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## Identifying Barriers to Delirium Screening and Prevention in the Pediatric ICU: Evaluation of PICU Staff Knowledge

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### Background and objectives

Delirium in the pediatric intensive care unit (PICU) setting is often unrecognized and undertreated. As defined in the Diagnostic and Statistical Manual of Mental Disorders: Fifth Edition (DSM-5) delirium is a disturbance and change in attention and awareness from baseline, developed over a short time, with a fluctuating course. The change from baseline includes a disturbance in cognition, which is not better explained by another neurocognitive disorder (American Psychiatric Association., American Psychiatric Association., DSM-5 Task Force., 2013). In adults, Intensive Care Unit (ICU) delirium is associated with increased hospital length of stay, morbidity and mortality (Brummel et al., 2014; Ely et al., 2001; Ely et al., 2004; Girard et al., 2010). Due to heterogeneity in ages, development and diagnoses, delirium screening in critically ill children can be challenging. Despite validated tools for screening delirium in this population, few pediatric ICUs (PICUs) internationally perform screening (Kudchadkar, Yaster, & Punjabi, 2014).

Pediatric delirium has been more recently highlighted in literature, with the development and evolution of pediatric screening tools (Smith et al., 2011; Traube et al., 2014). Pediatric studies have shown that delirium is present in at least 30% of critically ill children and adolescents (Silver et al., 2012; Smith et al., 2011). There is limited data on pediatric patient outcome measures after delirium, but a few retrospective studies describe longer length of stay and similarities to an adult delirium course (Tukel & Tavare, 2003). However, many PICU's internationally are still not screening for delirium. In a recent survey study characterizing international PICU practices, 71% of respondents reported that their unit does not perform routine delirium screening, and only 2% reported that delirium screening is performed on every child at least once per shift (Kudchadkar et al., 2014).

Knowledge of etiology and risk factors for delirium in adults is growing. One study by Ouimet in 2007 showed that hypertension, alcoholism, severity of illness score (APACHE II), and use of sedatives and analgesics to induce coma were independently associated with the incidence of delirium (Ouimet, Kavanagh, Gottfried, & Skrobik, 2007). Another study

by Aldemir in 2001 indicated that respiratory disease, infection, fever, anemia, hypotension and metabolic derangements were associated with incidence of delirium (Aldemir, Ozen, Kara, Sir, & Bac, 2001). While there are less documented investigations into risk factors for pediatric delirium, it could be assumed that similar risk factors might be indicated in delirium for the pediatric critically ill patient.

In order to tailor an educational intervention to facilitate consistent and reliable screening, it is important to determine current knowledge gaps and barriers to delirium screening and prevention. Our goal was to implement twice-daily delirium screening with the Pediatric Confusion Assessment Method-ICU (pCAM-ICU) in our large, tertiary-care PICU. The overall objective of this study was to determine current knowledge regarding delirium and its risk factors among PICU nurses prior to beginning targeted education. In adult literature, similar surveys have been done to evaluate knowledge and opinions about delirium screening (Hare, Wynaden, McGowan, Landsborough, & Speed, 2008). We hypothesized that prior to a targeted educational intervention, PICU nursing staff do not have an adequate knowledge base for accurate screening and diagnosis of delirium in critically ill children.

## Methods

A 17-item questionnaire was administered to all nurses in a 36-bed tertiary care PICU to assess current staff knowledge about pediatric delirium. The survey was sent to all PICU nursing staff, and responding to the survey was voluntary. Survey questions were formulated by experts in pediatric delirium based on available evidence surrounding risk factors, screening methods, treatments, and diagnostic criteria for adult and pediatric delirium.

After the survey was piloted for feedback to PICU nursing leadership, the questionnaire was administered online to all PICU nurses before targeted education and implementation of the pCAM-ICU tool. All participants were informed that individual responses would remain anonymous and confidential, and participation in the survey was considered consent to be involved in the study. The institutional review board approved the questionnaire and study. Data were summarized as the proportion answering correctly for each of the items.

## Results

Of the 143 nurses who received the survey link, 105 completed the survey (73.4%). The percentage of nurses who answered each question correctly ranged from 35% to 100%. Only one nurse scored 100%. The answers to each item are summarized in Table 1. Several concepts reviewed in the survey revealed a strong knowledge base. Out of 105 respondents, over 95% recognized that poor nutrition and dehydration increases the risk of delirium. Additionally, almost all nurses (103/105; 98%) confirmed that delirium does not always manifest as a hyperactive, confused state. All respondents correctly identified that altered sleep/wake cycles may be a symptom of delirium, and 91% recognized that delirium is characterized by fluctuations in orientation and disorientation.

In contrast, there were specific concepts that identified significant knowledge gaps and areas for education. Eleven percent of nurses (12/105) believed the Glasgow Coma Scale (GCS) is an appropriate method for delirium screening. Furthermore, 38% surveyed (40/105)

answered that benzodiazepines are beneficial in the treatment of delirium. When questioned about the presence of a urinary catheter as a risk factor, thirteen percent (14/104) incorrectly answered that the presence of a catheter can reduce the risk of delirium. Forty-three percent incorrectly responded (45/104) that delirium usually lasts several hours. Sixty-three percent believe that gender has no effect on the development of delirium. Finally, the majority of respondents (62%) believed that children generally don't remember being delirious.

## Discussion

The results of this survey demonstrate specific areas where there is a deficiency in knowledge about risk factors and treatment of pediatric delirium among PICU nursing staff. In a recent international survey of pediatric intensivists by our group, less than 2% of pediatric intensivists report consistent delirium screening in their PICU. When asked what forms of delirium screening tools were most commonly used, many listed pain and withdrawal assessment tools such as the Finnegan, Withdrawal Assessment Tool-1 (WAT-1), and Sophia Observation withdrawal Symptoms (SOS) scale assessments. (Kudchadkar et al., 2014). Therefore, targeted multidisciplinary educational interventions are critical to successfully implement delirium prevention and treatment programs in the PICU.

This survey highlighted several particularly concerning areas where PICU nursing staff knowledge was deficient about delirium. Lorazepam has been identified as an independent risk factor for delirium (Flagg, Cox, McDowell, Mwose, & Buelow, 2010; Pandharipande et al., 2006). However, thirty-eight percent of the nurses surveyed believed that benzodiazepines were an effective treatment option for delirium. The GCS score is a neurological scale that gives a reliable, description of state of consciousness. Education about screening tools for delirium became an important focus after observing that eleven percent of our nurse respondents believed that the GCS was an appropriate method to screen for delirium. Presence of a foley catheter can be a functional restraint, increase risk of infections, and be a precipitating factor for delirium (Inouye & Charpentier, 1996), however thirteen percent of nurses responded incorrectly that placement of a foley catheter can help reduce the incidence of delirium. Finally, several studies have found that both adult and pediatric patients have memories of their delirious state after discharge from the ICU, (Colville, Kerry, & Pierce, 2008; Parker et al., 2015; Svenningsen et al., 2014; Wade et al., 2014) which can have long-term psychological sequelae. We identified the importance of education surrounding potential long-term effects of delirium, as 37% of nursing staff believed that children don't remember being delirious. The misconception that delirium isn't remembered may lead to decreased urgency and emphasis in prevention and treatment.

Many publications have demonstrated that prior to implementation of a protocolized screening program, the nursing or physician staff may use simple observation to diagnose delirium (Boot, 2012; Flagg et al., 2010). Given that delirium has a waxing and waning course, the bedside nurse is the ideal front line provider to evaluate presence or absence of delirium. Knowledge about the importance of delirium screening and the ability to accurately perform a rapid and efficient delirium assessment that is uniform in the PICU is vitally important to patient care. Barriers to evaluation include lack of education, concern

about the time involved, or complicated nature of the assessment tool. Another barrier which should also be considered when implementing new screening is the investment of the physician team. Physicians are more likely to take notice and act upon a new diagnosis of delirium when a known assessment tool is used on a regular basis, validating the nursing efforts to screen.

There are notable limitations to this study. First, given the survey was administered only to nursing staff in a single-center, it is possible that the results are not generalizable to nurses in other PICUs. In addition, although the respondents represented a wide range of education and experience levels with critically ill children, there is also the potential for selection bias if the non-responders were different from the responders in years of experience or knowledge of delirium.

## Conclusions

Pediatric delirium is a significant issue for the critically ill child, with a need for close monitoring, recognition, and treatment. Our study highlighted areas for which targeted education needed to be done. Prior to implementation of unit-wide delirium screening, it was determined that the staff required further education regarding the importance, risk factors, and treatments for pediatric delirium. Furthermore, the results obtained may be considered applicable to most pediatric critical care units who employ staff with a wide variation of experience and education. It is likely that most critical care units, whether pediatric or adult, will have similar deficits in knowledge without targeted education for the staff about how to diagnose delirium, appropriate screening and associated risk factors.

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**Highlights**

Pediatric delirium screening is not being performed consistently in most PICUs internationally.

Prior to targeted educational intervention, staff knowledge about delirium is deficient.

Evaluating knowledge provides information to guide design of an effective educational program.

Targeted educational intervention is key to success of a unit-based pediatric delirium screening.

**Table 1****Survey Answers**

<b>Survey Item</b>	<b>Correct</b>	<b>Incorrect</b>
1. Fluctuation between orientation and disorientation is not typical of delirium (FALSE)	96 (91.4%)	9 (8.5%)
2. Poor nutrition increases the risk of delirium (TRUE)	102 (97.1%)	3 (2.9%)
3. The GCS score is the best way to diagnose delirium in critically ill children (FALSE)	93 (88.6%)	12 (11.4%)
4. Hearing or vision impairment increases the risk of delirium (TRUE)	86 (81.9%)	19 (18.1%)
5. Delirium in children always manifests as a hyperactive, confused state (FALSE)	103 (98.1%)	2 (1.9%)
6. Benzodiazepines can be helpful in the treatment of delirium (FALSE)	65 (61.9%)	40 (38.1%)
7. Behavioral changes in the course of the day are typical of delirium (TRUE)	96 (91.4%)	8 (7.6%)
8. Patients with delirium will often experience perceptual disturbances (TRUE)	98 (93.3%)	6 (5.7%)
9. Altered sleep/wake cycle may be a symptom of delirium (TRUE)	104 (99%)	0
10. Symptoms of depression may mimic delirium (TRUE)	87 (82.9%)	17 (16.1%)
11. The greater the number of medications a patient is taking, the greater their risk of delirium (TRUE)	86 (81.9%)	18 (17.1%)
12. Delirium usually lasts several hours (FALSE)	59 (56.2%)	45 (42.8%)
13. A urinary catheter in situ reduces the risk of delirium (FALSE)	90 (85.7%)	14 (13.3%)
14. Gender has no effect on the development of delirium (FALSE)	37 (35.2%)	67 (63.8%)
15. Dehydration can be a risk factor for delirium (TRUE)	104 (99%)	0
16. Children generally don't remember being delirious (FALSE)	39 (37.1%)	65 (61.9%)
17. A family history of dementia predisposes a patient to delirium (FALSE)	72 (68.6%)	32 (30.4%)