Commentary

Recently published papers: Take your predictions with a drop of saline … and breathe deeply before turning on your phone

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Abstract

Early recognition of sick patients with a poor prognosis, and the rapid institution of appropriate therapy are tenets of good medical management across all specialties. Here we highlight five recent papers that aid us in achieving such goals in and around the intensive care unit (ICU). Both score-generating clinical tools and clinical acumen are championed for identifying the sick, while appropriate, early intervention in acute deterioration is shown to be beneficial, before and after ICU admission. Saline or albumen for resuscitation? The answer became clearer in May, as did what to do about all those mobile phones…

Keywords artificial respiration, cellular phone, predictive value of tests, resuscitation, risk assessment, risk factors, severity of illness index

He that would know what shall be
must consider what has been.

Thomas Fuller, MD, *Gnomologia* (1732)

Scoring systems are beloved by some intensivists. They can provide a means by which patients may be compared between facilities, therefore enabling sensible trials to be conducted. They may also play a role in directing treatment plans for patients. However, the Holy Grail for many enthusiasts remains their potential use as prognostic tools among the critically ill in an attempt to predict the future. One would hope that clinical acumen also plays a role in determining treatment and the study by Rocker and coworkers [1] is somewhat reassuring in this respect. That prospective study, which included some 851 mechanically ventilated patients, was performed to evaluate the predictive ability of, and outcomes associated with, daily clinician estimates of a probability of intensive care unit (ICU) survival under 10%. The usual baseline characteristics were recorded, together with daily Acute Physiology and Chornic Health Evaluation II score and Multiple Organ Dysfunction Score. After morning ward rounds the attending physician and each bedside nurse were asked to predict the clinical probability of ICU survival as one of the following: under 10%, 10–40%, 41–60%, 61–90%, or over 90%.

Just over 35% of the cohort died on the ICU. Of those patients deemed to have a greater than 10% chance of surviving ICU, 87.8% survived. Of those with an expected survival chance of under 10%, 29% did actually survive their ICU stay, although no data are given regarding whether they survived their hospital stay. The physicians tended to have a bleaker outlook than the nursing staff, but when both observations were combined this was, unsurprisingly, a more powerful predictor. Indeed, the clinical prediction was more powerful than illness severity, use of inotropes and vasopressors, or organ dysfunction. However, the group thought to have a poor outlook was also more likely to have some form of life support withdrawn. Therefore, it appears from this study that clinical assessments of prognosis remain strongly influential in determining outcome.

A study conducted by Ewig and coworkers [2] takes prediction a step further (or back?) onto the medical wards. In a 3-year prospective study of 696 sequential patients

CURB = Confusion, Urea, Respiratory rate, Blood pressure; ICU = intensive care unit; MET = medical emergency team; NIV = non-invasive ventilation.

(after exclusions) with community-acquired pneumonia, several tools for assessment of severity and prediction of mortality were validated. These included the original and modified American Thoracic Society guidelines, the original and modified British Thoracic Society guidelines, the Pneumonia Severity Index and the less cumbersome CURB (Confusion, Urea, Respiratory rate, Blood pressure) index based on recent studies reported by Lim and coworkers [3,4].

The modified American Thoracic Society guidelines were superior to the other tools in predicting the severity of community-acquired pneumonia, as judged by need for ICU care. Fulfilling two out of three minor criteria (systolic blood pressure <90 mmHg; multilobar [>2 lobes] involvement; and arterial O_2 tension [in mmHg]/fractional inspired O_2 ratio <250) or one of two major criteria (requirement for mechanical ventilation; and septic shock) gave positive and negative predictive values for ICU admission of 87% and 94%, respectively. However, prediction of mortality was better with either the Pneumonia Severity Index or CURB index. The simple CURB score (1 point for each of confusion of acute onset; serum urea >7 mmol/l, respiratory rate ≥30 breaths/min; and diastolic blood pressure ≤ 60 mmHg or systolic blood pressure <90 mmHg) was found to be a very quick and useful method for rapidly assessing the risk for dying. Scores of 0, 1–2 and 3–4 were associated with mortality rates of 3%, 21% and 56%, respectively. This may well prove to be a useful ward/emergency room tool, but even the very best predictive tool is just a guide.

Leading on from these studies, the paper by Bellomo and coworkers [5] appreciates that part of the role of the ICU is to prevent patients deteriorating before ICU admission or indeed preventing admission. This approach has attracted much attention of late, and Bellomo and coworkers performed a prospective controlled trial in order to assess whether the introduction of a medical emergency team (MET; slightly confusing for the exercise physiologists among us!) may reduce adverse outcomes following surgery. In this setting, the MET consisted of the duty intensive care fellow and a designated ICU nurse. Specialist availability was provided on site for 12 hours but was also available after hours if needed. Any member of the hospital clinical staff could activate the MET team (including social workers), and the average response time was a phenomenal 1.7 min. This figure we find particularly astounding, and reflects Australia's resurgence as a sporting nation. Of particular interest are the criteria for initiation of the MET team. In an era in which increasingly complicated scoring systems are being employed to identify those 'at risk', the authors must be applauded for using straightforward parameters that focus on drastic acute changes but also include the sensible caveat that a staff member is worried about a patient. Once again experience is the key.

So what of the MET? The results reported are impressive. The introduction of the MET resulted in a relative risk reduction for adverse outcomes of 57.8%. The most striking reductions were in renal failure requiring renal replacement (relative risk reduction 88.5%), respiratory failure (79.1%) and severe sepsis (74.3%). Somewhat surprisingly, there was also a dramatic reduction in the risk for acute stroke. Unsurprisingly, this all translated into reductions in the number of postoperative deaths and in the length of stay. The authors themselves outlined the flaws in this study, some of which are almost impossible to circumvent. The study was not double blinded, placebo controlled, or randomized. Also, considerable effort was made to educate those on the wards with respect to the criteria needed to activate the MET, which might have raised awareness on the wards. Also, it is common that in one's daily practice on the ICU one is called to review patients on the wards in a more informal 'MET-like' arrangement. It is not clear whether such arrangements were in hand previously, but we assume so. These criticisms should not detract from the findings, although we would be interested to see whether the improvements are sustained. The power of these results is that they perhaps illustrate that the speed by which a patient is reviewed by individuals equipped to deal with any physiological deterioration may dictate the eventual outcome. Now, if we could just get some more juniors and get rid of the European working time directive …

The theme of early intervention in deteriorating patients was continued in a study conducted by Esteban and coworkers [6]. That prospective, randomized, multicentre trial of 221 patients compared non-invasive ventilation (NIV) for respiratory failure, within 48 hours of elective extubation, versus standard medical therapy. Those investigators demonstrated that not only did NIV fail to prevent the need for reintubation, but that it also delayed reintubation and resulted in increased mortality. Reintubation rates were 48% in both groups (relative risk 0.99, 95% confidence interval 0.76–1.30). Median time to reintubation was 12 hours for the NIV group, as compared with 2.5 hours for the standard therapy group ($P = 0.02$), and most importantly mortality almost doubled in the NIV group (25% versus 14%; relative risk 1.78, 95% confidence interval 1.03–3.20; $P = 0.048$). The bulk of the deaths in the NIV group occurred in those who required reintubation (21 out of 28 deaths), suggesting that the delay in reintubation in this group may account for these findings. The moral of this study may be that if you are thinking of reintubation, then get on with it. It seems that things only get worse with time, and biting the bullet early helps to limit the risks.

The choice of resuscitation fluid for those patients the athletic Australians cannot keep off the ICU was made a little easier in May, thanks to the SAFE (Saline versus Albumin Fluid Evaluation) study group [7]. In the largest multicentre, double blind, randomized controlled trial on this issue to date, 7000 patients were assigned to receive either 0.9% saline or 4% albumin solution for fluid resuscitation during their first 28 days on the ICU. Contrary to the original Cochrane meta-

analysis that sparked the whole debate on this issue, those investigators found no difference in 28-day mortality between patients resuscitated with saline and those with albumin. No significant differences were identifiable in the rate of new single or multiorgan failure (assessed using Sequential Organ Failure Assessment score), in the number of days spent on the ICU, or hospital stay. There were also no differences in the time spent on mechanical ventilation or in the duration of renal replacement therapy between the two treatment groups. The study was pragmatically planned, dictating only the fluid resuscitation of the patients, leaving clinicians free to manage all other aspects of the patients' care as they saw fit. This freedom was controlled by stratification of randomization such that individual units treated equal numbers of patients in each group. Preplanned subgroup analysis suggested a benefit from albumin in septic patients, which was balanced by a detrimental effect in trauma patients with significant head injury. However, as the authors highlighted, further studies should look into such specific groups before any changes are introduced. With either fluid being shown to be equally safe and effective, the initial choice (for the moment at least) would seem to be down to the clinician (managers?) involved.

Finally, although British Telecom in the UK spent much money several years ago telling those of us on this small island that it is 'good to talk', it appears that this may not be true in the immediate vicinity of a ventilated patient, at least on the telephone. Shaw and coworkers [8] demonstrated that some urban myths might be true; 50% of ventilators they tested malfunctioned when in close (<30 cm) proximity to a transmitting mobile phone. Thankfully, only one model stopped completely. With the ever-increasing prevalence of wireless technology (computer networks, personal digital assistants, phones, pagers and radios, among other devices), better shielding by the manufacturers of ICU equipment from electromagnetic interference would seem prudent. The manufacturers of the machine that stopped completely have already introduced hardware and software upgrades that remedy the problem. However, in the meantime, perhaps we should keep mobile phones and ventilators at a safe distance, or at least keep the conversation short.

Competing interests

None declared.

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