mobilization of ICU patients. Because of the integral role of consistent delirium screening in early mobilization and decreasing unit-wide compliance with delirium screening, we instituted text reminders sent to bedside nurses' telephones. These text messages reminded nurses to complete delirium screening during their shift. After 2 weeks of text message reminders, we performed a third round of delirium screening compliance over 6 daytime shifts and 3 evening shifts over a 2-week period, followed by a third round of accuracy checks.

We also measured compliance separately for private and shared patient bed spaces as a descriptive variable for nursing assignment. Private bed spaces were defined as rooms with only 1 patient occupant, and shared bed spaces were defined as rooms with more than 1 patient occupant.

Ethical and Financial Considerations

As a noninvasive quality improvement study, this study was designated as exempt from the need for

approval by the Children's National Hospital Institutional Review Board. This study used minimal economic resources, as educational modules were composed by physicians, nurses, and nurse practitioners and disseminated online, and CAPD scoring was integrated into the already existing EHR.

Statistical Analysis

This analysis included descriptions of categorical variables for survey results, which were given as absolute numbers and percentages. The Mann-Whitney test was used, with significance evaluated at the α level of .05 for compliance and accuracy data. All data were collected and analyzed using Microsoft Excel (Microsoft Corporation).

Results

The preimplementation questionnaire was completed by 89 of 117 eligible PICU and float pool nurses (76%). The postimplementation questionnaire was completed by 74 of 103 eligible nurses (72%). Fourteen PICU registered nurses resigned from the staff during the time interval between nursing surveys. Demographic characteristics of the nurses who completed the pre- and postimplementation surveys were consistent, with most respondents having 1 to 5 years of nursing experience, primarily in a medical/surgical ICU setting (see Table).

Survey results showed that nursing perceptions evolved from before to after delirium screening implementation, with postimplementation responses showing a

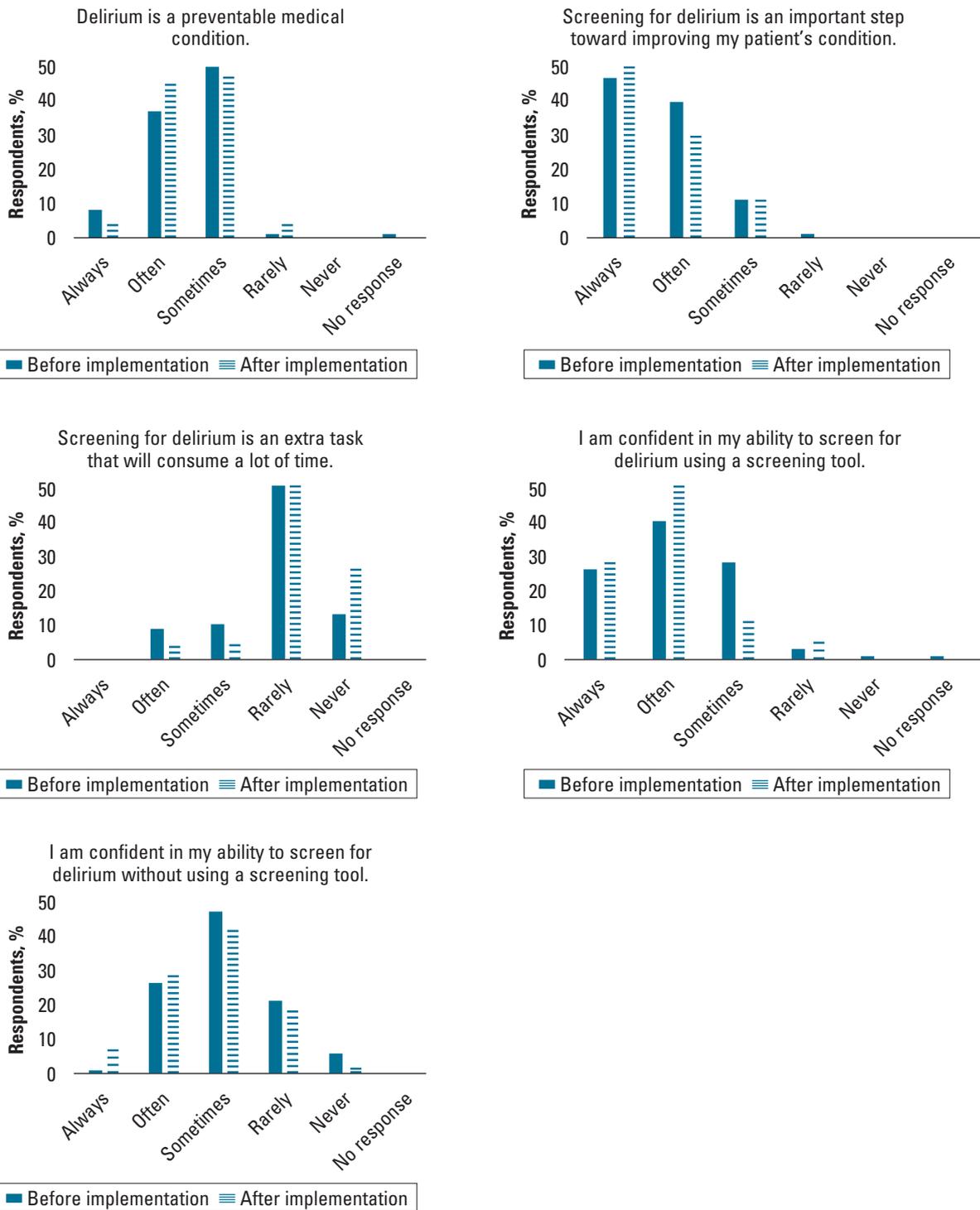


Figure 1 Results of preimplementation (n=89) and postimplementation (n=74) surveys regarding nursing perceptions of delirium screening.

greater percentage of nurses viewing delirium screening as an important part of patient care. In addition, after screening implementation, more nurses responded

that screening did not interrupt the nursing workflow, and user confidence in screening for delirium increased (Figure 1).

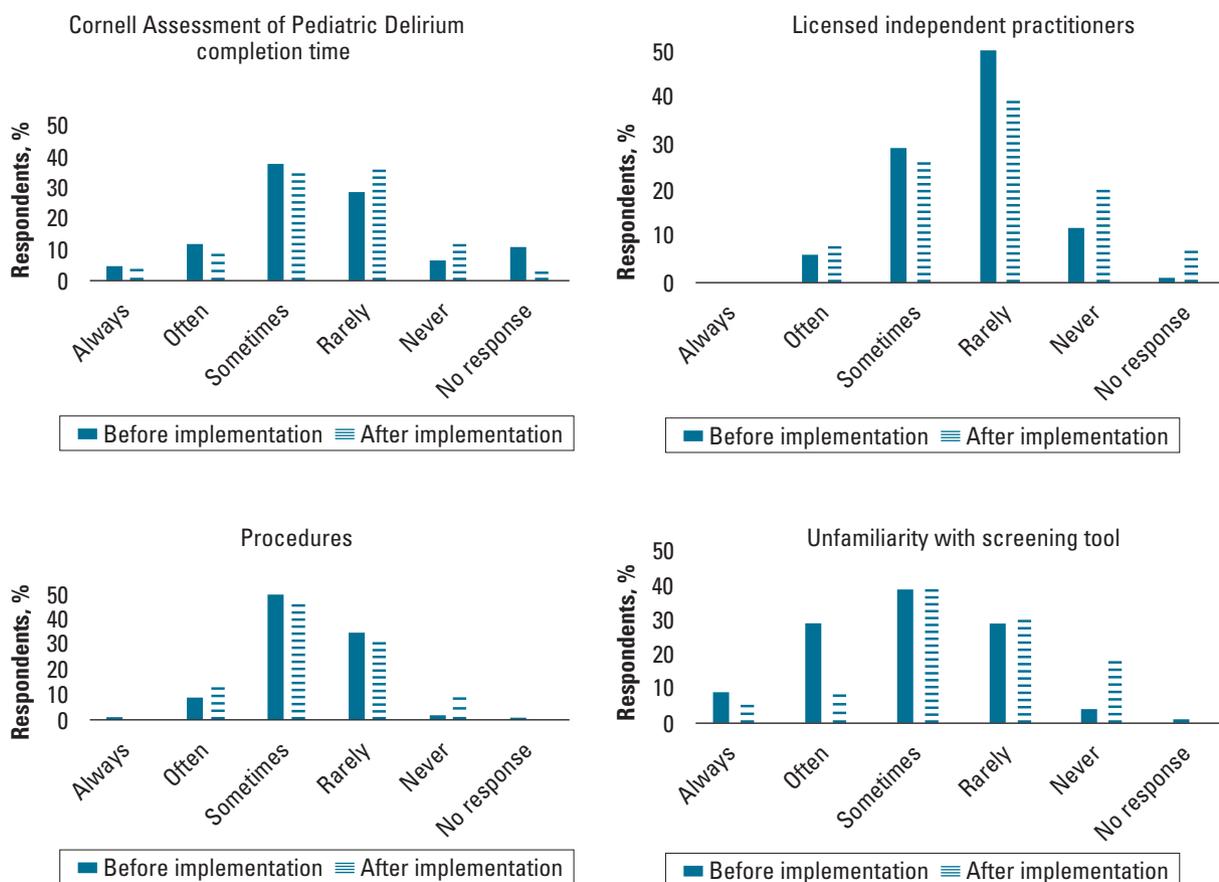


Figure 2 Results of preimplementation ($n = 89$) and postimplementation ($n = 74$) surveys regarding obstacles to delirium screening. Licensed independent practitioners were defined as physicians and nurse practitioners on the primary intensive care unit team, as well as specialists and consultants. Procedures included bedside procedures such as endotracheal intubation, central venous catheter placement, and intracranial pressure monitor placement as well as portable and off-unit radiology studies.

In terms of obstacles to delirium screening, after screening implementation, fewer respondents cited bedside procedures and licensed independent practitioners (including physicians and nurse practitioners on the primary ICU team, as well as consultants and specialists from other services) as obstacles, but more respondents viewed unfamiliarity with the screening tool as an obstacle (Figure 2).

Before implementation of the CAPD, the unit did not screen for delirium; therefore, no baseline delirium prevalence data were available. In the first year of delirium screening, 68% of eligible patients in the PICU experienced delirium screening compliant with the unit protocol, compared with 51% in the second year and 72% in the third year. Over the 3 years, the median rate of unit-wide compliance with delirium screening was 60% (IQR,

53%-67%), with the trend toward improvement being statistically significant ($P < .05$; Figure 3). Compliance with delirium screening did not differ significantly between private and shared patient bed spaces ($P > .05$). Unit-wide accuracy of delirium screening with the CAPD increased from 60% during the first year of screening to 100% during the second and third years ($P < .05$; Figure 4).

Discussion

This study was performed to determine nurses' attitudes toward and perceived barriers to delirium screening and then to use this information in the implementation of screening with the CAPD in an academic, tertiary care PICU. The results of this study showed that after mandated delirium screening and delirium education, an increased number of nurses recognized delirium

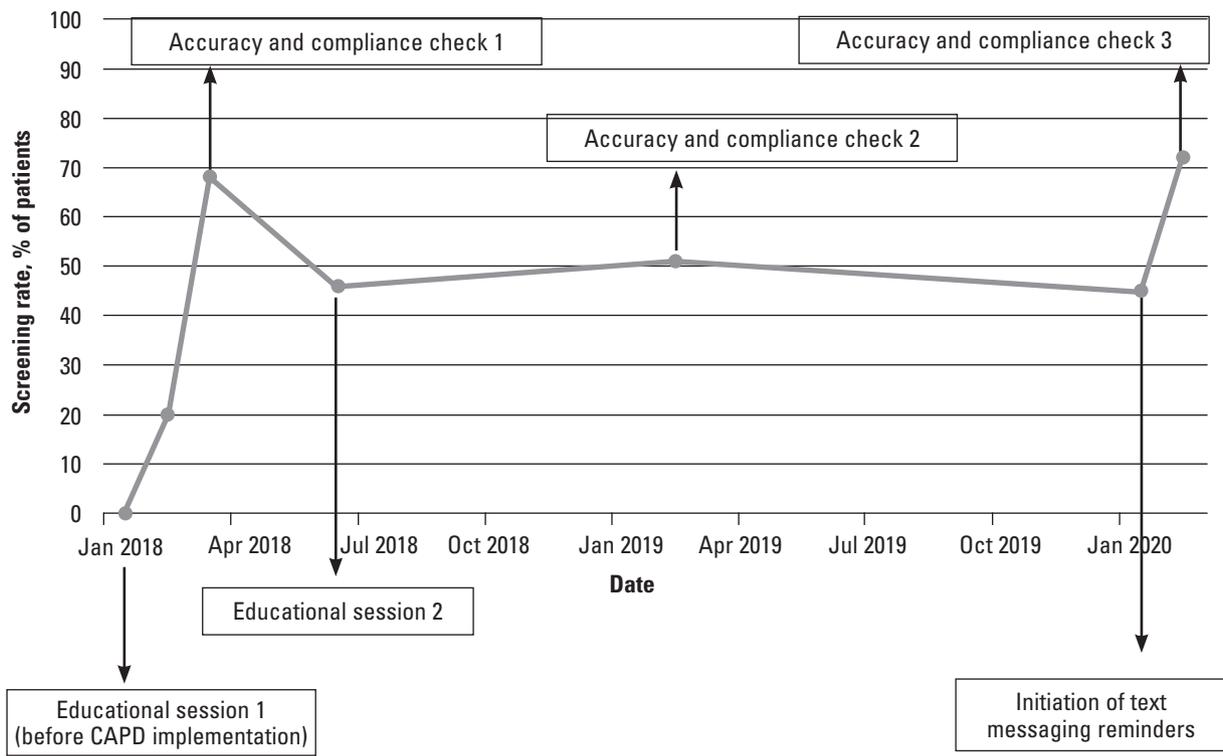


Figure 3 Unit-wide compliance over time with delirium assessment once every 12-hour nursing shift. Implementation strategies are noted in the timeline.

Abbreviation: CAPD, Cornell Assessment of Pediatric Delirium.

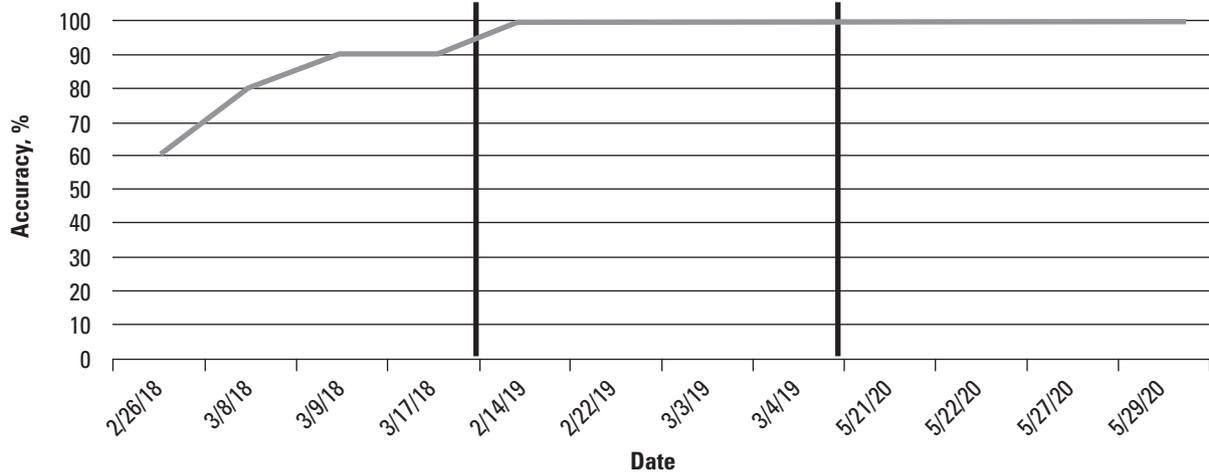


Figure 4 Unit-wide accuracy of delirium screening with the Cornell Assessment of Pediatric Delirium over time. Vertical black lines denote each cycle of accuracy checking.

as a preventable condition and believed that screening did not consume excessive time during their shift. Postimplementation survey results also showed that

nurses' confidence in their ability to screen for delirium increased. After implementation of screening, CAPD completion time, medical providers, and procedures

were less frequently viewed as obstacles to screening. However, unfamiliarity with the screening tool continued to be perceived as a barrier. Unit-wide compliance with delirium screening decreased after the first year but trended upward after the institution of reeducation and screening reminders. Online and bedside education were effective in teaching nurses to accurately use the CAPD, with achievement of 100% accuracy after 1 year.

Overall, the survey results indicated that the initial attitude toward delirium screening was frustration at the addition of yet another task to the nursing workflow but transitioned into appreciation of the improvement in patient care associated with enhanced delirium diagnosis, prevention, and treatment. This change correlated

Compliance improved with repeated education and frequent reminders to complete delirium screenings.

with a growing number of nurses who recognized the utility of

delirium screening. In the postimplementation survey, more respondents indicated that delirium screening was “always” an important step toward improving patient care, and the time required for CAPD completion was less often seen as an obstacle to performing delirium screening.

In previous surveys of adult and pediatric critical care clinicians, pediatric nurses also recognized the importance of screening for ICU delirium and highlighted similar barriers to screening, such as lack of familiarity with the screening tool and lack of knowledge about delirium.²²⁻²⁴ However, after implementation of delirium screening, nurses in adult ICUs continued to view procedures as a barrier, whereas pediatric nurses were less likely to take this view.²² This difference may be related to the time required to perform individual screening assessments: the Confusion Assessment Method for the ICU reportedly takes 5 minutes to administer, compared with 2 minutes for the CAPD.²⁵ In an academic hospital with multiple adult ICUs, nurses’ scores on a delirium knowledge test were significantly higher in units where nurses received didactic teaching about delirium compared with units without formal nursing education.²⁶

Without consistent monitoring of adherence to delirium screening, compliance decreased after the first year of mandated screening. Similar studies have found that without ongoing education and monitoring, implementation of a clinical protocol alone does not guarantee effectiveness.²⁷ One factor that was hypothesized to contribute to decreasing

compliance was a lack of screening reminders. In the present study, we incorporated technological assistance by sending screening reminder text messages to bedside nurses’ telephones during the second year of delirium screening, which was associated with a statistically significant improvement in CAPD compliance from 51% to 72% ($P < .05$).

Lack of continued education is another factor that has been suspected to be associated with a trend toward decreasing compliance. In an adult ICU with decreasing delirium screening compliance rates, didactic lectures and bedside simulation sessions on screening helped increase compliance rates between the first and second years of delirium screening implementation.²⁶ In a separate study focused on screening developmentally delayed patients and patients with technological dependence, compliance rates increased after multiple cycles of nursing education.²⁸ Pediatric critical care units that used an ICU bundle for delirium management saw a rise in nursing knowledge of delirium after educational sessions, along with an increase in compliance with screening and a decrease in the rate of delirium.¹⁶ Similarly, in our study compliance improved with repeated education and frequent reminders to complete delirium screenings.

Concurrent with the second year of delirium screening, the PICU implemented early mobilization efforts for pediatric ICU patients. As part of this initiative, patients who were good candidates for early mobilization were identified on the basis of several factors, including the presence or absence of delirium. Although the early mobilization program was not part of the original study design, the interest of the medical leadership team in improving delirium screening to better identify candidates for early mobilization may also have contributed to the upward trend of compliance with screening in year 3. As immobility and the use of physical restraints have been shown to be modifiable risk factors for delirium, institutional efforts to facilitate early mobilization served as an additional motivating factor in the identification and treatment of delirium in the PICU.^{16,29}

The limitations of this study include a change in the number of nursing staff members during the study period, although demographic characteristics of the 2 groups of survey respondents remained consistent. The survey was not validated, and because the survey responses were anonymous, the respondents’ answers could not be linked. Therefore, the same nurses may not have

completed both preimplementation and postimplementation surveys. This situation may have contributed to the increased rate of unfamiliarity with delirium screening in the postimplementation survey and influenced trends in attitudes and perceived obstacles over the 2 periods. During the performance of accuracy assessments, characteristics of nurses were not collected. Although the time between the first and second accuracy and compliance checks was 1 year, the time between the second and third checks was only 11 months; this difference represents another limitation of this study.

Conclusion

The results of this study showed that nursing perceptions toward delirium screening evolved over time, with an increasing number of nurses coming to view screening as an important task that did not disrupt their daily workflow. With increased recognition that delirium screening improves patient care, nurses became critical champions of delirium screening in the PICU. Incorporation of technological assistance in the form of regular text message reminders and institutional support for delirium screening as part of implementing an early mobilization program resulted in an upward trend in delirium screening compliance. Our findings may help guide future efforts to achieve effective delirium screening implementation and adherence in PICUs. **CCN**

Financial Disclosures

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See also

To learn more about delirium in the critical care setting, read "Relationship Between Intensive Care Unit Delirium Severity and 2-Year Mortality and Health Care Utilization" by Andrews et al in the *American Journal of Critical Care*, 2020;29(4):311-317. Available at www.ajconline.org.

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Implementation of a Pediatric Delirium Screening Program in a Pediatric Intensive Care Unit

As bedside caregivers, nurses are in a strategic position to observe changes that may indicate delirium. In this article, the authors describe instituting a delirium screening protocol in a pediatric intensive care unit (PICU) using the Cornell Assessment of Pediatric Delirium (CAPD).

- The CAPD is an observational bedside tool that provides a longitudinal assessment of a patient over the course of a 12-hour nursing shift. It is validated in children of all ages and in those with developmental delay.
- The CAPD uses 8 questions based on the definition of *delirium* provided in the *Diagnostic and Statistical Manual of Mental Disorders* (Fifth Edition). The questions were designed to be completed by the bedside nurse on a 5-point Likert scale ranging from “always” to “never.” A score on the CAPD greater than or equal to 9 indicates a positive delirium screening.
- The objective was to achieve consistent and accurate delirium screening with the CAPD once every 12 hours in a PICU. The implementation strategy consisted of nursing education, compliance checks and accuracy assessment of bedside delirium screening scores, and text message reminders to perform daily screening.
- We administered surveys before and 6 months after implementation of the screening protocol to determine nurses’ attitudes toward and perceived barriers to delirium screening.
- Survey results showed that nursing perceptions evolved from before to after delirium screening implementation, with postimplementation responses showing a greater percentage of nurses viewing delirium screening as an important part of patient care.
- In addition, after screening implementation, more nurses responded that screening did not interrupt the nursing workflow, and user confidence in screening for delirium increased.
- After implementation, CAPD completion time, medical providers, and procedures were less frequently viewed as obstacles to screening. However, unfamiliarity with the screening tool continued to be perceived as a barrier.
- The results of this study showed that nursing perceptions toward delirium screening evolved over time, with an increasing number of nurses coming to view screening as an important task that did not disrupt their daily workflow. Nurses became critical champions of delirium screening in the PICU.
- Incorporation of technological assistance in the form of regular text message reminders and institutional support for delirium screening as part of implementing an early mobilization program resulted in an upward trend in delirium screening compliance. **CCN**

Mallick N, Mize M, Patel AK. Implementation of a pediatric delirium screening program in a pediatric intensive care unit. *Critical Care Nurse*. 2022;42(3):37-46.