

Supplement to Decision Support Evidence Series whitepaper “Study finds benefits of spot check monitoring with early warning scoring”

Instructions on Use and Distribution

The Decision Support Evidence Series document “Study finds benefits of spot check monitoring with early warning scoring” summarizes background, purpose, methods, and results of the research paper “A controlled trial of electronic automated vital signs monitoring in general hospital wards” (“VITAL care” study). The research paper was peer-reviewed and published in the August 2012 issue (Vol. 40, No. 8) of the medical journal “Critical Care Medicine”.

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- The whitepaper is a promotional piece from Philips and may not be positioned as being published by an objective third party.
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Management Monitors & Measurements, Philips Medical Systems

Study finds benefits of spot check monitoring with early warning scoring¹

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Background

Patients expect the utmost care and vigilance when admitted to a hospital. But studies have shown that preventable, serious adverse events are nonetheless common among hospitalized patients.^{2,3,4,5,6,7}

As one bulwark against avoidable adverse events, clinicians can compare patients' vital signs measurements against standard criteria to identify when a patient's physiological condition is in danger of worsening.

In response, hospitals have made an effort to reduce adverse events through early identification of patients displaying early warning signs of deterioration, and quick initiation of treatment.

To that end, some hospitals have deployed a Rapid Response Team (RRT) also known as Medical Emergency Team (MET) or Critical Care Outreach Team that clinicians can notify when patients show evidence of deterioration based on early warning sign criteria set by the hospital.

Still, studies have shown that clinician notification is a weak link in this system, relying on correct, timely interpretation of accurate measurements and 24-hour vigilance. Any deviation from this ideal can lead to nonactivation or delayed activation of the RRT, which is associated with increased mortality.^{8,9,10,11,12,13,14,15,16,17,18}

Purpose

From August 2009 to June 2010, the authors performed a multi-centre, multi-national, before and after controlled trial. The study paper was peer-reviewed and published in *Critical Care Medicine* in August, 2012 (Volume 40, number 8).

The purpose of the study was to assess if, compared with standard paper-based systems, an automated Early Warning System (EWS) as part of a spot check patient monitor can help to identify patients in acute care settings (outside of the intensive care unit) who may be experiencing physiological instability and who are in need of prompt clinical intervention by an RRT.

Methods

The study looked at 10 hospitals in the United States, Europe, and Australia, consisting of 12 general wards and 349 beds. A total of 18,305 patients were included in the study: 9,617 in the control group (before the intervention) and 8,688 after the intervention.

For the first three months of the study, before the intervention, the investigators collected data on the prevalence of serious adverse events, RRT activation, and patient outcomes among the control group of patients.

Electronic vital signs monitors, Philips IntelliVue MP5SC, were then introduced to the wards. These monitors displayed

the following patient vital signs during nursing spot checks: temperature, blood pressure, heart rate, and pulse oximetry. During the spot checks, the monitors also prompted clinicians to input information on respiratory rate, conscious state, and other optional parameters. See Figure 1.

Based on criteria set by each hospital, the monitors used these measurements to calculate an early warning score for the patient. The MP5SC fully adopted the existing hospital EWS protocols, which were different and individualized for each site. These EWS protocols were already in place during the control phase.

The MP5SC with EWS displayed a color-coded status for the patient on the monitor screen—either “safe range” (white), “observe range” (yellow), “warning range” (orange), or “urgent range” (red). See Figure 2.

The monitors stored measurements for review and documentation, and could display measurement and scoring trends.

During the three-month intervention period, the authors collected the same types of data as during the control period on adverse events, RRT activation, and outcomes.



Figure 1: The flexible MP5SC patient monitor with built-in IntelliVue Guardian EWS can be used in spot-check as well as continuous monitoring mode.

Results

The trial found that using the MP5SC with EWS resulted in a significant time reduction for completing acquisition of vital signs, clinical observations and calculating the Early Warning Scores required by the hospital's EWS protocol.

Clinicians reported that the MP5SC with EWS was easy to use and helped them easily measure, evaluate, and document their patients' vital signs and EWS scores.

Conclusions

The multi-center study found that the introduction of Philips IntelliVue MP5SC reduced the time it took for clinicians to obtain and record vital signs, as well as to calculate Early Warning Scores.

The trial found the addition of the MP5SC with EWS to the hospitals' existing protocol was associated with a 6.3 percent increase in survival rate at the end of the RRT call among patients who received such a call. For the same patients, survival to hospital discharge or 90 days-survival also showed a significant improvement. It also altered the

proportion of RRT calls initiated because of respiratory criteria, an important early warning sign for deteriorating condition.

All of the study sites had individualized EWS and call escalation protocols in place before and during the control phase, indicating that the MP5SC with EWS can improve even an already established manual EWS process.

Overall, the study's findings point to automated monitoring as a way to increase the safety and improve the outcomes of patients in a hospital's general wards.

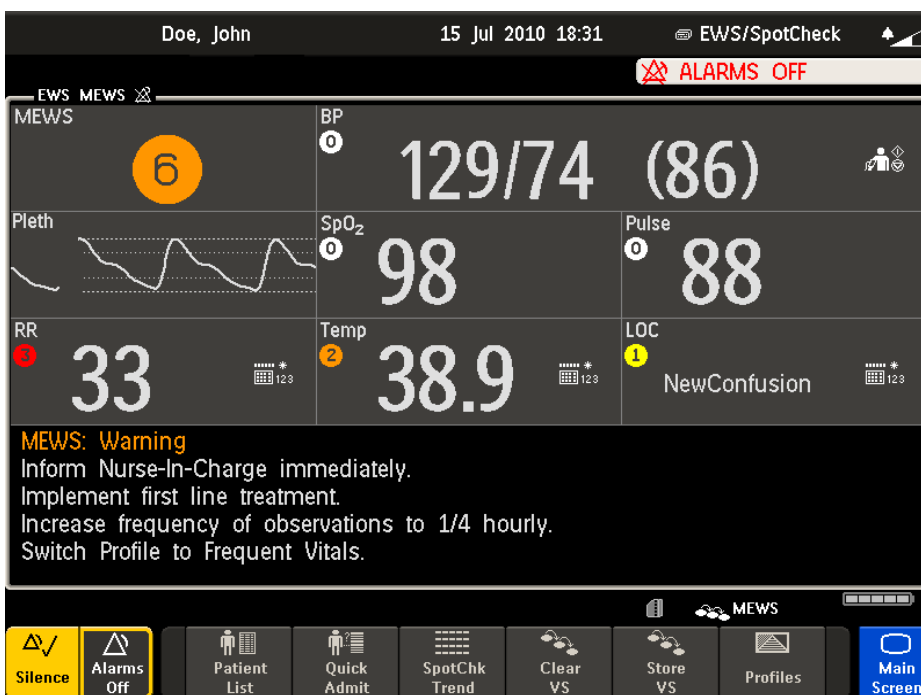


Figure 2:

Screen display illustrating the function of the MP5SC monitor. In this display, the patient has abnormal respiratory rate (RR), temperature and level of consciousness (LOC) identified by colored circles (sub-scores). The monitor also calculates the MEWS score (6) and displays the recommended actions according to the institution's EWS protocol. EWS, early warning score; MEWS, Modified Early Warning Score; NBP, noninvasive blood pressure; Pleth, pulse oximetry plethysmography.

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Descriptors of monitoring and process of care in relation to all rapid response team calls*

Descriptor	Control	Intervention	p
Rapid response team dose (calls / 1000 admissions)	21.3/1,000	24.1/1,000	0.21
Age	68.0 (16.7)	69.4 (16.0)	0.39
Male	106 (53%)	106 (52%)	0.75
Number of vitals sets 24hr before call	5.2 (3.5)	5.7 (4.1)	0.19
Number of vitals sets 48hr before call	9.9 (6.4)	10.2 (6.8)	0.68
Number of abnormal vital signs at the time of rapid response team call	4 [2-6]	3 [1-5]	0.029
Emergency admission to intensive care unit	55 (27%)	61 (29%)	0.64
Transfer to higher acuity ward	75 (41%)	96 (49%)	0.13
Do-not-attempt-resuscitation orders before call	19 (11%)	24 (12%)	0.68
Do-not-attempt-resuscitation orders after call	19 (11%)	33 (17%)	0.10
Surgical emergency admission	49 (25%)	52 (25%)	0.96
Surgical elective admission	35 (18%)	28 (14%)	0.24
Medical emergency admission	110 (56%)	125 (61%)	0.35
Medical elective admission	2 (1%)	0 (0%)	0.24
Triggered by respiratory signs	37 (21%)	61 (31%)	0.029
Triggered by hypotension	32 (18%)	35 (18%)	0.92
Triggered by neurological change	14 (8%)	10 (5%)	0.26
Triggered by arrhythmia	22 (12%)	29 (15%)	0.53
Triggered by staff concern	23 (13%)	17 (9%)	0.17
Triggered by other factors	17 (10%)	24 (12%)	0.44
Triggered by multiple factors	32 (18%)	22 (11%)	0.06

Table 1

RRT, rapid response team

The time between documented presence of an institutionally sanctioned calling criterion and actual RRT attendance is expressed as mean with range; Vitals = vital signs (respiratory rate, heart rate, blood pressure, temperature, pulse oximetry, conscious state); DNR = do not attempt resuscitation; Elective = planned admission; Emergency = unplanned hospital admission. End of RRT intervention = the time when the RRT left the patient's bedside.

* Data for individual hospitals is presented in a Tables Appendix 2, Bellomo R, Ackerman M, Bailey M, et al. A controlled trial of electronic automated advisory vital signs monitoring in general hospital wards. *Crit Care Med.* 2012;40(8):2349-2361.

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