Delirium Knowledge, Self-Confidence, and Attitude in Pediatric Intensive Care Nurses

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ABSTRACT

Purpose: A diagnosis of delirium places a critically ill child at risk of increased morbidity/mortality. Although delirium is common in critically ill children, only 2% of pediatric intensive care units (PICU) screen for delirium. The impediments to screening include knowledge deficits regarding delirium and delirium screening tools. The purpose of this improvement science project was two-fold. The first was to implement delirium screening in a PICU. The second was to evaluate the impact of multifaceted education on PICU nurses' delirium knowledge, self-confidence and attitude towards delirium.

Design & method: A series of three plan-do-study-act cycles (PDSA) were used to implement this practice change. Multifaceted education was provided during the PDSA cycles. Two questionnaires were used to assess for changes in delirium knowledge, self-confidence and attitude towards delirium among PICU nurses. Analysis of variance (ANOVA) was used for data analysis.

Results: Forty-two PICU nurses completed a questionnaire measuring delirium knowledge, self-confidence, and attitude during each PDSA cycle. A significant increase in delirium knowledge, self-confidence, and attitude towards delirium was found after education ($p = .003$; $p < .001$; $p = .036$) and 3 months post implementation of delirium screening ($p = .023$; $p < .001$; $p = .027$) as compared to pre-education.

Conclusion & practice implications: Multifaceted education is a successful tool in improving nurses' knowledge, self-confidence and attitude regarding delirium. The use of PDSA cycles is a practical systematic method to improve quality of care. Improving knowledge, self-confidence and attitude have the potential to mitigate adverse effects of delirium in the critically ill child.

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Delirium is common in critically ill children, occurring in up to 25% of patients in Pediatric Intensive Care Units (PICU) (Traube et al., 2017). As defined by *The Diagnostic and Statistical Manual of Mental Disorders* (American Psychiatric Association, 2013), delirium is a disturbance of attention or awareness from baseline that develops acutely and fluctuates in severity. It is associated with an additional disturbance in cognition unexplained by a pre-existing neurocognitive disorder and is a consequence of a medical condition. Delirium places critically ill children at risk for adverse outcomes including morbidity and mortality and adds to the cost of caring for them (Traube et al., 2016; Traube et al., 2017). Critically ill children with delirium can experience longer hospital stays, prolonged mechanical ventilation (Silver et al., 2015;

Traube, Silver, Gerber, et al., 2017), and more frequent post-traumatic stress disorder after hospitalization (Colville, Kerry, & Pierce, 2008).

Background

Routine screening for delirium provides for early recognition and alerts caregivers of the need to intervene (Patel, Bell, & Traube, 2017; Schieveld, Ista, Knoester, & Molag, 2015). Screening critically ill children for delirium is recommended by the European Society of Paediatric and Neonatal Intensive Care (Harris et al., 2016), the American Association of Critical-Care Nurses (Pun & Boehm, 2016), and the American Nurses Association (American Nurses Association, 2016). However in one study, only 2% of pediatric intensivists reported that screening was routinely performed for their PICU patients, although there are three validated delirium screening tools for critically ill children (Kudchadkar, Yaster, & Punjabi, 2014).

Barriers exist to screening for delirium. One well-described barrier is a knowledge deficit among nurses (Yaghmour & Gholizadeh, 2016) including critical care nurses (Gesin et al., 2012; Marino, Bucher, Beach, Yegneswaran, & Cooper, 2015; Speed, 2015). Flaigle, Ascenzi, and

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Kudchadkar (2016) found a gap in delirium knowledge among pediatric critical care nurses. Additionally, the absence of screening tools in electronic documentation systems and a lack of confidence regarding delirium assessment are barriers to screening (Abusaad, Mostafa, & Ibraheim, 2017).

Purpose

The purpose of this improvement science project was two-fold. The first was to implement delirium screening in a PICU. The second was to evaluate the impact of multifaceted education on PICU nurses' delirium knowledge, self-confidence and attitude towards delirium.

Method

Design

The plan, do study, act (PDSA) quality improvement method was used as a framework for this project. PDSA uses a four-step approach to implementing changes to improve quality of care (Taylor et al., 2014). In the plan stage, the problem is identified, and a plan for change is developed. In the do stage, the change is implemented and observed, and unexpected problems are documented. In the study stage, the success of the change is evaluated including what was learned and what went wrong. In the act stage, a decision is made to adopt the change, abandon the change, or modify the change and initiate a new PDSA cycle. PDSA cycles provide an opportunity to assess the impact of an intervention on the change process or outcomes. PDSA cycles can be iterative and provide ongoing evaluation of the intervention with the aim of improving care delivery. Fig. 1 describes the process of a run of three PDSA cycles. The framework was used to assess current state of science on delirium, select a tool for screening, develop multifaceted educational materials, implement delirium screening, and measure nurses' delirium knowledge, self-confidence, and attitude towards delirium.

The measurement was performed using two questionnaires pre-education, immediately post-education, and 3 months post implementation of delirium screening. In addition, ongoing monitoring strategies were developed. Fig. 2 illustrates each step taken in this project.

Ethical approval

The institutional review board at the community-based health system determined this project was not human subjects research, thus consent or assent was not required. All nurse participants were informed that their participation was voluntary. Electronic communication regarding the project stated that completion of the questionnaires was considered evidence of consent. To maintain participant confidentiality, all numbered questionnaires were kept in a locked cabinet in a locked room separate from the list of assigned numbers.

Setting

This project was conducted in the PICU in a Pacific Northwest community-based teaching hospital that provides tertiary care for children. The project was identified as a quality goal by the PICU quality committee. The PICU has 24 beds and serves patients who are 0–21 years of age with acute or chronic, potentially life-threatening or disabling conditions. The unit also cares for patients who are post cardiac surgery, mechanically ventilated, or supported on extracorporeal membrane oxygenation. The PICU is staffed by pediatric intensivists, pediatric cardiologists, a clinical nurse specialist (CNS), registered nurses (RNs), respiratory care practitioners, a pediatric pharmacist, a pediatric dietician, a child life specialist, and a pediatric social worker.

Sample

Participants included a convenience sample of 42 RNs out of 60 RNs who worked in the PICU at the initiation of the project. Inclusion criteria
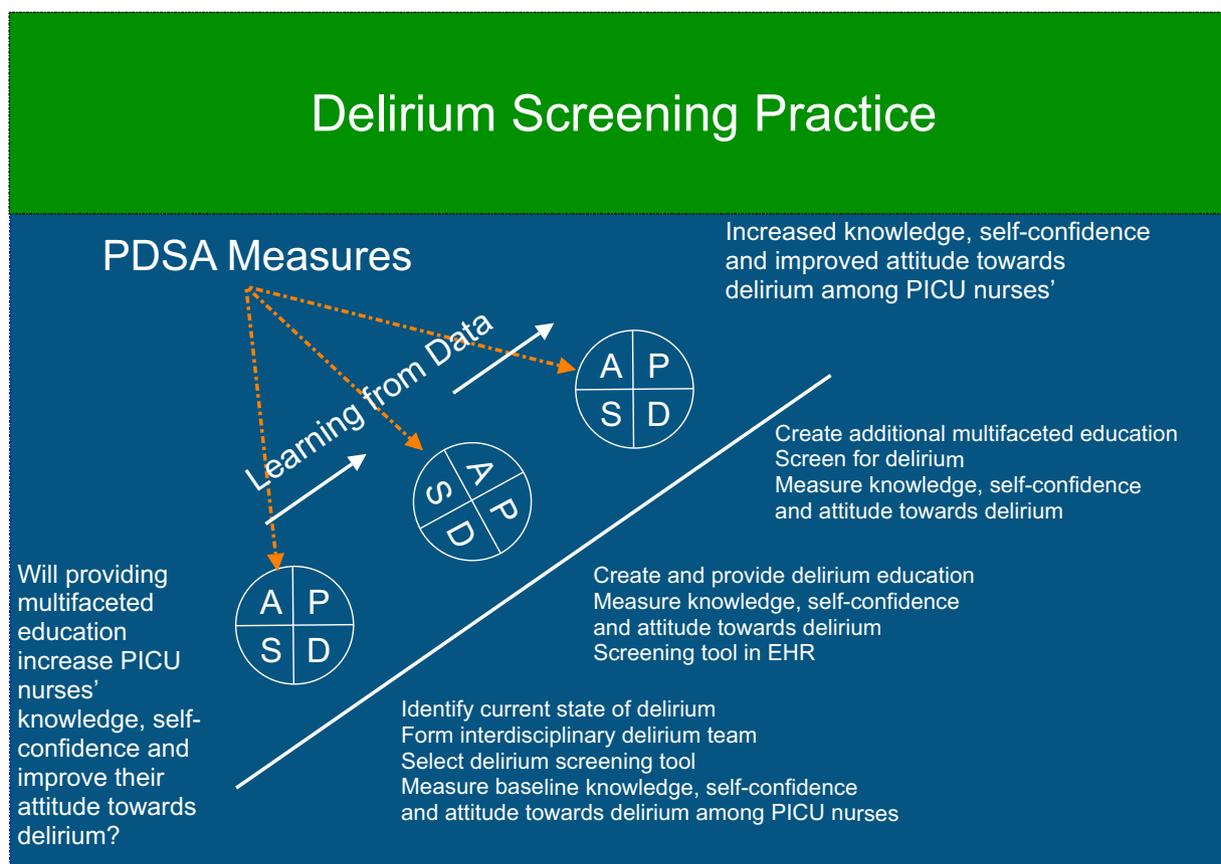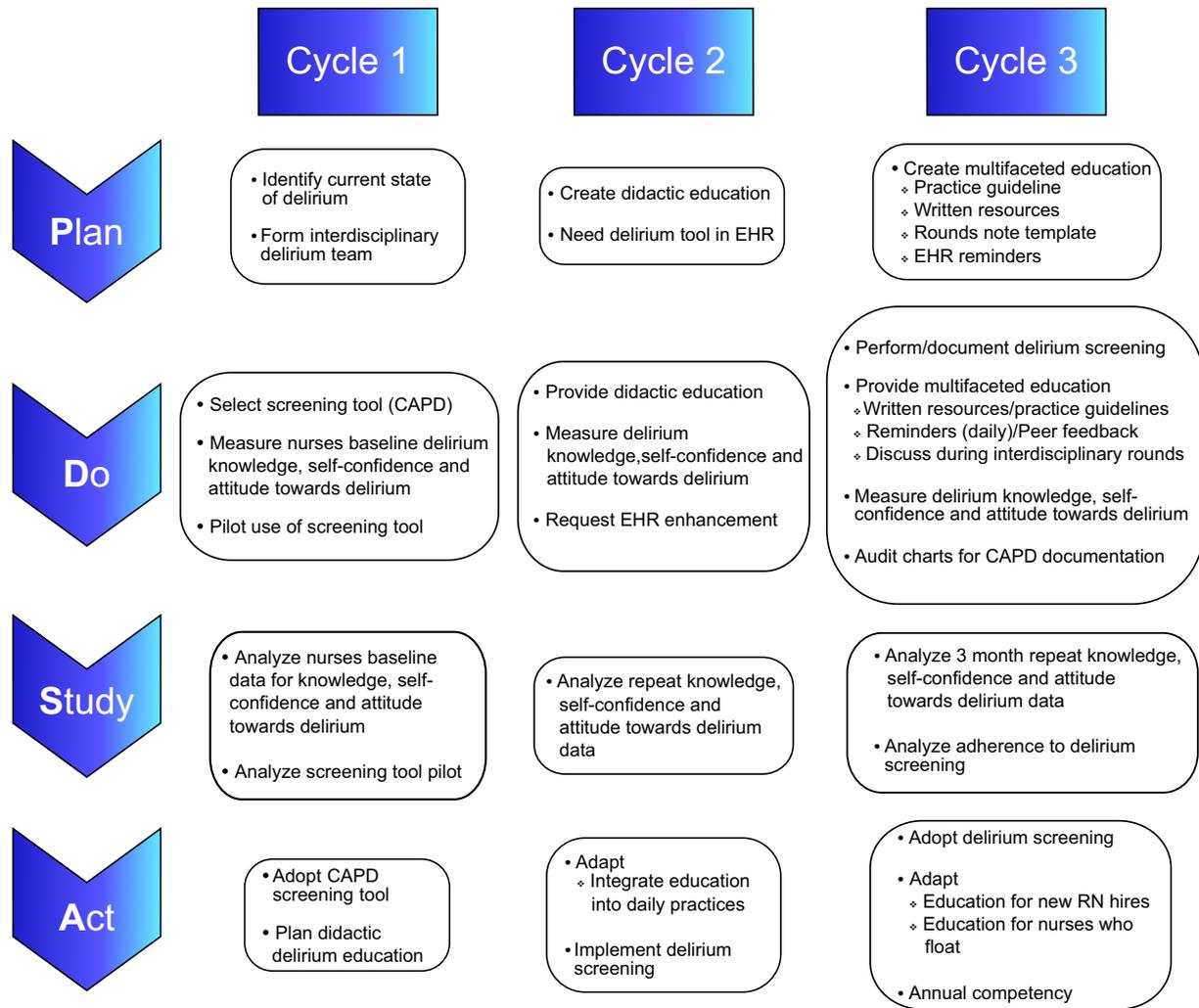
Fig. 2. Details of individual PDSA cycles.

included staff RNs who worked full-time, part-time, or on-call and were dedicated to the PICU. We excluded those who were on a leave of absence. Recruitment of PICU staff nurses began with an email that included a summary of the project. Those who responded that they wished to participate were assigned code numbers; numbered questionnaires were hand delivered to them for completion prior to the education session, immediately post-education, and 3 months after implementation of delirium screening.

Instruments

Instruments were used to collect data on the following concepts: delirium knowledge, self-confidence and attitude towards delirium. Demographic information collected included age, years of RN experience, years of PICU experience, and highest nursing education degree.

The Delirium Knowledge Questionnaire was developed by experts in pediatric delirium at Johns Hopkins Hospital and has 17 true/false statements (Flaigle et al., 2016). Data from knowledge statements in the questionnaire were coded as correct or incorrect. Each correct statement was assigned one point. The sum score was the number of correct responses. The statements are based on available evidence and address risk factors, screening methods, treatments, and diagnostic criteria for

adult and pediatric delirium (Flaigle et al., 2016). This is the only published questionnaire specific to knowledge about delirium for critically ill children found in the literature. Permission from the original author to use the instrument was obtained.

The Nursing Perception Statements: Self-confidence and Attitude Toward Delirium instrument was developed by an acute care nurse practitioner and used with adult critical care nurses (Marino et al., 2015). The original author provided permission to use the instrument. The instrument includes five items: three measure self-confidence and two measure attitude towards delirium. The instrument uses a 5-point Likert-type scale with these responses: 1 indicating *strongly disagree* and 5 indicating *strongly agree*. Self-confidence and attitude responses were coded as the numerical response.

Although the two instruments have not been psychometrically assessed, the questionnaires were reviewed by the target unit's interprofessional team including pediatric intensivists, nurses, nurse educator, and CNS who determined the content was appropriate for this project.

A third instrument, the Cornell Assessment of Pediatric Delirium (CAPD) was selected to screen patients for delirium. The CAPD tool has a sensitivity of 94.1% and a specificity of 79.2% in diagnosing delirium as compared to a child psychiatrist (Traube et al., 2014). This

Fig. 1. A run of plan-do-study-act (PDSA) cycles.
Adapted from: *The improvement guide: A practical approach to enhancing organizational performance* (p.103), by G. J. Langley, R. D. Moen, K. M. Nolan, T. W. Nolan, C. L. Norman and L. P. Provost, 2009, San Francisco, CA: Jossey-Bass. Copyright 2009 by Jossey-Bass. Adapted with permission.

instrument was used to determine adherence to delirium screening by PICU nurses. Chart audits were performed to evaluate documentation of the CAPD score.

Intervention

The PICU quality committee had previously identified screening critically ill children for delirium as a quality goal. In order to achieve this goal, multiple interventions were planned and delivered using runs of PDSA cycles. The interventions used a multifaceted educational approach to address delirium and its screening. This approach consisted of group didactic education, individual bedside education, written resources, and practice guidelines. Didactic education included a 1-hour presentation at staff meetings and a mandatory professional development day that was offered four times to allow all staff to attend. Topics at both didactic sessions included delirium definition, prevalence, risk factors, pathophysiology, adverse outcomes, screening using Cornell Assessment of Pediatric Delirium (CAPD), a survivor video, and interactive case studies. To augment this education we provided written resources, delirium practice guidelines at the bedside and within the electronic health record (EHR), daily reminders and feedback from peers and the unit CNS. The CNS and charge nurse provided daily feedback to staff. The CNS rounded at the bedside of every patient with each nurse reviewing CAPD screening and use of the developmental anchor points. Furthermore, the PICU intensivists championed delirium screening by discussing the delirium (CAPD) score for each patient during interprofessional rounds. To facilitate the discussion in rounds the PICU charge nurse documented CAPD scores in the rounds progress note.

Timeline

The project involved three PDSA cycles that were performed over 3 months. The first PDSA cycle was intended to identify current delirium practices, form an interprofessional team (delirium champions), measure knowledge, self-confidence, and attitude towards delirium, and select a delirium screening tool. The PDSA cycle two aim was to provide didactic education, repeat measurement of knowledge, self-confidence, and attitude towards delirium, and collaborate with informatics to have the tool integrated into the EHR. The PDSA cycle three aim was to implement delirium screening, provide additional education using a multifaceted approach, to repeat measurement of knowledge, self-confidence, and attitude towards delirium 3 months after initiating delirium screening, and monitor adherence to screening. Random chart audits were performed to evaluate adherence to documentation of delirium screening. See Fig. 1 for the PDSA cycles and Fig. 2 for details of each cycle.

Analysis

All statistical analyses were done using IBM SPSS version 23. Data analysis was conducted using descriptive and inferential statistics. Descriptive statistics were used to describe the sample and each variable of interest. Continuous variables (age, years as RN, years in PICU) were analyzed using means and standard deviations. Proportions were used for categorical variables (educational preparation and gender). Repeated measures analysis of variance (ANOVA) was used to compare the effect of education on PICU nurse delirium knowledge, self-confidence and attitude towards delirium over time (pre-education, post-education, 3 months post implementation of delirium screening). Self-confidence and attitude were composite scores of each scale. Statistical significance was defined at $p < .05$ and all p values were two tailed. Data were included only if the participants completed the questionnaires at all three time intervals. The code numbers on the questionnaires allowed comparison of individual nurses across all three time points.

Table 1
Descriptive characteristics of PICU nurses.

Characteristics N = 42	M	SD
Age (yrs)	39.92	18.16
RN experience (yrs)	14.87	10.99
PICU RN experience (yrs)	12.45	11.43
	n	%
Gender		
Female	41	98%
Educational background		
Diploma	2	5
ADN	6	14
BSN	33	79
MSN	1	2

Note. ADN = Associates Degree in Nursing;
BSN = Bachelor of Science in Nursing;
MSN = Master of Science in Nursing.

Results

RN sample

Of the 60 nurses employed as dedicated PICU staff at the initiation of the project, 42 (70%) completed the two delirium questionnaires at all three time points, and their data are the ones analyzed. Ten nurses declined to complete the questionnaires or did not complete all questions at one of the time periods. There was attrition: two nurses resigned, three transferred to other positions within the system, and one retired. Other missing data could be attributed to two nurses on leave of absence during one of the data collection time periods. Table 1 has the demographic statistics for the sample population.

Changes in nurse knowledge, self-confidence, and attitude towards delirium

Table 2 displays results of the ANOVAs for delirium knowledge, self-confidence and attitude towards delirium. Delirium knowledge, self-confidence and attitude scores increased significantly post-education and 3 months post implementation of screening as compared to pre-education (Table 2). Self-confidence demonstrated the most significant increase post education and 3 months post implementation of delirium screening.

Table 2
PDSA cycles: one way repeated measures ANOVA for delirium knowledge, self-confidence, and attitude scores.

Variables	M	SD	95% CI[a]		F	p-Value[b]
			Lower bound	Upper bound		
Knowledge score						
PDSA cycle 1[c]	14.28	1.24	13.92	14.7	5.26	
PDSA cycle 2[d]	14.98	1.14	14.64	15.36		.007**
PDSA cycle 3[e]	14.84	1.53	14.41	15.35		.023*
Self-confidence score						
PDSA cycle 1[c]	2.83	0.69	2.6	3.03	54.9	
PDSA cycle 2[d]	3.76	0.62	3.57	3.96		<.001***
PDSA cycle 3[e]	3.8	0.62	3.62	4.01		<.001***
Attitude score						
PDSA cycle 1[c]	2.83	3.81	3.6	4.03	5.29	
PDSA cycle 2[d]	3.76	4.07	3.9	4.27		.036*
PDSA cycle 3[e]	3.8	4.08	3.88	4.34		.027*

Note.
[a] CI = Confidence interval.
[b] Results significant at the following levels:
[c] PDSA cycle 1 = pre-education.
[d] PDSA cycle 2 = post-education.
[e] PDSA cycle 3 = 3 months post implementation of delirium screening.
* = $p < .05$.
** = $p < .01$.
*** = $p < .001$.

Screening

Chart audits of 50% of admitted patients to PICU were performed over 3 months. The first audit was performed one month after implementing delirium screening, and the second audit was performed two months later. Charts audits were completed for patients in the PICU every other day. A total of 176 charts were reviewed for documentation of screening. The first audit ($n = 90$ charts) revealed 67% adherence to screening, and the second audit ($n = 86$ charts) showed 100% adherence to screening. Ongoing monthly audits are planned for the next 6 months.

Discussion

The purpose of this project was to evaluate nurses' delirium knowledge, self-confidence, and attitude towards delirium post implementation of delirium screening as a standard of care. Delirium screening was implemented as standard of care for critically ill children in a community hospital following a series of interventions over 3 months. As part of the project, the screening tool was embedded in the EHR, providing a prompt to nurses to complete and document screening. Multiple educational efforts were required for the screening tool to be accepted and used by nurses. Rounding by the CNS and the availability of delirium champions throughout the project supported the importance of this screening. In addition, the discussion and documentation on interprofessional rounds emphasized why this separate screening is needed.

Increasing knowledge and self-confidence/attitude towards delirium among PICU nurses was important to the project. The high baseline delirium knowledge found in PICU nurses probably occurred because this initiative had been discussed for months at the PICU quality council and strategic planning meetings, also, a PICU intensivist had been involved in the implementation of delirium screening at a previous children's hospital and often mentioned the topic when on service.

Results from the delirium knowledge questionnaire completed prior to education were similar to those found by Flaigle et al. (2016). All respondents for Flaigle et al. (2016) and our nurses, responded correctly that altered sleep/wake cycles may be a symptom of delirium. Flaigle et al. found that 98% as compared to 96% of our respondents correctly identified that delirium does not always manifest as a hyperactive, confused state. Statements regarding poor nutrition and dehydration as risk factors for delirium had similar correct responses, over 95% (Flaigle et al., 2016) as compared to 98% of our respondents.

Knowledge deficits regarding delirium had common themes between the two groups of PICU nurses. Flaigle et al. (2016) and our respondents incorrectly responded that children generally do not remember being delirious, 62% as compared to 51%. Another similar knowledge gap was that benzodiazepines are beneficial in the treatment of delirium, 38% as compared to 33% of our nurses responded incorrectly.

However, there were knowledge deficits that differed between the two groups of PICU nurses. None of our nurses, as compared to 11% for Flaigle et al. (2016), stated that the Glasgow Coma Scale is an appropriate method for delirium screening. The statement that delirium usually lasts several hours differed in responses, 37% of our nurses compared to 57% of respondents for Flaigle et al. (2016) answered correctly.

There was an interesting phenomenon in our group of PICU nurses in the response to four knowledge statements 3 months post delirium screening implementation (PDSA cycle three). For these statements the nurses' knowledge actually deteriorated after education. The statements included: fluctuation between orientation and disorientation is not typical of delirium, which increased from 5% to 12% incorrect; and behavioral changes in the course of the day are typical of delirium, increased from 2% to 9% of nurses responding incorrectly. The remaining two statements were: delirium usually lasts several hours, which increased from 37% to 56% incorrect; and gender has no effect on the development of delirium, which increased from 33% to 51% of nurses responding incorrectly. The increased percentage of incorrect responses after education may be related to clinical characteristics of the critically ill children cared for during this time period.

Three months post delirium screening implementation (PDSA cycle three), there were three statements for which there was greater than a 50% increase in correct responses. These included: benzodiazepines are helpful in treating delirium, children generally do not remember being delirious, and a family history of dementia predisposes a patient to delirium.

PICU nurses knowledge of delirium and the effect of education on delirium knowledge are comparable to those found among nurses working in adult ICUs. Three studies (Gesin et al., 2012; Marino et al., 2015; Speed, 2015) evaluated the impact of delirium education on knowledge for adult critical care nurses. Their delirium knowledge scores ranged from 61%–75% pre-education to 82%–95% post-education. All three studies demonstrated significant increases ($p < .001$) in mean delirium knowledge scores after education.

Self-confidence is essential in providing effective clinical care. In a qualitative study conducted by Hagbaghery, Salsali, and Ahmadi (2004), nurses stated that self-confidence was an important factor influencing clinical decision-making. In our project a significant increase in self-confidence and attitude towards delirium scores occurred post-education and at 3 months post implementation of delirium screening. These results are similar to those found by Marino et al. (2015) among adult critical care nurses after delirium education and implementation of a delirium protocol.

As with increased delirium knowledge, significantly increased self-confidence and improved attitude may be attributed to increase in knowledge and ongoing support of team members. The 3-month maintenance of increased self-confidence and improved attitude towards delirium may be attributed to the reinforcement provided by discussions on unit rounds, continual use of the practice guideline, reminders provided by the EHR cue, and feedback from peers. The increased self-confidence and improved attitude may have contributed to the increased adherence to delirium screening 3 months post implementation of delirium screening as shown in our chart audits.

The use of multifaceted education such as in our project has been found to be an effective strategy to increase delirium knowledge. A systematic review of studies evaluating the effect of education on delirium knowledge found multifaceted education was the most effective strategy to increase delirium knowledge among nurses (Yanamadala, Wieland, & Heflin, 2013). This multifaceted approach includes didactic as well as bedside education, bedside resources, reminders, and feedback (Yanamadala et al., 2013).

Limitations

Limitations to this project include use of a non-validated delirium knowledge questionnaire. This survey was developed at Johns Hopkins University and is the only published instrument on this topic. Another potential limitation is selection bias among the nurses who responded to the surveys and completed the three questionnaires. Those who had different baseline delirium knowledge and self-confidence and attitudes may have been motivated to respond to the survey differently than those who did not participate.

The sample was small and used subjects as their own controls without a separate comparison group. The increased delirium knowledge, although small was significant, but may not be clinically relevant. Additionally, the project was conducted in one PICU, in a community-based children's hospital, which limits generalizability to other PICU nurses in other settings. Further evaluation on the impact of education should be conducted with larger samples in multiple PICUs.

Implications for practice

This project utilizing multifaceted education demonstrated increased knowledge, self-confidence, and improved attitude towards

delirium in PICU nurses. Based on our work and previous similar studies, multifaceted education has been shown to be the most effective in increasing nurses' knowledge of delirium. Education is only one component needed to reliably screen for delirium in critically ill children. Ongoing monitoring, reinforcement of delirium screening and discussion on interdisciplinary rounds are also needed to facilitate adherence to delirium screening.

Another consideration in implementing a change in practice is the identification of facilitators and barriers to the practice change. Lack of knowledge is a barrier, and providing education throughout the implementation phase would be a facilitator for the nurse. The delirium screening tool and resources need to be readily available and easy to use. This means the screening tool and definitions should be incorporated into the electronic health record. From a leadership and organizational perspective, a multidisciplinary approach to implementation of delirium education, implementation of screening and evaluation throughout the process is essential.

Conclusion

Increasing PICU nurses' knowledge of delirium, improving self-confidence and attitude towards delirium is the first step to mitigating adverse outcomes from delirium for critically ill children. Multifaceted education increased delirium knowledge, self-confidence, and improved attitude towards delirium for PICU nurses. Ongoing monitoring is needed to ensure staff adherence to screening. Education is only one strategy to increase early recognition of delirium.

Sustainability of delirium screening and incorporating practice changes requires ongoing measurement and communication of delirium outcomes to the multidisciplinary team. Utilizing an improvement science framework such as the PDSA is a pragmatic approach to changing practice in a clinical setting.

Conflict of interest

The authors declare no conflict of interest.

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