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Impact of an Electronic Integrated Monitoring System Upon the Incidence and Duration of Patient Instability on a Step Down Unit

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Purpose
We evaluated the ability of an Integrated Monitoring System (IMS) to improve nurses' ability to both detect cardiorespiratory instability according to Medical Emergency Team (MET) call criteria in patients on a SpO_2 and ECG monitored stepdown unit (SDU) and shorten duration of instability.

Background
Early discharge from ICUs to SDUs has increased, but patients are at risk of developing instability that can be undetected and under-treated in this environment of lower intensity monitoring. Failure to find and treat instability adversely affects outcome. Using an electronic IMS to continuously integrate individual minimally invasive monitoring parameters into a single index value with central station alarm capability may improve nurses' ability to detect, recognize, and attend to instability.

Methods

Prospective, longitudinal study of monitored patients (24 bed trauma SDU) in 3 phases. An IMS (Visensia[TM]) received continuous input from bedside monitors and used 4 vital signs (VS) (HR, RR, BP, SpO_2) to develop a single neural networked value, the Visensia Index (VSI). Phase 1 (P1; 8 wks) VSI was not displayed; patients received standard care; VSI and VS trends were background recorded. Phase 2 VSI was displayed on bedside and central station monitors; staff educated on use. Phase 3 (P3; 8 wks) staff used a clinical algorithm for response to alert of VSI $\geq$3.2. Detection of VS parameter changes meeting MET trigger values defined instability. Data comparisons for P1 to P3 used descriptive, Chi-square and students t-test analyses.

Results

Admissions (326 in P1; 308 in P3) and continuous monitoring hours (18,258 in P1 and 18,314 in P3) were similar. Most patients in both phases were never unstable (P1 always stable n=244 (74.8%); P3 always stable n=245 (79.5%). Similar percentages of patients developed at least one instability event which achieved MET call criteria (MET_{min}) in P1 and P3 (25.2% P1 and 20.5% P3; p=.306). However, the mean duration (minutes) of instability per MET_{min} patient decreased from 113.4min/MET_{min} patient in P1 to 61.5min/MET_{min} patient in P3 (p=.046). The percentage of patients who developed serious and persistent instability which should have resulted in a call to the MET (MET_{full}) was significantly less in Phase 3 (17.8% P1 vs. 5.2% P3; p<.0001). There were fewer missed events where the MET should have been triggered as the ratio of patients with MET_{full} who had a MET activation (MET_{actual}) fell from 1:8.3 in P1 to only 1:1.7 in P3.

Conclusion

Using an IMS improved detection of clinical instability as compared to conventional four channel monitoring in the SDU environment, and also seemed to increase the reliability that a MET was called. Further study will determine the relationship between improved detection and treatment approaches for patients with instability.

Conflict of interest

None