

# Promoting the Use of Continuous Vital Signs Monitoring (CVSM) Technology for Early Recognition of Clinical Deterioration in Non-Intensive Care Unit (ICU) Adult Hospitalized Patients

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To address modern healthcare challenges, advancements and acquisition of technology occur at a rapid pace. One technology which expanded rapidly during the COVID-19 pandemic was the use of continuous vital signs monitoring (CVSM). CVSM was designed to facilitate nursing practice by providing a constant evaluation of physiological patient data and alerting clinicians if vital signs exceeded preset parameters. CVSM technology, especially with non-ICU adult hospitalized patients, provides nurses with crucial information to improve decision-making in cases of clinical deterioration. However, if the nurses do not accept and use the CVSM technology all potential benefits are lost.

This evidence-based quality improvement project was conducted on a 21-bed adult non-telemetry medical/surgical unit within a large academic medical center in Cleveland, OH. The location was

selected because a CVSM system had been rapidly installed at the onset of the pandemic with limited support for the acceptance and use of the technology.

## Literature Review

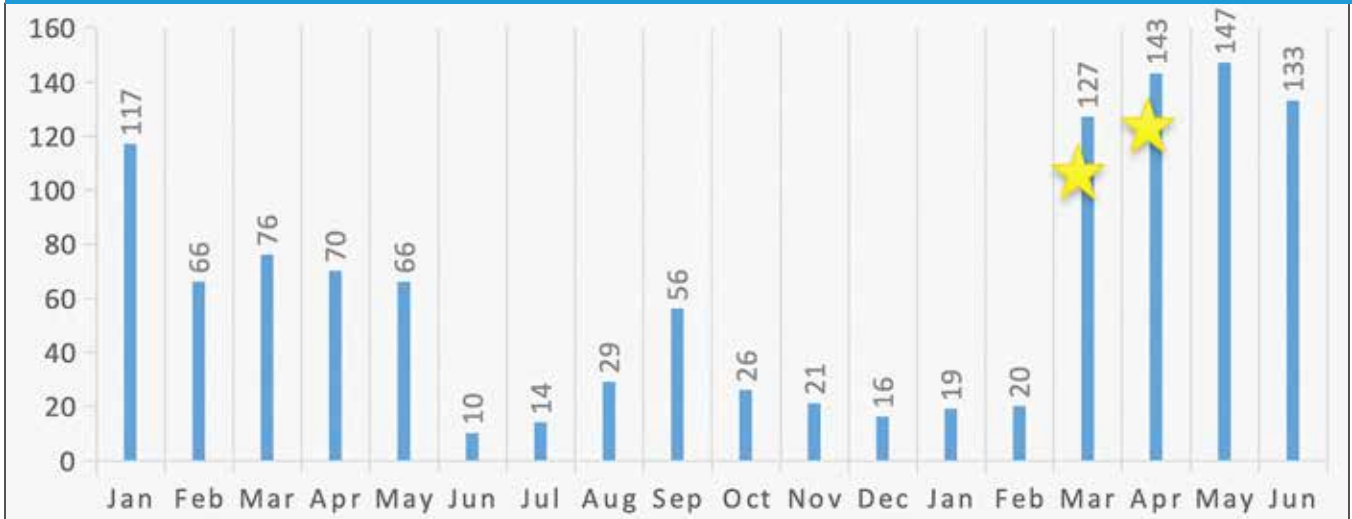
In a systematic review by Downey et al. (2018), data on CVSM as a method to improve clinical outcomes has been mixed. However, CVSM that measured more than one parameter had positive benefits over intermittent vital sign monitoring in certain clinical conditions such as during an acute stroke. Some studies noted patients had decreased risk of mortality, intensive care unit transfers, Rapid Response Team (RRT) activation and hospital length of stay when CVSM was utilized (Sun et al., 2020; Verrillo et al., 2019). Other studies have demonstrated CVSM may contribute to improved patient mobility and patient safety (Hernandez-Silveria et al., 2015) and a reduction in length of stay (Downey et

al., 2018; Stellpflug et al., 2021). Stellpflug and colleagues also noted that patient deterioration events were recognized and treated sooner as a result of CVSM, and RRT activations decreased.

The data on nonclinical outcomes, which related to cost effectiveness, alarm burden, patient and nurses' perceptions were more consistently favorable. In the systematic review by Downey et al. (2018), five of the twelve studies examining nonclinical outcomes reported that CVSM held the potential to improve decision-making and nurses valued CVSM when they were trained and confident in using the technology. The authors concluded that the clinical and nonclinical efficacy of CVSM was contingent on the degree to which nurses were engaged with the technology. Reduction of nursing workload (Weenk, et al., 2020) and enhanced decision-making (Stellpflug et al., 2021) have also been identified as benefits of CVSM. Collectively, CVSM offers a platform for nurses to increase their knowledge about their patients, make better and more timely decisions, and take action to prevent patient deterioration (Kooij et al., 2022).

## Project Description

The purpose of this project was to promote safe, equitable, patient-centered care through the implementation, acceptance and use of a CVSM system to assist in early recognition of clinical deterioration in non-ICU adult hospitalized pa-

**Figure 1 .** Number of Patients Admitted to CVSM System by Month (January 2022 – June 2023)

Note: Data obtained from Masimo Patient SafetyNet system. Project was implemented in March and April, 2023.

tients. Three interventions were planned: a pre/post survey to evaluate staff perception of CVSM, implementation of a standard CVSM protocol and educational support for the devices and protocol. The education and protocol were then placed on an intranet site for future reference. The proposed standardized protocol was developed from a review of the literature, unit protocols from other entities using CVSM and discussion with organizations external to the health system. The protocol was presented to the unit leadership for input and approval. The final protocol was used to create education in various forms including one-hour classes (including both education on the devices and the protocol) and asynchronous education placed on the hospital's intranet site.

## Project Results

Changes in acceptance and intent for staff to utilize the CVSM system was difficult to determine due to scheduling overlap with CVSM education and the 'pre' survey release. The second objective was to educate nursing staff on the use of the CVSM system for early recognition

of clinical deterioration. This was met with approximately 61% of the staff members (n=46) participating in the formal education classes. Numerous staff members also participated in informal rounds conducted three times per week which included reminders about the protocol and intranet resources. Finally, objective three which was to reduce the number of rapid response initiations and emergent patient transfers to intensive care units was also met.

Prior to implementation of the project the number of patients placed on CVSM per month varied from a high of 117 in January 2022 to a low of 10 in June 2022 while the unit census remained stable. The implementation of the protocol in March 2023 resulted in 127 patients being placed on CVSM that month followed by 143 patients placed on the monitor in April 2023. Monitoring remained high post project implementation with 147 patients in May, 2023 and 133 patients in June being placed on the CVSM system (*see figure 1*).

The primary reason patients were excluded from monitoring was related to mental health conditions (ex: patient

refusing all care not specifically CVSM) and/or behaviors (ex: threat of violence). Other reasons patients were not admitted to the CVSM system included staff members not applying the device on admission, or the supply of disposable sensors was low or not available. Although patients receiving end-of-life care were excluded from monitoring for clinical deterioration, nursing staff preferred to utilize the CVSM system to assist with comfort assessment.

Clinical deterioration was assessed through review of rapid response activations, transfers to ICU, and failure to rescue events. Rapid response activations during the project implementation months were slightly elevated in comparison with the rapid response activations during the same months in 2022. Additionally, there was no significant difference between the number of patients transferred to the ICU, and the percentage of patients who were transferred to the ICU during the same two time periods. There has been no known failure to rescue events on the identified medical/surgical unit from 2022-2024.

## Discussion

Findings from this project were consistent with available literature. Positive benefits of using CVSM over intermittent vitals was reported in two clinical situations. A nurse identified abnormal vital signs on the CVSM monitor and upon further assessment found one patient to be experiencing a metabolic crisis and another patient with a new onset of abnormal cardiac rhythm. In both situations the conditions were recognized, and interventions initiated sooner than they would have if intermittent vital signs were taken. Additionally, patient deterioration was recognized and treated as a result of CVSM. One confused patient frequently removed her oxygen, causing a decrease in her pulse oximetry. By monitoring pulse oximetry in real time, the nurse could keep “eyes on the patient” and intervene as needed. While there was not a significant decrease in rapid response activations and transfers to the ICU during the project implementation, it should be noted that the threshold for the entire hospital’s automatic rapid response trigger system (RADAR) was lowered in March of 2023. The change resulted in an overall hospital spike in rapid response initiations, however the project unit numbers remained consistent.

Nonclinical outcomes identified in the literature were consistent with the

findings from this project. Nurses who utilized the CVSM system verbalized satisfaction and positive impacts on their workload with use of the technology. Nurses who engaged with the system also expressed that the data obtained from the CVSM provided a more accurate real time patient assessment when the nurse was not in the patient’s room. One example cited by night shift staff was feeling confident their patients’ vital signs remained stable while they were sleeping after receiving pain medication.

## Limitations

Although the findings from the project were overwhelmingly positive and consistent with the literature, there were a few limitations that must be noted. One limitation is that the results were specific to one inpatient unit and population in an urban teaching hospital and not generalizable. The automatic rapid response threshold changes may also have influenced the results of the project. Additionally, the project timeline was relatively short, and limited time has passed since project implementation to assess sustained change in practice.

## Recommendations for Future Research and Projects

Additional large scale research studies should be conducted on nursing staff acceptance and use of CVSM technology, as well as the clinical and nonclinical

outcomes associated with use. While the alarms for this project were limited to the central monitoring station, alarm fatigue amongst staff members who utilize CVSM with central monitoring vs. direct clinical notifications should be evaluated. The use of CVSM with patients who are considered end of life for monitoring, symptom management and comfort should also be reviewed. Additional projects incorporating CVSM into early warning scores and the impact on early identification of patient deterioration would be another topic to consider. Finally, the impact of CVSM on situational awareness of RNs, LPNs, nursing assistants, and other healthcare professionals would also be beneficial to both researchers and hospital personnel.

## Conclusion

In conclusion, it is not enough to simply install technology such as CVSM. It is crucial to ensure that bedside nursing staff have input into the technology as it often requires changes in nursing practice. When nurses accept and utilize technology such as CVSM it allows them to be closer to their patients, improve decision-making, and patient outcomes. Results of this project were positive and provide a solid base for future research and projects in the future. ■

### References online:

[myamericannurse.com/?p=409034](https://myamericannurse.com/?p=409034)

# Bylaws Amendments for 2025

**Contributing Author: R. Wynne Simpkins, MS, RN, Bylaws Chair**

The ANA-Ohio Bylaws Committee is accepting proposed amendments to the ANA-Ohio Bylaws through February 2025. All bylaw amendments are required to be completed by early March in order to accommodate the requirement from ANA that we submit any proposed

amendments to their Committee on Bylaws 90 days before we send them to our members. The Bylaws Committee wants to get any proposed amendments out to the membership in June of each year. Thank you for assisting us in meeting our timelines. Please submit any amend-

ments on the form which should be available in the Member’s Only section of the ANA-Ohio website. If you are unable to locate the form, please email me at [wynne.simpkins@gmail.com](mailto:wynne.simpkins@gmail.com) to request the form. ■