



Implementation of a nurse-driven sedation protocol in the ICU

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Abstract

Background: *Managing anxiety, pain and delirium in critically ill patients is an ongoing challenge. Differences in physician practice, variations of pharmacological agents, as well as concentrations and units can increase the risk of medication error. Personal preferences, subjectivity, and nurses' level of expertise are variables when titrating analgesic and sedation infusions.*

Purpose: *The purpose of this study was to evaluate the perceived benefits of implementing a standardized nurse-driven sedation protocol in the ICU. We examined its impact on the rates of medication errors and perceptions of staff using the protocol.*

Design: *This descriptive study used a survey to collect data.*

Sample: *We used a convenience sample of 75 nurses who worked in the ICU during the implementation of the sedation protocol.*

Results: *Analysis of variance was completed comparing all sub-scale scores. No statistical significance was found, but scores did not decrease over time. No medication errors or near misses were reported throughout the sedation protocol implementation. Qualitative comments from staff provided feedback and assisted in identifying issues with the protocol.*

Conclusion: *We believe that the implementation of the sedation protocol has been beneficial in our adult ICU. Findings indicate that with experience and resources nurses can manage anxiety, pain and delirium more confidently than without such a protocol. Critical care nurses, given the right tools, education, and support can make decisions that promote positive outcomes for patients receiving sedation and analgesia in the ICU.*

Background

In our 22-bed, locum-dependent intensive care unit (ICU) at Thunder Bay Regional Health Sciences Centre (TBRHSC), there is great variation in physician practice and personal preferences for certain pharmacological agents when managing sedation. There are also several variations in medication mixing concentrations and types of infusion pumps available for medication administration.

Our geographical isolation often results in difficulty recruiting experienced critical care nurses. This, combined with the glob-

al nursing shortage, results in hiring and educating new graduates or nurses with no critical care experience. Currently in the ICU at the TBRHSC, greater than 30% of nursing staff have less than two years experience. Even experienced critical care nurses have expressed that managing anxiety, pain and delirium is a challenge but, when combined with the above factors, they believe there is an increased risk of error if a standardized approach is not followed. Sedation practices vary widely among institutions, partly because of institutional bias and partly because requirements for sedation vary greatly from patient to patient (Kress, Pohlman, & Hall, 2002).

Patient pain and discomfort can be caused by monitoring and therapeutic devices (e.g., catheters, drains, noninvasive ventilation devices, endotracheal tube), routine nursing care (e.g., airway suctioning, physiotherapy, dressing changes, patient mobilization), and prolonged immobility. Unrelieved pain may contribute to inadequate sleep, possibly causing exhaustion and disorientation (Jacobi et al., 2002).

The use of continuous sedative infusions is associated with prolonged mechanical ventilation, ICU length of stay, and hospital length of stay (Kress, Pohlman, O'Connor, & Hall, 2000). The use of a sedation vacation and titration of sedation to the lowest dose possible to achieve patient comfort are nursing interventions for mechanically ventilated patients. The wake-up period is a time when the depth of sedation can be evaluated and adjusted to individual patient needs (Kress et al., 2000). The protocol-driven approach to sedation allows optimization of sedation administration to meet patient needs (Kress et al., 2002).

Purpose

The purpose of this study was to evaluate the perceived benefits of implementing a standardized nurse-driven sedation protocol in the ICU. We examined its impact on the frequency of medication errors and perceptions of staff using the protocol. We hypothesized that after implementing the sedation protocol, nurses in the ICU would make fewer medication errors and would report greater autonomy and confidence when administering medications used to treat anxiety, pain, and delirium.

Method

Study design. This was a descriptive study and the researchers used a survey to collect data. The sample consisted of 75 nurses who worked in the ICU during the implementation of the sedation protocol. Surveys were distributed to staff and then returned in a self-addressed envelope. Completed surveys were confidential and anonymous. The Research Ethics Committee at Thunder Bay Regional Health Sciences Centre approved this study.

Procedure. The critical care team at TBRHSC developed a nurse-driven sedation protocol in June 2006. The development team included the critical care educator, an intensivist, manager, pharmacist, and staff nurse. The protocol applies evidence-based practice advocated by the Society of Critical Care Medicine (SCCM) coupled with tools for nurses to administer medication safely.

Assessments and interventions in the protocol included several components. The Richmond Agitation Sedation Scale (RASS) (Sessler et al., 2002) was used to assess the patient's level of sedation in order to guide sedation administration. A Visual Analogue Scale (VAS) using a numeric scale from 0-10 was used to assess pain. The Confusion Assessment Method-ICU Delirium Tool: CAM-ICU (Ely et al., 2001) was used to assess for signs of delirium.

The protocol was divided into four pathways: pain, anxiety, delirium and neuromuscular blockade. The pain and anxiety pathways were developed into one physician order sheet and all mechanically ventilated patients had this preprinted order sheet included on their chart. All medications on this path were based on a standardized weight-based dosing regimen and titrated to lowest effective dose.

Careful observation of the patient's RASS guided medication administration rates and response to daily interruption of sedation. Daily interruption of sedation was implemented in order to facilitate a daily neurological exam, prevent medication accumulation, and assess readiness to wean from mechanical ventilation (Kress et al., 2000).

The delirium and neuromuscular preprinted order sheets were separate and added to the chart as required. The goal of the delirium pathway was to have it completed by the physician in advance for patients at risk for developing delirium. Nurses would assess their patient every four hours for signs of delirium and could implement the pathway orders if the CAM-ICU criteria were met. The neuromuscular order sheet listed several standardized neuromuscular blocking agents based on weight-based dosing and prompted clinicians to add on the pain and sedation pathways to ensure that adequate pain and sedation management were received.

Implementation. Several steps were required to implement the sedation protocol, including:

- Development of a standardized drug mixing concentration and ordering policy that would be used by nurses, physicians and pharmacists
- Development of weight-based titration and infusion reference tables
- Purchase and programming of infusion pumps with standardized drug concentrations and safety features
- Development and distribution of pre-printed physician order sheets outlining titration ranges and target goals
- Provision of education sessions, learning packages and a quiz for the 75 ICU nurses over a three-month span
- Identification of clinical experts, used as "Sedation Super-Users," to provide ongoing support for staff after implementation.

- Inclusion of the sedation protocol added to all new admission charts and made easily accessible in the unit
- Administration of a "Sedation Protocol Evaluation Survey" to evaluate the protocol, its impact on perceptions of autonomy, confidence and ease of use at three, six, and 12 months after implementation

Instruments. The Sedation Protocol Evaluation Survey was used to evaluate the protocol's benefits. The survey tool was adapted from a Nursing Work Index Survey instrument (Aiken & Patrician, 2000) and uses a Likert-type rating scale. The survey consists of 32 statements, which aim to evaluate four categories. Of these 32 statements, three pertain to the protocol's ease of use, eight pertain to overall perception of quality of care, seven pertain to confidence, and eight statements are concerned with aspects of autonomy. One open-ended question was offered at the end of the survey to allow for nurses' comments. Random ICU nurses evaluated the survey for content validity. A small pilot study was done before implementation of the tool to address reliability and problems with implementation.

Surveys were given to staff at three-, six- and 12-month intervals after the sedation protocol was implemented. Retrospective data were collected on medication error rates before and after the protocol implementation. Medication incident reports, involving only medications listed in the protocol, were reviewed. Errors involving incorrect dosages, incorrect drug and near misses were categorized and compared. A near miss was defined as an unexpected occurrence involving the risk of serious physical or psychological injury, or death. The near misses had the potential to cause harm, but did not because they were identified and resolved before any harm occurred to the patient.

Data analysis

The Sedation Protocol Evaluation Survey uses Likert-type scales, giving ordinal level data. The data were analyzed by establishing a mean from summed total score for each dimension. The open-ended question at the end of the survey was not scored, but was solely for the purpose of allowing for more qualitative comments from the participants.

Findings

The return rates of the surveys were: three months 41%, six months 35%, and one year 53%. The following results were obtained from the surveys. A higher score indicates a higher level rating. (Refer to Figure One.) The first sub-scale, *quality of care*, had possible score ranges of 8 to 32. At three months, the mean score was 21.1, at six months 21, and at one year 21.88. The second sub-scale, *perception of autonomy*, had possible score ranges from 8 to 32. At three months the mean score was 23.6, at six months 22.6 and at one year 23.5. The third sub-scale, *protocol's ease of use*, had possible score ranges from 3 to 12. At three months, the mean score was 8.0, at six months 7.5 and at one year 8.7. The fourth sub-scale, *perceived confidence*, had possible score ranges from 7 to 28. At three months the mean score was 20.5, at six months 20.8 and at one year 21.6. Analysis of variance was completed comparing all sub-scale scores. This was done with a t-test using

the SPSS statistical program. No statistically significant differences were found within the sub-scales, but scores did not decrease over time.

No medication errors or near misses were reported throughout the sedation protocol implementation.

Qualitative comments from staff provided feedback and assisted in identifying issues with the protocol. Several staff identified that the protocol was easier to use over time and that they were becoming increasingly comfortable using the IV pumps with weight-based calculations. Additional comments indicated the protocol was still not being used on every patient and that the physicians still needed reminders to implement them.

Discussion

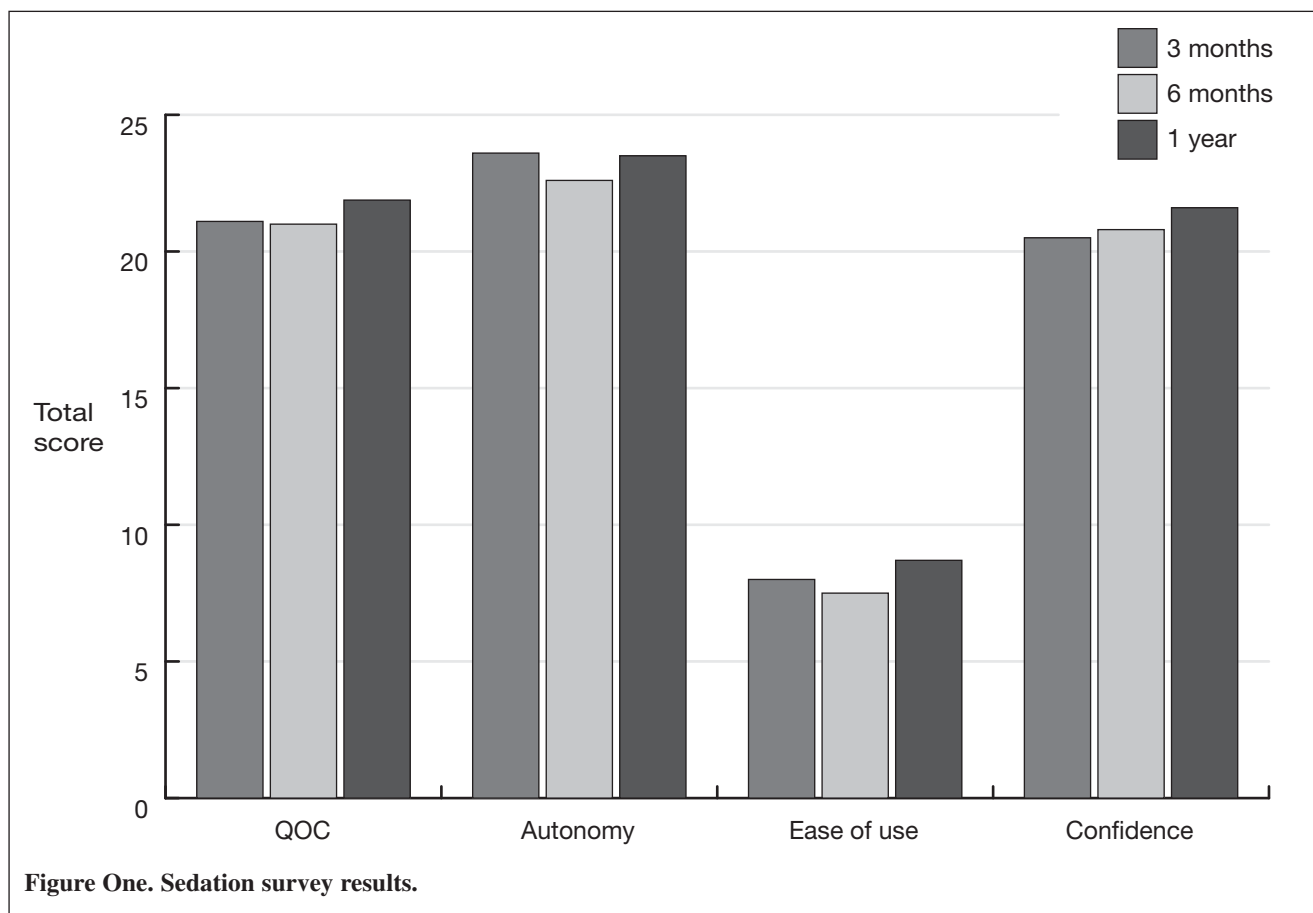
Implementing the sedation protocol has been of benefit in our mixed adult ICU. As the findings suggest, despite having no statistically significant differences in survey scores, after one year staff have verbalized increased confidence. Nurses find the protocol easy to use, and they expressed a perceived improvement to quality of care when using a standard sedation protocol. The protocol and associated tools provided a standardized approach for mixing medications. The administration of medications was delivered more accurately, using body weight, as compared to past practice when body weight was not considered. All patients in the past would receive the same drug dosage. Nurses had the opportunity and judgment to adjust dosages based on established goals and objective data. Although daily interruption of sedation within the protocol was not consistently used, it allowed the opportunity for re-

evaluation of sedatives, neurological assessment and potential weaning of the sedation on ventilated patients. Nurses perceived giving overall better quality of care.

The findings did suggest there was a slight decrease in nurses' perceived autonomy. Reasons for this finding may be related to the experience of staff. ICU has many junior staff. Therefore, they may not have fully developed the confidence and critical thinking skills that would allow them to make autonomous decisions. Less experienced nurses often require more reassurance and guidance with independent decision-making.

When evaluating the delirium pathway arm of the protocol, it should be noted that the intention of this section was to have it completed in advance by the physician and, if delirium was diagnosed by the nurse, using the CAM-ICU assessment tool, the nurse could independently implement the provided orders. However, physicians were not often providing orders in advance, but instead were waiting until delirium was present. This practice reduced the opportunity for autonomous decision-making by the nurse.

Although the protocol offered a consistent approach to medication administration, it is difficult to quantify its effect on medication error rates. The nurses did not report any errors or near misses prior to, or during the implementation of the protocol. The researchers acknowledge that staff often does not report near misses, but having no medication errors reported is questionable. When nurses are observed by the researchers, it is apparent that they have become increasingly reliant on the IV pump's drug library and safety features to calculate infu-



sion rates and less often use printed titration sheets as their guide. The data indicate nurses administer complex weight-based medications with increased confidence and safety.

After one year, the sedation protocol has become unit policy and additional IV pumps have been purchased and updated with safety features. In addition, the CAM-ICU Delirium Assessment Tool has been incorporated into the daily assessment of all ICU patients within the electronic charting system.

Challenges experienced

During the implementation of the sedation protocol, we experienced several challenges:

Development. Development of the various components and approval of the protocol took eight months.

Education. The majority of education was provided five months prior to protocol implementation date. Therefore, nurses required additional review, retraining and additional support for implementation. During the first three months of implementation, there were a variety of intensivists and locums (eight physicians in total) using the protocol. Not all physicians were aware or educated on the protocol and its components.

Response to change. Initially, there was lack of physician compliance in using the sedation protocol for a variety of reasons. In addition to physicians, there were also several nurses who were resistant to change. They preferred to continue to assess patients and administer medications as they had always done in the past. Some of the staff viewed the CAM-ICU and daily awakening sections of the protocol as difficult or cumbersome to use. Some staff were hesitant to use the daily awakening section for fear of patient self-harm or difficulty in resettling their patients.

Equipment and resources. Staff reported several equipment/resource challenges that included unreliability or difficulty using the peripheral nerve stimulator when administering neuromuscular blocking agents. There was also a limited supply of IV infusion pumps with drug library and additional safety features. At the time, only six out of 20 IV pumps were available with these features. Often, nurses had difficulty calculating and interpreting weight-based dosages, and the titration reference sheets, and VAS assessment tools were not always available or were missing when needed.


Limitations

There are several limitations with the study. These include use of a self-administered survey, which allows the respondents to check off their responses without reading questions thoroughly, the timeframe for the administration of surveys (three, six, and 12 months) incorporated results from new staff who had no or little opportunity to use the protocol, and incomplete surveys, as some staff were not familiar with the protocol in clinical practice.

The self-reporting of the survey could potentially be inaccurate due to motives or fear of consequences. The information had the possibility of being incomplete. Re-testability could be challenged as results may vary depending on the age and experience of the participants.

Another limitation was inconsistent use of the sedation vacation, RASS, and delirium assessment tools. It was noted that several staff under-used the daily awakening protocol. Further education and re-enforcement are still required in these areas.

Conclusion

In conclusion, we believe that the implementation of the sedation protocol has been beneficial in our adult ICU. Findings indicate that with experience and resources nurses can manage anxiety, pain and delirium more confidently than without such a protocol. Several strategies were used for successful implementation of the protocol. The challenges that were experienced have been documented and addressed. Critical care nurses, given the right tools, education and support can make objective decisions that promote positive outcomes and improve quality of care for patients receiving sedation and analgesia in the ICU. 

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Acknowledgements

We would like to acknowledge Dr. William Anderson, Larry Bertoldo, Pharmacist, and Carolyn Freitag, Critical Care Manager for their contributions in the development of the TBRHSC Sedation Protocol.

References

- Aiken, L.H., & Patrician, P.A. (2000). Measuring organizational traits of hospitals: The Revised Nursing Work Index. *Nursing Research, 49*, 146–153.
- Ely, E.W., Inouye, S.K., Bernard, G.R., Gordon, S., Francis, J., May, L., et al. (2001). Delirium in mechanically ventilated patients: Validity and reliability of the confusion assessment method for the intensive care unit (CAM-ICU). *Journal of the American Medical Association, 286*, 2703–2710.
- Jacobi, J., Fraser, G.L., Coursin, D.B., Riker, R.R., Fontaine, D., Wittbrodt, E.T., et al. (2002). Clinical practice guidelines for the sustained use of sedatives and analgesics in the critically ill adult. *Critical Care Medicine, 30*, 119–141.
- Kress, J.P., Pohlman, A.S., & Hall, J.B. (2002). Sedation and analgesia in the intensive care unit. *American Journal of Respiratory Critical Care Medicine, 166*, 1024–1028.
- Kress, J., Pohlman, A., O'Connor, M., & Hall, J.B. (2000). Daily interruption of sedative infusions in critically ill patients undergoing mechanical ventilation. *New England Journal of Medicine, 342*, 1471–1477.
- Sessler, C., Gosnell, M., Grap, M., Brophy, P., O'Neal, P., Keane, E., et al. (2002). The Richmond agitation-sedation scale. *American Journal of Respiratory Critical Care Medicine, 166*, 1338–1344.