

Reducing the Amount of Overnight Vital Signs: A Quality Improvement Initiative

Sarah Minacci

Lakeview College of Nursing

N434: Evidence-Based Practice

Professor Travis Whisman

September 24, 2024

Reducing the Amount of Overnight Vital Signs: A Quality Improvement Analysis

Healthcare is a field that is always evolving as new knowledge from research is gained. This requires healthcare professionals, such as nurses, to be lifelong learners who must be dedicated to incorporating new knowledge gained from research into their practice. In response to the need of nurses to be lifelong learners, the Quality and Safety Education for Nurses Institute (QSEN) was established with the mission of providing core competencies to educate and inspire healthcare professionals to improve the quality and safety of their institutions (QSEN Institutional Affiliation, 2022). One of these core competencies is quality improvement. The goal of quality improvement is to, “use data to monitor the outcomes of care processes and use improvement methods to design and test changes to continuously improve the quality of and safety of healthcare systems”(QSEN Institutional Affiliation, 2022). More generally put, quality improvement aims to identify problems in healthcare and create solutions to those problems using a patient centered approach. Quality improvement projects are essential in keeping up to date with research and improving practices at healthcare facilities. The QSEN Institute outlines in specific detail how the competency of quality improvement can be put into practice. First, it encourages nurses to recognize that they themselves are important researchers and that they have value and the ability to improve care for patients (QSEN Institutional Affiliation, 2022). Nurses should also understand that quality improvement is a continuous process and should be considered an integral part of their daily work (QSEN Institutional Affiliation, 2022). Nurses spend more time with patients than other healthcare providers and this also gives them a unique ability to help identify gaps between current practices in their facility and best practices according to research (QSEN Institutional Affiliation, 2022). The QSEN Institute encourages nurses to be active participants in quality improvement and understand that they can design

changes in their practices and evaluate how those changes improve patient care (QSEN Institutional Affiliation, 2022).

As previously stated, nurses should always be striving to improve the quality of care given to their patients and one particular quality improvement initiative that should be implemented, is the reduction of overnight vital signs taken on patients in order to improve their quality of sleep and enhance overall wellbeing. Waking patients up during the night to take their vital signs is a common cause of distress and sleep disturbance in hospitalized patients and is often unnecessary for stable individuals (Tóth et al., 2020). Poor sleep caused by such nightly interruptions is associated with many adverse effects such as delirium, weakened immune system, and increases in blood pressure, stress, and mortality (Tóth et al., 2020). Overnight vitals not only disrupt patient sleep but account for an estimated 10% of a nurse's shift as well and this time could be allocated to more acutely ill patients (Tóth et al., 2020). Therefore, the topic of necessity of overnight vital signs is an important quality improvement initiative to consider.

Article Summary

Introduction

The study chosen to illuminate the idea of reducing the number of overnight vitals for stable patients is a research article titled "Let Sleeping Patients Lie, avoiding unnecessary overnight vitals monitoring using a clinically based deep-learning model". The goal of this study was to create online software that can take a sequence of previous vital signs and use that data to reliably identify patients who are at low-risk for deterioration or complications overnight and therefore would benefit from skipping overnight vital signs (Tóth et al., 2020). The researchers gathered data from approximately 2.3 million hospitalization admissions which resulted in 26

million vital sign assessments (Tóth et al., 2020). The researchers then trained a computer system, known as a deep recurrent neural network, to take the vital signs data and produce a nightly assessment of how stable a patient would be over night (Tóth et al., 2020). Vital signs data included heart rate, respiratory rate, blood pressure, body temperature, patient age, and calculated risk score (MEWS) (Tóth et al., 2020). This research design was unique in that it inverted the standard approach of identifying high-risk patients who need closer monitoring and instead used a computer system to identify patients who are stable and low-risk that could benefit from having their overnight vitals skipped (Tóth et al., 2020). In the end, the researchers found that their computer software was successful in safely identifying patients that could forgo overnight vitals and allowed for approximately 50% of the nights that patients stayed at the hospital to be free of sleep disturbances from vital signs (Tóth et al., 2020). During this study, only two out of 10,000 patients were incorrectly classified as stable (Tóth et al., 2020). The researchers of this study anticipate the use of such software in hospitals to improve patient outcomes and satisfaction, increase healthcare providers efficiency, and create significant cost savings for hospitals (Tóth et al., 2020).

This research article was specifically chosen because it showed that it is possible to safely decrease the amount of overnight vitals performed on stable patients so that they may sleep undisturbed. The researchers were able to create a computer software system that healthcare providers are able to adjust to their preferred confidence threshold to fit the needs of their clinical settings meaning that they can implement a more risk-adverse or relaxed threshold (Tóth et al., 2020). This serves as a great example of a realistic quality improvement initiative that could be implemented all over the country.

Overview

As previously stated, this research article is a prime example of a quality improvement initiative to improve a patient's sleep by avoiding unnecessary overnight vital signs. The article directly utilizes several components of the QSEN competency of quality improvement. First, the authors of the article were able to acknowledge a gap in research, stating that very little research has been done to identify low-risk patients that would benefit from skipping overnight vitals and that by identifying these patients there is an opportunity to improve sleep and therefore enhance overall patient recovery (Tóth et al., 2020). Quality improvement also involves the use of data to monitor outcomes and this research article was able to use a great deal of patient data to create a computer software system capable of monitoring the stability of patients and deeming if they were low-risk enough to forgo their overnight vitals (Tóth et al., 2020). They created this software with the understanding that sleep disruption creates many unwanted side effects and therefore, finding a way to avoid unnecessary overnight vitals would in turn improve the quality of care that patients receive (Tóth et al., 2020). After implementing their computer software system, the researchers engaged in yet another aspect of quality improvement by evaluating the effect of their software. They found that approximately 50% of the nights patients stayed at the hospital could safely be kept free of sleep disturbances from vital signs (Tóth et al., 2020). They were then able to extrapolate this data and find that by safely being able to forgo half of overnight vital signs it would result in up to a 20-25% reduction in workload for overnight healthcare providers (Tóth et al., 2020). The researchers also noted that the reduction in overnight vitals would also increase patient satisfaction with care and save the hospital money as the adverse effects caused by poor sleep tends to lead to increased length of hospital stays (Tóth et al., 2020).

Quality Improvement

This type of quality improvement software could be utilized in any care setting from hospitals to long-term care facilities or rehabilitation centers. Given the fact that the computer software works specifically by identifying low-risk patients, it is unlikely that it would be used in more acute care settings like an intensive care unit; however, it could prove very beneficial on med-surg units, postpartum, or long-term care facilities where patients are less severely ill. Though, if this change is to be easily implemented in more healthcare settings, then there are several resources that would need to be available. First, the cost of such a system must be considered; while the researchers in this article did not mention the cost of their computer software, it may be the case that smaller healthcare facilities would be unable to afford such an expense. Additionally, before implementing a new software like this, physicians, nurses, and all other healthcare staff should be thoroughly trained on how the predictive computer software works and know that it does not replace “gut” feelings in care. Once in place, data should still be collected on the effectiveness of the software and it should not automatically be assumed as best practice just because the researchers of this article had positive results. An important part of quality improvement is always assessing how care could be improved and therefore, each healthcare system that may implement such a computer software should be assessing if it is actually improving care in their specific facility or not.

If the efficacy of the researchers designed computer software system holds true, then healthcare systems would see many benefits from its implementation. First and foremost, avoiding unnecessary overnight vital signs has the potential to greatly improve patient care. As the article noted, overnight vital signs are the second most common cause of sleep disturbance in hospitalized patients (Tóth et al., 2020). Poor sleep can result in a variety of adverse effects

ranging from increased stress and delirium to weakened immune systems and increased mortality (Tóth et al., 2020). Therefore, by forging overnight vitals when safely possible, the authors anticipate seeing improvements in patient outcomes and overall satisfaction with care as quality sleep is especially important in the recovery process (Tóth et al., 2020). Furthermore, by not having to do as many patients' vital signs at night, this gives nurses and other healthcare providers additional time to focus more closely on their more acutely ill patients and complete other tasks (Tóth et al., 2020). This software could also serve to save healthcare facilities money as the adverse effects related to sleep disturbances are known to increase the length of hospital stays and therefore increase the cost accrued to both patients and the hospital system itself (Tóth et al., 2020).

Application to Nursing

Practice

The authors of the study note that currently, there is no set evidence-based practice for how frequently routine vital signs should take place (Tóth et al., 2020). However, in the typical medical-surgical setting, routine vitals are usually taken every four to five hours and vary in frequency depending on the patient's condition (Tóth et al., 2020). It is true that overnight vital signs are necessary and crucial to the care of unstable, high-risk patients (Tóth et al., 2020). It is also true that there is already risk stratification software in place in most hospital settings that helps to identify those high-risk patients who require more frequent vital sign assessments (Tóth et al., 2020). Thus, this same type of technology should be used to identify low-risk patients who do not need vital sign assessments every four hours and would actually benefit from their reduction (Tóth et al., 2020). The importance of quality sleep on patient recovery time has

already been established; hence, the best practice of using risk stratification should also be utilized to enhance sleep quality for patients when possible (Tóth et al., 2020).

Education

Taking accurate vital signs and then critically analyzing those vital signs to detect potential problems in patients are some of the first skills taught to nurses. Current guidelines regarding the frequency at which nurses obtain those vital signs from their patients is directed by hospital policy, but at the same time, they are also educated and encouraged to use their clinical judgment to determine if more frequent vital signs are needed based on the signs and symptoms they are observing with their patients (Tóth et al., 2020). However, even if a nurse uses their clinical judgment and determines a patient does not need overnight vital signs, they must still follow their hospital policy regarding how frequently vitals are taken and perform overnight vitals anyway (Tóth et al., 2020).

Research

Due to the fact that nurses are duty-bound to complete vital sign assessments at the frequency deemed appropriate by their hospital, it should now be a priority to further study the current risk stratification software in place at hospitals to see how they can be modified to also identify low-risk patients. The accuracy of such computer software systems in correctly identifying patients as low-risk is, of course, paramount for patient safety. Not only that, but it would be important to evaluate the settings in which this type of technology would be most beneficial compared to settings where it should likely be avoided, such as intensive care units. It would also be a

priority to study the effects of forgoing overnight vital signs on stable patients to see if the benefits to patients outweigh the potential risks.

Conclusion

As lifelong learners, nurses must be committed to incorporating the changes to best practice into their work that come about from the type of research mentioned above. The QSEN competency of quality improvement helps nurses to recognize that they are not passive participants in implementing best practices, but that they can act as agents of change in their places of work by helping to create solutions to problems that they identify (QSEN Institutional Affiliation, 2022). Because nurses spend more time with patients than other healthcare professionals, they are uniquely positioned to identify problems in the healthcare system that others may not notice. Nurses recognize how the care that they provide to patients can greatly affect their health outcomes. Therefore, the QSEN Institute encourages nurses to consistently strive to find ways to improve upon the care that they provide to patients and can do so by creating small tests of change within their practice (QSEN Institutional Affiliation, 2022).

Here, the test of change specifically discussed has been that of reducing the frequency of overnight vital signs for stable patients. Whereas there has been a great deal of research done to develop computer systems to aid healthcare workers in identifying high-risk patients who require close monitoring, little research has been done to help identify low-risk patients who might actually benefit from a reduction in sleep disturbances due to vital signs (Tóth et al., 2020).

Waking patients to take vital signs is one of the most common causes of sleep disturbance in the hospital (Tóth et al., 2020). It is also well-known that poor sleep in hospitals can exacerbate patient conditions and can cause a variety of side effects such as delirium, a weakened immune system and increases in stress and blood pressure (Tóth et al., 2020). Not only

do the sleep disturbances from vital sign assessments cause unwanted side effects to patients, but they can also take up a great deal of time during a nurse's shift when this time could be better spent by more closely monitoring unstable patients (Tóth et al., 2020). In all, implementing a computer software system to identify stable patients who would benefit from forgoing vital signs is a quality improvement project worth investing in as it has the potential to improve patients' recovery process and allow nurses to allocate their time to more acutely ill patients who need closer monitoring.

References

Tóth, V., Meytlis, M., Barnaby, D. P., Bock, K. R., Oppenheim, M. I., Al-Abed, Y., McGinn, T., Davidson, K. W., Becker, L. B., Hirsch, J. S., & Zanos, T. P. (2020). Let sleeping patients lie, avoiding unnecessary overnight vitals monitoring using a clinically based deep-learning model. *NPJ Digital Medicine*, 3(1), 149. <https://doi.org/10.1038/s41746-020-00355-7>

QSEN Institutional Affiliation. (2022). *QSEN institute competencies*. QSEN.

Retrieved September 10, 2024 from, <https://www.qsen.org/competencies-pre-licensure-ksas>