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Pain and Sedation Scales in the Pediatric Intensive Care Unit

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Sedation and Pain Scales Benchmark Study

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Contents

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Sedation and Pain Scales Benchmark Study

Executive Summary

In the pediatric Intensive Care Unit (PICU) there is a need for analgesia and sedation to reduce pain and discomfort, allow for interventions, optimize ventilation, decrease the amount of time in the PICU, and improve outcomes including the time after discharge. Adequate management of sedation and pain is the key to healing, duration of hospitalization, as well as a decrease in mortality rates. It is essential to have adequate pain control to maintain healing and stress reduction. Over sedation with mechanically ventilated children in the PICU can have significant complications. Complications include withdrawal, risk for infection and increased the amount of time needed for assisted ventilation. With mechanical ventilation there is a need for adequate management of analgesia and sedation. There are various different ways to assess acceptable sedation and pain management. It is possible to utilize a sedation scale and pain scale that offers the best level of sedation and pain management for pediatric patients in the PICU. The COMFORT B Scale (CBS) is a tool used to assess behavioral and physiological items allowing research to offer strong evidence for the benefits and utilization (Recher et al., 2020). In the pediatric population there are multiple pain and sedation scales used to treat and identify pain while ensuring adequate sedation and the best care during the critical time spent in the intensive care unit. It is important for the medical staff caring for critical pediatric patients to have confidence in the pain and sedation scale being used is providing the best possible outcome for the children they are caring for. How do assessment tools compare to others? This motivates the question: In pediatric patients admitted to the pediatric intensive care unit (PICU) (P), how

does the COMFORT B scale (I) compared to other sedation tools (C) affect adequate sedation and pain (O) during the PICU admission (T)?

With the advancement of technology and research, there are many very ill children requiring mechanical ventilation and sedation. PICUs across the world have reported 20-64% of children require a form of ventilation and critical care (Dorfman et al., 2014). This emphasizes the need for increased awareness of adequate sedation and pain management during this critical time. Pain and sedation assessment are the initial intervention to quality patient outcomes and pain management.

Rationale for the Project

Efforts to improve pain level assessments in the pediatric population in order to improve patient outcomes it is important to effectively treat pain, manage sedation, and provide comfort to this vulnerable portion of the patient population. Proposing evaluation and a change in the sedation scale used for assessing pain, sedation levels, and outcomes of sedated pediatric patients is the objective for this change project. The goal of this change project in to implement policies and protocols associated with the use of pain scales that will effectively treat pain and provide comfort while also improving patient outcomes including time in the PICU, improving withdrawal symptoms, improving the treatment time of withdrawal symptoms, and to help decrease the amount of time the patient is hospitalized. It is important to address and balance the ethical issues associated with implementation of this change project such as the risk associated with changing the assessment scale, informed consent associated with children, the vulnerability of the pediatric population, and the severity of illness. Recommending a change for the vulnerably ill pediatric patient by identifying and proposing the best method to assess pain and sedation will improve the outcome of the patient and make this project worth implementations

while protecting the rights of the patients and families involved (Melnyk & Fineout-Overholt, 2015).

Understanding that trialing multiple assessment scales for pain and adequate sedation could emerge the question of quality implementation of the CBS. Awareness is the key to protecting the patient with the implementation of a specific assessment tool and helps to protect the quality of care the patient has a right to obtain. It is important to ensure improvement in the quality of care, decrease pain and sedation withdrawal, and warrant no harm or change in the patient safety goals (Melnyk & Fineout-Overholt, 2015). Giving full disclosure and adequate precise information to the patient is an important ethical standard of care. This change project is focused on sedated pediatric patients that are considered a vulnerable population due to age and physical disability affecting the patient's ability to legally and ethically give informed consent to participate in an evidence-based project (Polit & Beck, 2017) . To ensure ethical standards of care for this vulnerable population the parents or legal guardian will be asked to sign a written consent before their child will be a part of any study.

Literature Synthesis

In the review of literature for this change proposal the search began in 2018. The data was searched with CINAHL, EMBASE, PubMed, and Cochrane databases using the key words: pediatric, pediatric intensive care unit, sedation, pain scales, sedation assessment, ventilated pediatric patients, CBS, compare, and pain.

Coordinated interpretation of the evidence helped to support this change proposal focusing on the research work used to explore the effectiveness of the CBS with other pain and

sedation assessment scales. The research revealed the CBS is successful in measuring pain and sedation in pediatric patients that are ventilated in the PICU. Using the scale can help improve patient outcomes including but not limited to adverse events, hospitalization times, discharge criteria, decreasing medication withdrawal, ,and the need for discharge support.

Many of the articles used to support this change project are descriptive and observational studies. The studies compared different pain scales to the CBS to help understand the primary difference in the scales, and how well does the assessment help decrease the amount of pain being experienced by the patient in the PICU (Laures et al., 2019) . Avoiding negative outcomes and promoting awareness of managing and accessing sedation levels and pain are the focus of two studies comparing the FLACC scale and the CBS. Dantas, Dantas, Santana-Filho, Azevedo-Santos, & DeSantana (2016) successfully showed sedated and ventilated patients in the PICU were adequately sedated and had less pain when the nurse was using the CBS compared to the patient having more pain and less sedation levels while undergoing painful procedures when the nurse was using the FLACC scale to assess pain and sedation. Laures et al., (2019) found the FLACC and CBS are the most commonly used assessment tools, and the CBS was used 81% of the time to measure pain and sedation in pediatric patients.

One of the studies compared the Bispectral Index Monitor (BIS) and the CBS assessing if there is a correlation between the two assessment tools. The BIS is a tool that measures the hypnotic effect of anesthetic and sedative drugs. According to Amigoni et al., (2012) the BIS and CBS are both adequate to measure and titrate analgesic and sedative drugs according to the patient's needs. That both scales are validated instruments for measuring adequate sedation while

the CBS maintains importance over the BIS. The study showed either scale will prove adequate evaluation of sedation by using either scale.

A few of the articles compared the CBS to other scales and assessments such as newborn infant parasympathetic evaluation (NPIE) which is based on high frequency-domain heart rate variability which reflects parasympathetic activity. This is a tool used to assess postoperative pain in newborns and the use has not to assess sedation and pain in ventilated patients had not been previously evaluated (Recher et al., 2020). The scales were compared to assessment of procedural distress in sedated and ventilated children in the PICU. According to Recher et al., (2020) there was significant correlation between the NPIE scale and the CBS and both scales could be used to detect discomfort in the future. In a descriptive, comparative design study, the numerical rating scale was used compared to the CBS measuring efficacy and efficiency while providing the highest quality of care to the patients (Sulla et al., 2018). The results of the study found 60% of the staff preferred the CBS, it was easy to use, the scale is pertinent to assess pediatric pain and sedation levels compared to the numerical group (Sulla et al., 2018). Using a nonrandomized prospective cohort study the historical control of a clinical based judgement was compared to the use of a hospital-based protocol using the CBS. The study focused on the assessment judgement of sedation based on the nurses and attending physician's clinical judgement versus an intervention group using the CBS, sedation adjusted according to protocol. Comparing length of stay and days of mechanical ventilation (Saelim et al., 2019). The results of the study showed effective sedation and patient outcomes with both control groups, there was no difference in duration of mechanical ventilation, PICU length of stay, and hospital length of stay (Saelim et al., 2019). This is a study comparing experienced nurses and physicians who have several years of PICU experience. This proposal may need further evaluation with less

experienced nurses to help understand if a sedation scale is equal to clinical judgement with adequate training.

Two of the studies focused on the effectiveness of different pain scales and what variables correlated with levels of discomfort in children. According to Bosch-Alcaraz, Jordan, Benito-Aracil, Saz-Roy, & Falco-Pegueroles (2020) in a descriptive observational cross-sectional study, assessing pain and discomfort appropriately using the CBS based on variables provides the ability to properly sedate patients promoting better patient outcomes. It is important to understand which assessment tools are available that will appropriately measure physiological and behavioral cues and adequacy of analgesia and sedation (Dorfman et al., 2014). A systematic review of original and validation reports was conducted using 10 databases, 25 articles identifying 15 instruments (Dorfman et al., 2014) . There are many tools to measure pain and sedation in the pediatric patient. The objective of this change project is to compare a couple of assessment tools mostly used by the nurses in the PICU and evaluated by survey to the CBS. According to Dorfman et al., (2014) The CBS is the greatest clinical assessment tool used to assess pain, non-pain related distress, and sedation in mechanically ventilated pediatric patients. Nurses, physicians, and families are all invested in ensuring the best outcomes for every child. As reviewed and illustrated by the studies discussed in this section, the CBS is a valid scale to implement as a process and protocol in the PICU to promote the best quality outcomes.

Project Stakeholders

Healthcare for pediatric patients should have a focus on the patient, the entire family, and the healthcare team working with the patient. Family wellness, communicating information, caring for the patient, and respect for the patient as well as the family encourages family centered

care as a priority in a PICU. Having a child that is ill enough to need sedation, mechanical ventilation, and care in a PICU is stressful and challenging for the entire family. It is equally important to listen, educate, empathize, and inform the entire family which incorporates and helps understand the importance of family centered care. The outcomes associated with the care received while a child is ill could affect the entire family. Family centered care focuses on the time the child is in the PICU as well as the time after discharge.

Implementation of pain scales that promote the best possible outcomes for patients that are sedated and ventilated in the PICU is a key variable to the outcome of the patient and the entire family who are also stakeholders in the process of healing. It is important to incorporate the best pain and sedation management, keep the family informed, encourage participation, as well as understanding what the support system and care will be once the patient is discharged home. Understanding the evidence and proposal of the best pain scale to optimize the best patient outcomes should be focused, guided, and implemented to the patient's circumstance and expected outcomes (Melnyk & Fineout-Overholt, 2015). Incorporating families, listening, empathizing, informing, and assessing the child are all important variables to promoting the best patient outcomes. Family members who are constantly at the bedside of their child can provide important feedback to the team and be involved in the decision-making process. This empowers parents, improves communication, strengthens bonds, and helps them cope with managing stress in this difficult situation. Family-centered care also helps families to understand care plans and helps to avoid conflicts with staff. In relation to implementing the best possible pain scale assessment for the pediatric population, family members can potentially read their child's pain levels more accurately than most others and can assist in relating this information to caregivers.

Every age population can benefit by including family members in the patient care processes, in the pediatric population it is absolutely vital especially in an intensive care environment. The PICU is an extremely stressful environment for patients and their families and can often result in long-term stays. Nurses play an important role in providing family-centered care in these difficult circumstances and can help families cope with stress and the short or long-term challenges they may face. According to nurses' perceptions in the study by Coats et al., (2018) family-centered care was challenging but seen as beneficial to the pediatric patient in the PICU. Family members rounding with care teams to relate valuable information is so refreshing and innovative. It appears that the stakeholders in this project would not only include the pediatric patient and family members, but also the multi professional hospital personnel of nurses, physicians, pharmacists, physical therapy, respiratory therapist, and many more.

Implementation Plan

The following is an implementation plan for this change project that is evidence based, promoting change in the way pain assessments are conducted in the PICU.

After proper approval, the first step to implementing this change proposal would be to send out a survey to the PICU nurses, nurse practitioners, and the pediatric intensive care intensivist that work in the unit asking them if they feel like pain is being accurately assessed when they use the COMFORT B scale. This could be either a simple Yes/No question or one where they rate their thoughts on a scale of 0-5. The survey could also include whether or not the nurses have a preference on a pain scale used to treat pain for their patients in the PICU and why they think the preferred pain scale if other than the COMFORT B scale is a better tool to use as a pain assessment. If the survey response has a pain scale that rates higher or near the COMFORT B

scale, this would be the best pain scale to use to compare which scale is most likely to give the best pain assessment to the sedated pediatric patient .

The next step would be to educate all the care providers and the nursing staff why the pain scale is being implemented into practice during the pilot implementation, the proper use of the assessment tools being used, and the goals for the study. Once the study is implemented, the PICU nurses will assess all sedated/intubated patients in the PICU using the COMFORT B Sedation tool as well as the top two pain scales on the survey from the nurses, nurse practitioners, and intensivists that work in the unit. The COMFORT B scale will be used with half of the patients needing sedation in the PICU; the nurses, nurse practitioners, and the pediatric intensivist will choose a pain scale of choice between two additional scales divided evenly to assess the other half of the patients in the PICU needing sedation. The patients assessed with the COMFORT B scale will continue to be managed using the pain and sedation protocol for nurses already in place; for patients using other two sedation scales, the practitioners and physicians will manage sedation. For each patient in the study, nurses will document which pain scale is used, sedation levels, how well the patient responded to sedation after assessment and intervention, any adverse events secondary to over or under sedation, how long they are in the PICU, if the patient had withdrawal symptoms after sedation is removed using the withdrawal assessment tool-1 (WAT-1). A final step to the study will be assessing the patient at the time of discharge. The withdrawal score at the time of discharge will need to be assessed and documented. It is important to document if there is a need for medications for withdrawal symptoms at the time of discharge.

Timetable/Flowchart

The steps to this project include survey, deciding on which pain scales to compare, education, implementation, evaluation, modifying practice, educate staff on how practice will be modifies, and making a change. Prior to implementation of this change project it will need to have organizational approval.

Surveying the PICU nurses, nurse practitioners, and the intensivists will be the initial step taking up to one month to send out a survey and questionnaire, getting feedback, and evaluating response. Once the information obtained is organized, it will take about two weeks to have an understanding of which two additional pain scales will be used to compare the CBS. The medical staff in the PICU is going to be the key influencer in the implementation of change in the current pain and sedation assessment. Taking up to three weeks, the medical staff will be provided with an in-service, handouts, and bedside reminders of what is to be expected to successfully compare the assessment tools being used to evaluate pain over the next six months during the trial and implementation period. Taking about one month to evaluate patient variables, sedation and pain management, withdrawal scores, and discharge summaries the pain assessment protocol will be ready for change and introduction. The policy will need to be presented and approved through the proper channels in the organization. Once the policy is modified, the current policy will indicate that critical care nurses who have patients under sedation and require pain medications should assess and medicate pain according to the corresponding level determined by using the COMFORT B scale and additional scales implemented due to comparison and findings through pilot implementation. The staff will once again need a three-week time frame to be introduced to the new policy change and

implementation plan through in-services and handouts. Once the staff is comfortable with the new policy and implementation the administrative staff will allow additional acuity and staffing changes up to one month ensuring with this change the patients get the best quality of care and ensure successful improvement of sedation and pain management in the PICU. After successful implementation, there will be continuous evaluation of patient outcomes. See Appendix B for the flowchart.

Data Collection Methods

Through research and implementation it can be determined how other sedation scales compared to the COMFORT B scale are used to determine levels of sedation and pain. The medical staff in the PICU is going to be a key influencer in the implementation of this change project. The pilot implementation will be six months, during this time three pain scales used on sedated and ventilated patients will be evaluated. Comparing data prior to the implementation and the data six months after implementation will provide the data that will evaluate a successful change. This change project will be a successful implementation if the data after six months of the pilot implementation shows the patient spends less time in the PICU intubated and sedated, the amount of time on the ventilator is decreased, there are less adverse events associated with over-sedation or under sedation, the average pain score is less during the time of sedation, the withdrawal scores improve, the patient spends less time in the hospital, and the need for methadone during the hospital stay and at discharge will be evaluated. To provide successful implementation of using the COMFORT B scale as the assessment tool for sedated and intubated pediatric patients in the PICU a successful reflection should be evaluated for the following steps:

- The survey and questionnaire should be successfully returned and evaluated within one month. Identifying the top two preferred pain scales identified by the staff by using a percentage, take the top two scales and compare them to the COMFORT B scale. The goal is to use the COMFORT B scale with half of the patients and the other two scales with the other half of the patients. The scales will be chosen based on order of admission and pain scale will be implemented immediately.
- During the pilot implementation, the data being compared will be as follows:
    - How much time was the patient in the PICU, compare and analyze the amount of time each patient spent in the PICU using mean and standard deviation. Results will be compared using the t-test. the analysis of variance. The change project would be successful if the patients managed with the COMFORT scale spent less time in the PICU.
    - How much time the patient spent on the ventilator needing sedation and pain medication, analyze this data by calculating the mean of days for each patient. Results will be compared using the t-test. Successful implementation of the COMFORT B scale would show less time on the ventilator due to over sedation or other causes related to sedation and pain management.
    - Identify any adverse events due to the patient being under sedated or over sedated. Express the variables in percentage. Successful implementation of the COMFORT B scale would show a lower percentage of adverse events

associated with the amount of sedation variable over the six-month pilot implementation.

- Calculating the average pain score while the patient was sedated. Successfully using the COMFORT B score would show by a lower mean for pain during intervention while sedated.
- Measuring the average withdrawal score after sedation. Results will be measured using the analysis of variance. Successful implementation of the COMFORT B scale would demonstrate a lower average withdrawal score during and after the time sedation is being weaned.
- Measure the average days the patient was hospitalized. The successful implementation of the COMFORT B scale would show a lower average of days the patient was hospitalized. Results will be measured using the analysis of variance Adequate sedation and pain management would decrease adverse events and decrease hospitalization time.
- Measure by average how many patients had to be discharged home with methadone to help with withdrawal. Results will be measured using the analysis of variance. A lower average of methadone needed post discharge with patients that were assessed with the COMFORT B scale will show successful implementation of this change project.

With the evaluation of the patient variables associated with using the COMFORT B scale to measure pain and sedation and the statistical analysis is complete, analyze and report the findings. Using a summary method emphasizes the best pain scale to be used based on the data analysis of pain scales and summarize the recommendation. This change project will be a

success if the summarized recommendation concludes the COMFORT B scale provides adequate sedation and pain management compared to the other two pain scales used during the pilot implementation.

Cost/Benefit Discussion

Evaluating the cost associated with a change project is important based on the benefit of the project, what it will cost the organization during implementation, and the cost associated with the patient outcomes. The implementation of this change project will be minimal. The project cost will be focused on materials, the amount of time staff will be paid during organization, data analysis, and the additional staffing needed during the pilot implementation time of six months.

The largest analysis of benefit will be focused on the data associated with patient outcomes while using the COMFORT B scale as the assessment tool for pain and sedation while in the PICU. Adequate sedation will decrease the number of adverse events and improve quality care given to each patient. Adverse events are costly to the organization, leading to the need for further interventions, prolonged time in the PICU, increased sedation requirements, prolonged hospitalization, and the need for support weaning from the sedatives. The benefit of using the COMFORT B scale to help improve quality patient care, patient outcomes, and nursing satisfaction. Improving quality of care will improve staffing retention which will save the organization thousands of dollars with nurse retention, improve patient satisfaction surveys which improves organizational reimbursement, and improve patient outcomes which also saves the organization money and improves reimbursement for the hospitalization.

Discussion of Results

In the PICU there is a need for analgesia and sedation to reduce pain and discomfort, allowing for interventions, optimizing ventilation, decreasing the amount of time in the PICU, and improving outcomes including interventions needed after discharge. Adequate management of sedation and pain is the key to healing, duration of hospitalization, a decrease in mortality rates, improved patient and nursing satisfaction, decreased organizational cost, and improved reimbursement. It is essential to have adequate pain control to maintain healing and stress reduction. Over sedation in the PICU can also have significant complications including withdrawal, risk for infection, and increased amount of time needed for assisted ventilation. There are various ways to assess adequate sedation and pain management. It is possible to utilize a sedation and pain scale that offers the best level of sedation and pain management for pediatric patients in the PICU. The COMFORT B scale has been researched and offers validity, reliability, and strong evidence of its benefits (Beytut, 2016). There are many pain and sedation scales that have shown to provide adequate assessment of pain and sedation in the pediatric population.

This change project is currently a benchmark project and was not implemented due to the current unprecedented times during the COVID 19 pandemic. The successful implementation of this benchmark project comparing COMFORT B scales with other assessment scales for sedated patients in the PICU will provide statistical proof of improved patient outcomes, patient satisfaction, nursing satisfaction, and improved quality of care. Patient quality of care will improve by decreasing adverse events, decreasing the need for additional medication for withdrawal at the time of discharge, decreasing the amount of time the patient is hospitalized, and improving cost associated with staffing retention, patient surveys, and improving patient outcomes.

Conclusions/Recommendations

The purpose of this change project is to improve pediatric pain and sedation management by comparing the COMFORT B scale to other pain management scales used in the pediatric intensive care unit. The PICU is the focus of the change project, focusing on improving the management of pain and sedation to help improve patient outcomes. Although adequate sedation is crucial in maintaining patient anxiety, comfort and decrease risk of self extubations; excessive sedation can have adverse effects on the quality of care, increase the risk for prolonged PICU stay and hospitalizations (Saelim et al., 2019) .

Maintaining autonomy and morale for the project is an important part of accuracy and sustainability. Incorporating input from the nurses and physicians who work in the PICU through survey and implementation will be a key factor contributing to longevity and successful implementation. Interdisciplinary collaboration through survey and the variables of implementation affects patient outcomes because trust and respect enhance communication about patient issues (Atwater et al., 2006). If the staff working in the PICU have a vested part in the change project by having an input about the most favorable pain and sedations scales, comparing data with the COMFORT B scale will increase staff satisfaction and compliance.

Once this project is implemented, maintaining sustainability is an important piece to making a lasting change that continues to increase positive patient outcomes and allows the patient to go home on less medication and with less irritability. Commitment to the project comes from the entire team understanding how the other pain scales compare to the COMFORT B scale over time and what the plan is to reach the long-term goal of improving patient outcomes through adequate sedation. All the healthcare givers take responsibility for the clinical growth and outcomes of the PICU patient with the implementation of adequate sedation allowing nursing

autonomy to provide quality care and improve patient outcomes based on the most applicable pain scales available. The final step for this project would be to continue evaluating the statistical data over a significant amount of time, continue to make changes that will improve the amount of pain and sedation associated with critically ill pediatric patients.

References

Amigoni, A., Mozzo, E., Brugnaro, L., Gentilomo, C., Stritoni, V., Michelin, E., & Pettenazzo, A. (2012). Assessing sedaiton in a pediatric intensive care unit using comfort behavioural scale and bispectral index: these tools are different. *Minerva Anestesiologica*, *78*, 322–329. https://pubmed.ncbi.nlm.nih.gov/22127309/

Atwater, A., Hartmann, E., Brown, B., Carteaux, P., Freeman, M., Hegwood, P., Michael, L., Rikli, J., Secrest, J., Bauman, B., & Plsek, P. (2006). Evaluation and development of potentially better practices for staffing in neonatal intensive care units. *Pediatrics*, *118*(Supplement 2), S134–S140. https://doi.org/10.1542/peds.2006-0913j

Beytut, D. (2016). Validity and reliability study of sedation diagnosis method comfort scale. *Ağrı - The Journal of The Turkish Society of Algology*, *28*(2), 89–97. https://doi.org/10.5505/agri.2015.24471

Bosch-Alcaraz, A., Jordan, I., Benito-Aracil, L., Saz-Roy, M., & Falcó-Pegueroles, A. (2020). Discomfort of the critically ill paediatric patient and correlated variables. *Australian Critical Care*. https://doi.org/10.1016/j.aucc.2020.02.009

Coats, H., Bourget, E., Starks, H., Lindhorst, T., Saiki-Craighill, S., Curtis, J., Hays, R., & Doorenbos, A. (2018). Nurses' reflections on benefits and challenges of implementing family-centered care in pediatric intensive care units. *American Journal of Critical Care*, *27*(1), 52–58. https://doi.org/10.4037/ajcc2018353

Dantas, L., Dantas, T., Santana-Filho, V., Azevedo-Santos, I., & DeSantana, J. (2016). Pain assessment during blood collection from sedated and mechanically ventilated children. *Revista Brasileira de Terapia Intensiva*, *28*(1). https://doi.org/10.5935/0103-507x.20160013

Dorfman, T. L., Sumamo Schellenberg, E., Rempel, G. R., Scott, S. D., & Hartling, L. (2014). An evaluation of instruments for scoring physiological and behavioral cues of pain, non-pain related distress, and adequacy of analgesia and sedation in pediatric mechanically ventilated patients: A systematic review. *International Journal of Nursing Studies*, *51*(4), 654–676. https://doi.org/10.1016/j.ijnurstu.2013.07.009

Laures, E., LaFond, C., Hanrahan, K., Pierce, N., Min, H., & McCarthy, A. (2019). Pain assessment practices in the pediatric intensive care unit. *Journal of Pediatric Nursing*, *48*, 55–62. https://doi.org/10.1016/j.pedn.2019.07.005

Lincoln, P. A., Whelan, K., Hartwell, L. P., Gauvreau, K., Dodsen, B. L., LaRovere, J. M., Thiagarajan, R. R., Hickey, P. A., & Curley, M. Q. (2020). Nurse-implemented goal-directed strategy to improve pain and sedation management in a pediatric cardiac icu. *Pediatric Critical Care Medicine*, *Publish Ahead of Print*. https://doi.org/10.1097/pcc.0000000000002505

Melnyk, B. M., & Fineout-Overholt, E. (2015). *Evidence-based practice in nursing & healthcare: A guide to best practice 3rd edition* (3rd ed.). Wolters Kluwer Health.

Polit, D. F., & Beck, C. T. (2017). *Nursing research: Generating and assessing evidence for nursing practice* (10th ed.). Wolters Kluwer.

Recher, M., Rousseaux, J., Flocteil, M., Jouancastay, M., Potisek, A., Lampin, M.-E., Leteurtre, S., & De jonckheere, J. (2020). Assessment of procedural distress in sedated/intubated children under 3 years old using the newborn infant parasympathetic evaluation. *Pediatric Critical Care Medicine*, *Publish Ahead of Print*. https://doi.org/10.1097/pcc.0000000000002454

Saelim, K., Chavananon, S., Ruangnapa, K., Prasertsan, P., & Anuntaseree, W. (2019). Effectiveness of protocolized sedation utilizing the comfort-b scale in mechanically ventilated children in a pediatric intensive care unit. *Journal of Pediatric Intensive Care, 08*(03), 156–163. https://doi.org/10.1055/s-0039-1678730

Sulla, F., Lachimia, M., Barbieri, L., Gigantiello, A., Iraci, C., Virgili, G., Artioli, G., & Sarli, L. (2018). A first contribution to the validation of the italian version of the behavioral pain scale in sedated, intubated, and mechanically ventilated paediatric patients. *ACTA Biomed For Health Professions, 89*(7), 19–24. https://doi.org//10.23750/abm.v89i7-S.7945

Appendix B

Flowchart