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Identifying High Risk Patients on the Ward

Author

David R Goldhill, *MA, MBBS, MD, FRCA,*

EDIC, Anaesthetic Department,

Royal National Orthopaedic Hospital

Stanmore, UK

david.goldhill@rnoh.nhs.uk

Hospital wards may contain patients who are, or may become, critically ill. They can usually be identified by abnormal physiological values. Early intervention may be beneficial.

The intensive care unit (ICU) is only one place in which critically ill patients receive care. Events before and after ICU admission are relevant to the outcome of these patients. In a group of British hospitals, patients admitted to ICU from hospital wards had a 53% mortality (Goldhill and Sumner 1998) and the longer patients were in hospital before ICU admission the higher their mortality (Goldhill et al. 2004). Patients who died after being admitted to ICU from the wards were in hospital a median of 3 days before ICU admission. Some 22% of admissions from the ward received cardiopulmonary resuscitation before ICU. These patients had a 79% mortality and constituted 33% of the deaths of ICU admissions from the wards (Goldhill et al. 2004). Furthermore 27% of deaths took place after the patients had survived their first ICU admission to be discharged back to the wards (Goldhill and Sumner 1998). This particularly applied to relatively 'low risk' patients, those with a predicted mortality by APACHE II (Knaus et al. 1985) of less than 20%. Patients on the wards are accessible and there is often time to intervene. If intensive care outcome is to improve, events on hospital wards, before and after ICU admission, must be addressed.

Typically only 2% to 4% of hospital beds are in ICUs or High Dependency Units (HDU). The total number of acute hospital beds has fallen over the last 20 years (Capewell 1996; Hensher and Edwards 1999). Ward patients tend to be sicker (Sparkes et al. 2004), doctors may have poor knowledge of critical illness (Cook and Smith 2004; Smith and Poplett 2002), there aren't enough trained nurses (Finlayson et al. 2002) and shorter working weeks disrupt continuity of care. Experience suggests that critically ill patients on wards may be unrecognised or unable to gain admission to a critical care unit at the appropriate moment.

Intensive care scoring systems predicting hospital mortality, such as APACHE II (Knaus et al. 1985), are based primarily upon deranged physiological values. Several studies demonstrate that abnormal physiological values are commonly recorded in the charts of ward patients in the hours preceding cardiorespiratory arrest, unanticipated ICU admission or death (Buist et al. 1999; Chaplik and Neafsey 1998; Franklin and Mathew 1994; Goldhill et al. 19991&2; Hillman et al. 2001; Hodgetts et al. 2002; Kause et al. 2004; Rich 1999; Sax and Charlson 1987; Schein et al. 1990; Smith and Wood 1998).

In Australia medical emergency teams (METs) (Lee et al. 1995) have been shown to decrease the numbers of cardiac arrests and hospital deaths (Bellomo et al. 2003; Bellomo et al. 2004; Buist et al. 2002) MET call-out criteria are based upon markedly deranged physiological values as well as concern by ward staff (table 1).

The use of physiological values in the form of an early warning score (EWS) to identify at-risk ward patients was first described by Morgan (Morgan et al. 1997). There are many different formats but they follow a similar theme, awarding points for varying degrees of derangement of different physiological systems (Goldhill 2001). The higher the total score the more 'at risk' the patient. The EWS used at the Royal London Hospital (PAR score) is shown in table 2.

To date EWSs have been devised using clinical acumen and common sense. They have yet to be scientifically validated as predictors of preventable adverse outcomes. The score generated depends crucially on the definition of normal physiological values and how much importance the score's creators have attached to the derangements of each of the physiological parameters measured.

Using the definition of normality from the PAR score a point prevalence study was undertaken of all inpatients outside the ICU on a single day at a University hospital in London. Some 11% had three or more physiological abnormalities and a 30-day hospital mortality of 21.3% (Goldhill and McNarry 2004). A further 20% had two abnormalities and their 30-day mortality was 9.2%. There was only one death within 30 days among patients with no recorded abnormalities, and this death occurred 21 days after the measurement day. The same study reported that patients cared for in a ward area that was judged inadequate for their needs had an increased mortality.

Data from 1047 patients seen by an intensive care outreach service showed that the number of physiological abnormalities was associated with hospital mortality, and an increasing PAR score was associated with decisions to admit to a critical care area, limit treatment and also with hospital mortality (Goldhill 2005). Multiple logistic regression analysis looking at the contribution of the seven physiological variables showed that all, except temperature, contributed to the decision to admit to critical care or limit treatment, and all, except temperature and heart rate, contributed to a prediction of hospital mortality. Graphing physiological values against hospital mortality suggested that extremes of all seven variables were associated with increased hospital mortality.

There is evidence to suggest that early intervention may improve the outcome of critically ill patients (Ball et al. 2003; Bennett 2002; Goldhill et al. 19993; Priestley et al. 2004; Rivers et al. 2001; Story et al. 2004). The implementation of a system to ensure regular, accurate measurement and recording of physiological values at the bedside should be possible. We would suggest that this is an essential part of any hospital-wide system to identify and manage high-risk ward patients.

Conclusion

Patients who are, or may become critically ill, are to be found on hospital wards. They have a high mortality and commonly deteriorate to the point of cardiorespiratory arrest before ICU admission. Early intervention may be beneficial and there is opportunity to intervene as these patients are often in hospital for days or weeks before ICU admission or death. Many of these patients can be recognised by their abnormal physiological values. An early warning system based upon physiological measurement has the potential to identify and track these patients.

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