Pasero Opioid-Induced Sedation Scale in a Pediatric Surgical Ward: A Quality Improvement Project

CE 1.5 Contact Hours

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Abstract: Pediatric patients are at risk for adverse events associated with opioid medication. Sedation scales enable nurses to reach knowledgeable decisions maximizing patient safety during opioid administration. Adult literature has focused on the Pasero Opioid-Induced Sedation Scale (POSS) to address this risk in the adult population; however, literature in the pediatric setting is limited.

Purpose: The purpose of this quality improvement project was to implement the POSS tool in a pediatric setting and reduce adverse outcomes because of opioid oversedation and respiratory depression.

Methods: Two patient cohorts were recruited and evaluated to compare the number of medical emergency team calls, supplemental oxygen use, and length of stay. Bedside nurses received education on opioid-induced sedation and use of the POSS tool. Pretest and posttest surveys were conducted to acquire nurse perceptions of the POSS tool in pediatric postsurgical patients.

Results: No medical emergency team calls occurred in the preintervention and postintervention patient cohorts. Eight percent of the preintervention patient cohort required supplemental oxygen in comparison with no oxygen need in the postintervention group. In the postintervention patient cohort, length of stay averages were 185.85 hours (*SD* = 325.6) in comparison with 89.09 hours (*SD* = 76.6) in the preintervention group. Nursing survey results improved in nurses' confidence, usage, and assessment using the POSS tool. This project led to widespread use of POSS in the facility.

Conclusions: POSS is an appropriate tool to assess pediatric patients in acute care units. The POSS tool assists nurses in accurate assessments and reduces adverse events related to opioid-induced sedation.

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On a pediatric surgical ward, patients may be given opioids for severe pain control, placing them at risk for adverse events such as oversedation, respiratory depression, nausea, constipation, and urinary retention (Martin, Bhalla, Beltran, Veneziano, & Tobias, 2014). Past research concentrated on several opioid sedation scales with the Pasero Opioid-Induced Sedation Scale (POSS) seen as the superior tool in the adult setting (Nisbet & Mooney-Cotter, 2009). Because of the paucity of literature exploring POSS in children, Quinlan-Colwell, Thear, Miller-Baldwin, and Smith (2017) evaluated POSS in a pediatric hospital setting. Results were encouraging, and the authors recommended replication of the study. Implementing the widespread use of the POSS tool in pediatric settings may provide a better understanding of the tool's use with children, helping pediatric nurses assess for oversedation and decrease the opportunity for adverse patient outcomes in youth.

The purpose of this quality improvement (QI) project was to implement the POSS tool in a pediatric surgical setting and help reduce the opportunity for adverse patient outcomes because of opioid oversedation and respiratory depression. Implementation of this scholarly QI project increased bedside nurse knowledge of sedation assessments to accurately monitor for early sedation and respiratory depression.

BACKGROUND

The pharmacist who monitors the electronic health record for pediatric surgical patients' intravenous opioid medication data in our large Southwestern children's hospital produced a pharmacy report indicating 1,179 intravenous opioid doses were administrated from January 1 to June 12, 2017 (Jim Eisenhower, personal communication, June 12, 2017). Because of the high

volume of opioids administered on the data report, the primary investigator was prompted to evaluate patient safety practices concerning opioid administration on the pediatric surgical unit.

Clinical assessment of oversedation and signs of respiratory depression prompt nursing staff to call the medical emergency team (MET), which is synonymous with a rapid response team at this institution (Jungquist, Smith, Nicely, & Polomano, 2017). The MET consists of a team of providers that immediately assess the patient at the bedside to treat and prevent complications such as cardiac arrest, conditions necessitating transfer to an intensive care unit, or death (Jones, DeVita, & Bellomo, 2011). If a patient is found to have respiratory depression, the code team is called (Reed, 2013). Although each institution may differ slightly in average range for respiratory rates and thus respiratory depression, baseline respiratory assessment rates for pediatrics (breaths per minute) are as follows: infants, 25–55; toddlers/preschoolers, 65–110; school-age, 14–22; and adolescents, 12–18 (Ward & Hisley, 2009). Ranges outside the normal parameters may signal respiratory depression, prompting the nurse to initiate interventions and escalate concerns with the primary healthcare provider.

At our institution in 2015, six MET calls occurred on the pediatric surgical unit; five incidences were because of respiratory distress related to oversedation after transfer from the postanesthesia care unit (PACU). Use of the POSS can decrease the use of the additional hospital resources such as the MET team or the Code team because nurses are constantly monitoring for level of sedation and implementing directed interventions from POSS (Kobelt, Burke, & Renker, 2014).

In 2015, clinical nurse specialists interviewed nursing staff on the pediatric surgical unit regarding the nurses' opinion on the frequency and cause of unit alarms to address the problem of alarm fatigue, a Joint Commission's (2014) patient safety goal. Nurses identified the frequent respiratory rate alarm when patients return from the PACU. The frequency of respiratory alarms provides qualitative and quantitative data on nursing staff concerns of respiratory depression in the postsurgical pediatric population. This data was important to this QI project because the increased rate of alarms on the pediatric surgical unit was often seen as patients were transferred from the PACU. Nurses often disregarded the alarms or did not recognize alarm warnings as a sign of early opioid-induced sedation. One of the goals of this QI project was to educate nurses on opioid-induced sedation, recognition, and when to intervene. Use of the POSS tool can assist nurses in identifying when patients are excessively sedated after surgery and showing early and late signs of respiratory depression (Pasero, 2013).

A thorough bedside nursing assessment facilitates the early identification of complications from opioid medication use, such as opioid-induced sedation. To reduce the risk of opioid-induced sedation, a complete nursing assessment is performed paying particular attention to respiratory rhythm, rate, and depth as well as sedation level (Cooper, Stannard, & Noble, 2015; Drebert, 2014; Jarzyna et al., 2011; Pasero, 2012). The literature also supports the use of technological monitoring such pulse oximetry or end-tidal carbon monoxide monitoring in conjunction with a thorough nursing assessment (Carlisle, 2014; Jarzyna et al., 2011; Pasero, 2012). Before any opioid pain medication administration, the literature also supports nurse assessments of sedation risk and providing early patient/family education on postsurgical sedation risks (Pasero, 2013; Veney, 2013).

QI recommendations include use of a standardized pain tool along with hospital policies that include sedation monitoring guidelines (Vermaire et al., 2011). A literature search was conducted in the CINAHL database using the search term "Pasero Opioid-Induced Sedation Scale." Any literature published more than 5 years ago or not applicable to this QI project was excluded from the literature review. The literature review did not produce high-level research articles pertaining to the use of the POSS tool, with only one article related to the use of the POSS tool in pediatric patient populations found (Quinlan-Colwell et al., 2017). Whereas other tools were evaluated for implementation, the POSS tool is the only assessment that measures sedation before and after an opioid has been administered in conjunction with pain. Other tools, such as the Comfort Scale, provide a readiness score for mechanically ventilated patients; the Ramsay Scale and Richmond Agitation Sedation Scale are used with the Aldrete scoring tool to assess sedation before, during, and after a sedative is given (Hoover, 2018). The POSS, with a reliability Cronbach alpha of .903 in adults, identifies patients with increased sedation levels with early recognition of respiratory depression (Cooper et al., 2015; Davis et al., 2017; Drebert, 2014; Kobelt, Burke, & Renker, 2014). All applicable literature was appraised using the John Hopkins Nursing Evidence-Based Practice Research Evidence Appraisal tool and the John Hopkins Nursing Evidence-Based Practice Non-Research Evidence Appraisal tool (Dang & Dearholt, 2017).

In 2013, the American Society of Pain Management Nursing conducted a survey of its members to identify practices related to opioid-induced sedation. Fifty-three percent of the survey respondents reported utilizing

the POSS tool within their institution in adult patients (Jungquist, Willens, Dunwoody, Klingman, & Polomano, 2014). Nurses report that the POSS tool is easy to understand and provides clear directions based on the patient assessment score (Drebert, 2014). The POSS tool allows the nurse to grade the patient's arousability and verbal communication with follow-up interventions in comparison with our hospital's previous assessment, which solely assessed sedation (Davis et al., 2017; Smith, Farrington, & Matthews, 2014). Recommendations to increase patient safety with patients treated on patient-controlled analgesia included use of standardized pain and sedation scales (Martin et al., 2014).

METHODS

QI Model

This QI project used the Plan, Do, Study, Act (PDSA) model as a foundation to improve the quality in bedside nurse assessment of opioid sedation in pediatric patients. Using the steps of the model, the first phase, "plan," assessed the current situation and analyzed potential causes (Cleary, 2015) determining that a specific tool to monitor for opioid oversedation in postsurgical pediatric patients within the current system was lacking. In addition, nurses were not familiar with the POSS tool or any opioid oversedation tools. The "do" step of the PDSA model, the implementation of the POSS to reduce adverse patient outcomes from opioid oversedation, was tested in a 24-bed inpatient surgical unit at a large metropolitan pediatric hospital. During the "study" step of the model, results were evaluated to determine whether the tool identifies patients at risk of opioid oversedation and reduces the risk of respiratory deterioration or failure (see Figure 1). The final step, "act" of the PDSA model, identifies actions to standardize improvements and plan for continuous improvement (Cleary, 2015). With the results from this project indicating an improvement in sedation assessment practices and a decreased risk of opioid oversedation in pediatric postsurgical patients, the tool became a part of the policies and procedures of all patients in our pediatric facility. Institution-wide nursing education of the POSS tool is ongoing and a standard component of routine in-services and competencies. House-wide adoption of the POSS tool is fully implemented in the emergency room, inpatient units, and ambulatory areas.

Subjects

This QI project evaluated two separate subject groups: nurses and patients. Patients were further defined as preintervention and postintervention cohorts. Presurveys and postsurveys completed by the nursing staff encompassed the nursing group.

Patients

Preintervention patient cohort included a chart review to obtain data to evaluate current practices regarding pain and sedation assessment. Twenty-five prospective preintervention patient charts were assessed. The postintervention patient cohort represented a convenience sample of eligible patients who met the inclusion criteria and where a POSS assessment was completed; 20 postintervention QI project patient participants agreed to participate.

Patient Inclusion Criteria

Inclusion criteria for chart review of patients and postintervention patient cohort included

1. prospective pediatric patient receiving opioids for analgesic purposes; and
2. postoperative pediatric patients.

Patient Exclusion Criteria

Exclusion criteria for chart review and postintervention patient cohorts included

1. primary diagnosis of respiratory distress or head injury; and
2. admission to the trauma service.

Nursing Inclusion Criteria

All nursing staff on the 24-bed inpatient surgical unit were given a pretest and posttest survey to evaluate POSS tool in the pediatric postsurgical setting. The sample size of nursing staff participants was dependent on the number of completed surveys.

Setting

The setting for this QI project was on a 24-bed inpatient surgical unit at a large metropolitan pediatric hospital. This inpatient surgical unit additionally houses trauma patients and overflow from different services. On the basis of the patient exclusion criteria, trauma patients were excluded because of the complexity of injuries but could benefit from this tool in the future.

Ethical Considerations

This project was reviewed by the institutional review board and deemed a QI project and exempt. This QI project was also approved by the quality and safety department within the hospital.

Interventions and Data Collection

A mandatory education session or in-service was provided to all nurses on the surgical unit during their

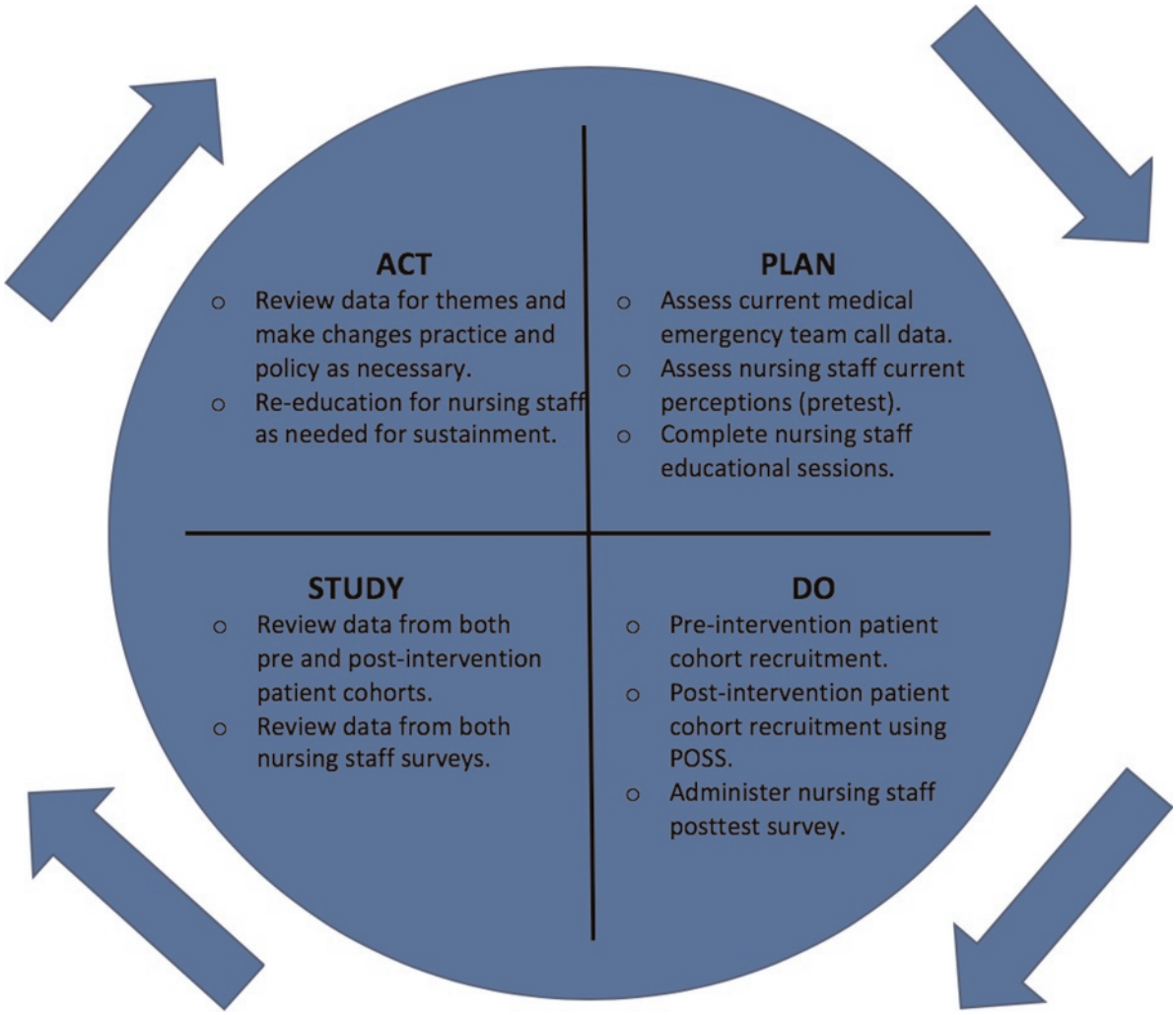

FIGURE 1. Plan, Do, Study, Act cycle of quality improvement project.

monthly education outlining the project process, assessing patients using the POSS, opioid safety, and opioid medication peak times. A graphic containing medication onset, peak, and duration times for commonly used opioids was placed in the medication room and nurses' station. Five in-service opportunities were provided and part of nursing's mandatory education requirements. Thirty nurses attended the in-service with a 91% attendance rate. Bedside nurses were provided with a pretest survey via a SurveyMonkey link in their work email. After completion of the nursing staff educational in-services, enrollment of the postintervention patient cohort began. The clinical nurse specialist (project manager) for the unit collected data from the nursing staff who completed the POSS assessment. Preintervention chart reviews occurred during the same time as the postintervention patient enrollment period. Patients were enrolled in the postintervention patient cohort during a 12-week period. At the end of the 12-week period, the posttest survey was administered to the nursing staff via a SurveyMonkey link in their work email.

Measures

In the preintervention patient cohort, de-identified data were extracted from the electronic medical record and entered into a password-protected Excel document. Data obtained included gender, age, diagnosis, opioid medication administered with dose, pain score, pain assessment tool, level of alertness before and after opioid medication administration, use of oxygen, and sedation assessment during the first 24 hours of receiving the

opioid. Respiratory rate, pulse oximetry readings, and respiratory assessments were obtained before and after each opioid dose. Any data on held opioid medication doses, decreases or increases in dose, length of stay (LOS), and escalations to providers or MET team were also extracted. For the postintervention patient cohort, the same data from the preintervention group were extracted in addition to the documented POSS score.

For the nursing staff, data were collected from the pretest and posttest surveys (Figure 2). The nursing staff survey was adapted from a study exploring the use of the POSS tool in pediatric critical care and inpatient unit

FIGURE 2. Nursing pretest and posttest survey results.

setting (Quinlan-Colwell et al., 2017). The nursing survey was placed into SurveyMonkey, filled out electronically by the nursing staff, and returned to the project manager for collection and analysis.

Analysis

All de-identified data collected from the preintervention and postintervention patient cohorts were entered into a password-protected Microsoft Excel file. Survey results from the nursing staff pretests and posttests were downloaded as an Excel file from SurveyMonkey. Descriptive statistics and actuarial analyses were conducted using IBM SPSS software.

The number of MET calls, supplemental oxygen use, and LOS were data points used to compare the effectiveness of the POSS tool in the two patient cohort groups. The pretest and posttest survey results provided data on the nurse staff perceptions of the POSS tool in this QI project. The overall project success was evaluated based on the data obtained from the patient cohort groups as well as the nursing staff survey results.

RESULTS

Patients

Population

Twenty-seven families of pediatric patients were approached and provided information about the QI project in the preintervention group. Two families declined, with 25 agreeing to participate. Of the 25 patients, 60% (n = 15) were male, whereas 40% (n = 10) were female. Zero percent of the patients were newborn, 4% (n = 1) were infants, 8% (n = 2) were toddlers, 16% (n = 4) were preschoolers, 48% (n = 12) were school-aged children, and 24% (n = 6) were adolescents. The preintervention patient cohort common diagnoses are displayed in Table 1. Other diagnoses ranged from hernias, other surgical procedures, and feeding difficulties.

Twenty patients were approached about participation in the QI project in the postintervention group, with all agreeing to participate. Of the 20 patients, 65% (n = 13) were male, whereas 35% (n = 7) were female. Zero percent of the patients were newborn, 10% (n = 2) were infants, 0% were toddlers, 10% (n = 2) were preschoolers, 40% (n = 8) were school-aged children, and 40% (n = 8) were adolescents. The postintervention patient cohort common diagnoses are displayed in Table 1. Other diagnoses ranged from other surgical procedures to feeding difficulties.

Pain Assessment

In the preintervention patient cohort, there were 262 pain assessments completed before opioid pain medication and within 1 hour of administration. Nursing staff used a 0–5 numeric scale in 52% (n = 15) of the patients, a 0–5 Wong-Baker Faces Scale in 24% (n = 6) of the patients, and the Face, Legs, Activity, Cry, Consolability scale in 24% (n = 6) of the preintervention patient group (Merkel, Voepel-Lewis, Shayevitz, & Malviya, 1997; Wong-Baker FACES Foundation, 2016). In the postintervention patient cohort, 74 pain assessments were completed before the patient received opioid medication and were reassessed within 1 hour. Nursing staff used a 0–5 numeric scale in 70% (n = 14) of the patients, a 0–5 Wong-Baker Faces Scale in 20% (n = 4) of the patients, and the Face, Legs, Activity, Cry, Consolability scale in 10% (n = 2) of the postintervention patient group.

Pain Medications

In the preintervention patient cohort, 102 doses of opioids were administered. Eighty-two percent (n = 84) of the doses were morphine, 11% (n = 11) were hydromorphone, and 7% (n = 7) of the doses were fentanyl in this patient group. The postintervention patient cohort had 36 doses of opioids administered. Sixty-seven percent (n = 24) of the doses administered were morphine, 33% (n = 12) were hydromorphone, and no patients were given fentanyl in the postintervention group. No differences were noted between groups for age, diagnosis, pain tool used, and doses given.

MET Calls, LOS, and Supplemental Oxygen Use

There were no MET calls for either the preintervention and postintervention patient cohorts during the project implementation. Eight percent (n = 2) of the preintervention prospective patient cohort required supplemental oxygen in comparison with the zero percent in the postintervention QI group. LOS averages in hours was 89.09 (SD = 76.6) in the preintervention patient group in comparison with 185.85 (SD = 325.6) in the postintervention patient cohort.

Escalation to Healthcare Provider

Escalation was needed when nurses identified a change in status, vital signs, intake or output requiring an intervention, or provider order. In the preintervention group, 68% (n = 17) of the patients did not require any escalation to the healthcare provider. Sixteen percent (n = 4) of the patients showed signs of decreased urine output or urinary retention, 8% (n = 2) showed hypertension, 8% (n = 2) showed tachycardia, 8% (n = 2) showed signs of respiratory depression requiring oxygen therapy, and 4% (n = 1) showed signs of a rash that were escalated to the healthcare provider. Ordered

Table 1: Comparison of Preintervention and Postintervention Patient Groups

	Preintervention Cohort (*N* = 25)	Postintervention Cohort (*N* = 20)
Gender		
Male	60% (n = 15)	65% (n = 13)
Female	40% (n = 10)	35% (n = 7)
Age group		
Newborn	0% (n = 0)	0% (n = 0)
Infant (1–12 months)	4% (n = 1)	10% (n = 2)
Toddler (1–3 years)	8% (n = 2)	0% (n = 0)
Preschooler (3–5 years)	16% (n = 4)	10% (n = 2)
School age (6–12 years)	48% (n = 12)	40% (n = 8)
Adolescents (13+ years)	24% (n = 6)	40% (n = 8)
Diagnosis		
Appendicitis	24% (n = 6)	20% (n = 4)
Orthopedic	36% (n = 9)	20% (n = 4)
Urinary	4% (n = 1)	10% (n = 2)
Abscess	4% (n = 1)	10% (n = 2)
Mass	8% (n = 2)	0% (n = 0)
Other[a]	24% (n = 6)	40% (n = 8)

[a]Other diagnoses include hernia repair, sleeve gastrectomy, obstruction, feeding difficulty, and respiratory conditions.

interventions included supplemental oxygen (8%, $n = 2$) and intravenous fluids (12%, $n = 2$).

In the postintervention group, 85% ($n = 17$) of the patients did not require any escalation to the healthcare provider. For the remaining 15% of the patients, escalation occurred for one exhibiting signs and symptoms of hypotension and decreased urine output, one patient showed hypertension, and another showed bradycardia. Only one patient required additional interventions of intravenous fluids (5%).

POSS Assessments

In the postintervention group, nursing staff completed 69 POSS assessments. Of these assessments, bedside nurses rated the patient as "1 = awake and alert" 74% ($n = 51$) of the time. In 14% ($n = 10$) of the assessments, nurses described the patients as "S = sleep, easy to arouse" and 12% ($n = 8$) as "2 = slightly drowsy, easily aroused" as designated on the POSS tool (Table 2).

Nursing

Participants

Nine registered nurses filled out a 10-question pretest after attending a POSS in-service on the unit but before using the POSS tool. At the time of the in-service, a sedation scale was not utilized within the institution. Nurses completed the survey (pretest) before using the POSS with a patient and after (posttest). Five POSS in-services were provided for nursing staff. In the pretest, 33% of the participants ($n = 3$) reported between 2 and 5 years of experience, 33% ($n = 3$) reported between 5 and 10 years of experience, and 33% ($n = 3$) reported more than 10 years of experience in nursing. In the posttest survey, six nurses filled out the survey, with four saying they also filled out the pretest. Fifty percent ($n = 3$) of the posttest nurses reported 2–5 years of experience, 17% ($n = 1$) reported 5–10 years of experience, and 33% ($n = 2$) reported more than 10 years of nursing experience.

Survey Results

Nursing staff were surveyed using a 10-question pretest ($n = 9$) and posttest ($n = 6$) to evaluate their perceptions of using the POSS tool in a pediatric surgical unit (Figure 2). A paired t test compared the means of survey questions. Improvements were found in nurses' confidence that they used the POSS correctly ($t(5) = -6.325$, $p < .001$), using the POSS to score pediatric patients was easy ($t(5) = -5.000$, $p < .004$), and the POSS was an appropriate scale to use in pediatric patients ($t(5) = -3.873$, $p < .012$). Improvement between the pretest and posttest survey scores was also identified with the POSS assisting nursing with continuity of sedation assessments ($t(5) = -5.000$, $p < .004$) and standardizing safe use of opioids when administered for pain ($t(5) = -5.000$, $p < .004$). Pretest and posttest surveys found no significant difference in responses when nurses stated that every patient on opioids for analgesic purposes should be scored by POSS ($t(5) = -1.536$, $p > .185$). Two questions addressing the POSS assisting nurses in responding appropriately to patient clinical changes and nurses feeling confident they scored the patient's sedation level correctly using the POSS could not be computed with a paired t test because the standard error of the difference was 0. A sign test was then conducted to determine whether there was difference between the pretest and posttest surveys for the aforementioned questions. Results of the analysis determined that there was an improvement in the nurses feeling confident they scored the patient's sedation level correctly using the POSS ($p = .031$) and the POSS assisting nurses

Table 2: Pasero Opioid-Induced Sedation Scale[a]

S = Sleep, easy to arouse
Acceptable; no action necessary; may increase opioid dose if needed
1 = Awake and alert
Acceptable; no action necessary; may increase opioid dose if needed
2 = Slightly drowsy, easily aroused
Acceptable; no action necessary; may increase opioid dose if needed
3 = Frequently drowsy, arousable, drifts off to sleep during conversation
Unacceptable; monitor respiratory status and sedation level closely until sedation level is stable at less than 3 and respiratory status is satisfactory; decrease opioid dose 25% to 50%[b] or notify primary[c] or anesthesia provider for orders; consider administering a nonsedating, opioid-sparing nonopioid, such as acetaminophen or an NSAID, if not contraindicated; ask patient to take deep breaths every 15–30 minutes.
4 = Somnolent, minimal or no response to verbal and physical stimulation; unacceptable; stop opioid; consider administering naloxone[d,e]; stay with patient, stimulate, and support respiration as indicated by patient status; call Rapid Response Team (Code Blue) if indicated; notify primary[c] or anesthesia provider; monitor respiratory status and sedation level closely until sedation level is stable at less than 3 and respiratory status is satisfactory.

1994, Pasero C. Used with permission. As cited in Pasero and McCaffery (2011).

[a]Appropriate action is given in italics at each level of sedation.

[b]If opioid analgesic orders or hospital protocols do not include the expectation that the opioid dose will be decreased if a patient is excessively sedated, such orders should be promptly obtained.

[c]For example, the physician, nurse practitioner, advanced practice nurse, or physician assistant responsible for the pain management prescription.

[d]For adults experiencing respiratory depression, give intravenous naloxone very slowly while observing patient response ("titrate to effect"). If sedation and respiratory depression occur during administration of transdermal fentanyl, remove the patch; if naloxone is necessary, treatment will be needed for a prolonged period, and the typical approach involves a naloxone infusion. Patient must be monitored closely for at least 24 hours after discontinuation of the transdermal fentanyl.

[e]Hospital protocols should include the expectation that a nurse will administer naloxone to any patient suspected of having life-threatening opioid-induced sedation and respiratory depression.

in responding appropriately to patient clinical changes ($p = .031$).

DISCUSSION

This QI project evaluated two separate subject groups to determine the effectiveness of the POSS tool in assessing pediatric opioid-induced sedation in postsurgical patients.

One of the data points used to compare the effectiveness of the tool was the number of MET calls. Comparison of the preintervention and postintervention patient groups showed no differences in the patient cohorts when comparing the number of MET calls as there were MET calls during implementation of this QI project.

Another data point used to compare the effectiveness of the POSS tool was the use of supplemental oxygen therapy in the preintervention and postintervention patient cohorts. The preintervention patient cohort had a low percentage of patients who required supplemental oxygen use. These patients were found to require supplemental oxygen postoperatively once they arrived to the surgical unit. This finding warrants additional consideration as patients in our QI project were requiring supplemental oxygen immediately after transferring from the paranesthesia care unit to the inpatient surgical unit. The literature recommends that a thorough handoff be completed between patient transitions and patients not be transferred during opioid peak times (Jarzyna et al., 2011). Hospitals should consider policies that do not allow for transfer of patients during medication peak times or to provide resources such as trained staff in monitoring for opioid-induced sedation during transfer. Hospital leaders should consider monitoring for opioid practices and develop QI projects to drive changes in patient outcomes (Durham et al., 2017).

In the postintervention cohort, no patients required supplemental oxygen. The POSS tool is designed to assist nurses in identifying patients with increasing sedation levels, which lead to opioid-induced sedation and respiratory depression (Pasero, 2013). The authors surmise that use of this tool allowed nurses to identify patients early before the patient requiring additional interventions such as supplemental oxygen in comparison with the preintervention patient cohort.

LOS was another data point used to compare the effectiveness of the POSS tool between the preintervention and postintervention patient cohorts. One

unexpected finding was that the LOS was higher in the postintervention patient cohort than the preintervention group. Literature reports that opioid-related adverse events have been found to increase LOS (mean LOS of 9.5 days) and hospital costs (average: $6,500 per patient; Kessler, Shah, Gruschkus, & Raju, 2013). In the postintervention patient cohort, the patient sample contained one patient who experienced surgical complications and resulted in a longer LOS. This data outlier resulted in a 1,501-hour LOS in comparison with an average of 116 hours in the postintervention group but had no correlation to pain management or sedation. Although patients in the postintervention patient cohort did not experience opioid-induced sedation, the LOS was higher in comparison with the preintervention patient cohort.

When comparing the preintervention and postintervention groups, a higher number of patients (n = 8) required escalation to a healthcare provider in the preintervention group. Patients in the preintervention group showed some signs and symptoms related to opioid side effects such as decreased oxygen saturation and requirement for supplemental oxygen use perhaps because of the higher number of opioid medication doses administered. Patients also showed other signs and symptoms related to opioid adverse effects such as urinary retention or decreased urine output; however, postsurgical patients also experience these symptoms, which may not be related to opioid pain medication. In comparison, only three patients in the postintervention patient group required escalation to a healthcare provider, with only one patient receiving additional interventions. None of the patients in the postintervention cohort showed signs of opioid-induced sedation. When reviewing the bedside nurse POSS assessments, nurses frequently assessed their patients as easy to arouse or awake and alert. There were zero unacceptable POSS assessments in the postintervention group that required additional actions and/or escalation to a healthcare provider.

Overall, nursing staff positively rated the POSS in the posttest survey in comparison with the pretest survey. Nursing staff positively rated the POSS as an appropriate tool in pediatric postsurgical patients in the posttest survey. Nurses expressed positive feedback in the QI project in general. Nurses voiced feelings of confidence when assessing their patients as well as increased compliance to monitoring and documentation of patient assessments. As a result, adherence by nursing staff to the current pain assessment policy increased. Although not addressed in the nursing surveys, it was an unexpected and positive finding. Implementation has expanded to the other hospital units. POSS education is now included on the annual competency list for all nursing staff.

Limitations

Several potential limitations are identified in this QI project. This project was completed over a 12-week period; therefore, the number of the patients included in the project was limited. It is recommended that this QI project be implemented using a larger patient sample. Another limitation is the difference in pain medications administered in the preintervention and postintervention groups. In addition, because of the low number of patients requiring oxygen therapy in the preintervention group, it was difficult to determine a correlation to opioid administration. Future studies studying an association between oxygen therapy and opioid pain medication with a larger patient population are needed.

There were also a limited number of bedside nurses who participated in the pretest and posttest surveys. The authors included reminders in unit huddles and face-to-face interactions as well as reminder emails to recruit additional nursing participants. With these efforts, there was a 26% participation in the pretest survey and 17% participation in the posttest survey. Because of the low number of participation from nursing staff, it is recommended that this project be replicated with a larger sample of nurses. In addition, this QI project was completed at a large pediatric metropolitan hospital on a surgical/trauma floor; therefore, the results of this project are not generalizable.

Implications for Nursing Research

The findings of this QI project suggest that the POSS is an appropriate tool to assess pediatric opioid-induced sedation in the pediatric surgical unit setting. In this QI project, patients requiring oxygen use in the preintervention group were in the immediate postoperative period. Future recommendations include piloting the POSS tool in a pediatric PACU and in a larger patient sample.

CONCLUSION

In conclusion, use of an appropriate assessment sedation tool, such as POSS, should be the nursing standard of care when assessing for opioid-induced sedation in pediatric patients. Use of the POSS will assist nurses in accurate patient assessments and reduce the risk for adverse events related to opioid-induced sedation. The implementation of this QI project facilitated nursing assessment of opioid sedation and helped to increase patient safety at a large metropolitan pediatric hospital system.

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