

The inclusion of pulse oximetry as a component of an early warning score following a cardiac arrest call or unplanned Intensive Care Unit (ICU) admission

Audit team: S Owen, S Clark, P Alexander

Contact: Sarah.owen@uhsm.nhs.uk

Period of data collection: 9th January 2008 – 9th April 2008



Background: It is well recognised that ward based early warning score systems can be used to predict outcome. In 2007 the UK's National Institute for Health and Clinical Excellence (NICE) recommended that physiological scoring systems should include the following variables: heart rate (HR), systolic blood pressure (BP), respiratory rate (RR), temperature (T), assessment of consciousness level (Alert, Verbal response, Pain response, Unresponsive – AVPU) and oxygen saturation (SpO₂).

Aims: The aim of the audit was to:

- Assess several published scoring systems against our existing Modified Early Warning Score (MEWS) which includes HR, BP, T, RR, AVPU and urine output.
- Assess whether including an oxygen saturation score to UHSMs track and trigger system improves its ability to predict mortality following a cardiac arrest call or an unplanned ICU admission.

Data collection: For a period of 3 months (January to April 2008) physiological data were collected for all unplanned ICU admissions and cardiac arrest calls in our institution. Up to 24 hours of physiological parameters prior to the event and the documented MEWS were taken from ward observation charts and collated on a database. The maximum pre-event value for each patient was then compared to corrected MEWS (recalculated from documented physiology), PMEWS (HR, BP, RR, T, AVPU, SpO₂), NMEWS (HR, BP, RR, T, AVPU, SpO₂, FiO₂) and SEWS (HR, BP, RR, T, AVPU, SpO₂, UO).

Analysis: Results are reported as median (IQR) and P values from Mann Whitney test. Receiver Operating Characteristic (ROC) curve areas were different among the scoring systems with the best prediction being those containing a SpO₂ score.

Findings: Hospital discharge data were available on 86 patients (overall mortality 45.3%) with 44 cardiac arrest calls (mortality 54.5%) and 42 unplanned ICU admissions (mortality 38.5%). Results are shown in the table below.

	Alive	Death	P	ROC Area	95% CI
Documented MEWS	4 (2-6)	4.5 (2-8)	0.094	0.62	0.49 to 0.74
Corrected MEWS	3 (1-5)	4 (2-6)	0.175	0.60	0.46 to 0.73
PMEWS	3 (2-6)	6 (3-7.5)	0.003	0.71	0.59 to 0.83
NMEWS	5 (2-7)	6.5 (4-9)	0.022	0.66	0.53 to 0.79
SEWS	3 (1-4.5)	5 (2.5-7)	0.008	0.69	0.56 to 0.81

Data suggested that the addition of SpO₂ to early warning score systems improve their ability to predict hospital discharge mortality following a cardiac arrest call or unplanned ICU admission. Further work is ongoing regarding defining appropriate weightings for each sub-group.

After completion in April, this piece of work was taken to the European society of intensive care conference in Lisbon, Portugal. This audit has been presented at the NICE steering group and several clinical governance meetings where it has been well received. It is expected that early next year (2009) the PMEWS will be piloted on a couple of the chest wards and will be expected to be Trust wide by the end of the year.