Introduction

Insufficient monitoring and surveillance as well as nurse staffing levels are system factors that potentially contribute to serious adverse events (SAE) and deterioration in hospitalized patients. Surveillance is considered a process that incorporates patient assessment and data collection, attending to, recognizing and interpreting cues with the intent of making patient care decisions.\(^2\) It is considered to be an ongoing process that incorporates assessment\(^3\) and physiologic monitoring\(^7\) with an aim to avoid rescue situations altogether, facilitate rescue when necessary, and to ultimately prevent patient deterioration and death. A recent meta-analysis showed that higher nurse staffing (RN-HPPD) is associated with reduced SAE, yet suggested that process factors, such as surveillance, are important for the causal path to safe care. Surveillance may mediate the relationship between staffing and patient outcomes, however, limited data are available to support this relationship.

Purpose

To examine the relationship between surveillance, staffing, and serious adverse events in children on general care postoperative units

Hypotheses

1) The relationship between patient factors and surveillance is moderated by staffing (i.e., RN-HPPD/Shift)
2) The relationship between staffing and SAE is mediated by surveillance

Methods

• Design: Nested Case-Control Study
• Sample: Children who experienced a SAE on a general care unit after non-cardiac surgery (Event Group) and a procedure-matched cohort of children without events (Control Group).
• Procedure: Trained assistants reviewed the medical records to obtain demographics, medical history, procedure, and other data.
• Analysis: Regression models were used to examine the influence of staffing and surveillance on the outcomes of interest.

Definitions

Surveillance: Frequency of documented nursing assessments (VS, RR, Sedation Depth) with or without added continuous monitoring

• Staffing: RN-HPPD/Shift (i.e., number of patients divided by total number of nurse hours)
• Serious Adverse Event (SAE): Presence of any AE (neurological, respiratory, cardiovascular, or other) requiring intervention
• Rescue Event: Required airway management, reversal of medication, and/or escalation of care such as transfer to a critical care setting
• Threshold Event: No escalation of care, but use of “minor” intervention such as supplemental oxygen, change in medication, or increased vigilance

Results

• The Event Group included 98 children and the Control Group 158 (described in Table 1).
• Nurse staffing was lower for the Event Group compared to Controls (Table 2).
• The average number of assessments per shift was higher for Event Group (4.27 ± 2.8 prior to event) compared to Controls (2.85 ± 1.90 on first postoperative shift; p<0.001), remained higher during each postoperative shift (p<0.001), and decreased over time overall (Wilks’ Lambda 0.848; partial eta squared 0.152; p<0.001).
• The number of interventions correlated moderately with surveillance (r=0.429, p<0.001), fairly with threshold events (rho=0.301, p<0.001), and very well with rescue events (rho=0.673, p<0.001).
• There was a significant moderating effect of staffing (i.e., significant effect of interaction term) on the relationship between comorbidity and surveillance, where on average, an increase of 1 nurse increased assessments by 0.365 per shift for children with comorbidities (Table 3).
• Surveillance did not mediate the relationship from staffing to SAE, but there was a significant interaction effect between staffing and surveillance, supporting a moderating effect of surveillance (Table 4).

Conclusion

This study revealed important information regarding the relationships between patient factors, nurse staffing levels, surveillance and outcomes in a pediatric postoperative setting. Staffing levels correlated positively with surveillance, and moderated the relationship between patient factors and surveillance, while surveillance moderated the relationship between staffing and adverse outcomes. Future studies regarding the relationship between nurse experience and education on surveillance and rescue are warranted.

References

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5) Taenzer. Anesthesiology 2011;115:421
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