Intensive Care Med (2016) 42:426–428
DOI 10.1007/s00134-015-4194-2

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Is this critically ill patient going to survive?

Received: 10 December 2015
Accepted: 13 December 2015
Published online: 11 January 2016

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Is this question important? The immediate response is 'of course', because survival is important. However, the real underlying question is "Why is it important to predict outcome?" And the answer to this question is much less straightforward. Does it make a difference knowing whether or not a person is predicted to survive an acute illness, traumatic event or disease process? If they are predicted to survive, this knowledge is unlikely to have any real impact for us as physicians or for the patient; it will not alter the way in which the patient is managed. However, knowing that a patient is going to succumb may have serious implications, potentially altering our approach to treatment, negatively affecting staff morale, and influencing how we speak to relatives and other members of the ICU team.

So, how should we answer this question, which is often (repeatedly) posed by relatives and/or other members of the care team? When considering these issues, it is important to remember that we are dealing with probabilities: what are the chances that this patient will survive? If the likelihood of survival is only 5 %, it means that out of 100 patients in exactly the same condition, just five will survive. If we are talking about your loved one, you may well feel these odds are worth taking and want to give him/her this 5 % chance. Perhaps as physicians, we may also judge this 5 % chance one worth taking, although we may be more likely to continue our efforts for a young polytrauma patient than for an elderly patient with known dementia. Knowing what the probabilities are for different situations can certainly be helpful when trying to explain the situation to relatives and colleagues, but the physician's knowledge of the individual patient in question must be used to interpret the probability.

In fact, a patient's outcome is determined by three elements: the severity of the acute disease is important but so are the underlying physiological reserve (including age and comorbidities) and the effectiveness of therapy (Fig. 1). Indeed, any abnormality in physiological status is associated with a higher risk of death: fever or hypothermia, profound bradycardia or tachycardia, hypo- or hypernatremia, increased creatinine, bilirubin, or liver enzymes, or a low platelet count are just a few examples. Even hyperglycemia is associated with worse outcomes [1]. It is, therefore, not surprising that the systemic inflammatory response syndrome (SIRS) criteria are associated with increased mortality rates. Indeed, this fact has been taken as an argument to support the usefulness of the SIRS criteria as a definition for sepsis [2], but this approach is not valid [3]. Simple physiological abnormalities formed the basis for the development of severity scores, such as the Acute Physiology and Chronic Health Evaluation (APACHE) or Simplified Acute Physiology Score (SAPS), in which an aggregate/sum of abnormalities is related to the chances of surviving the hospital stay. Indeed, surviving the ICU stay only to die on the general floor cannot really be considered a success. One may even argue that surviving the hospital stay only to live for a short period with a poor quality of life in a nursing home could not really be considered a success either, but there

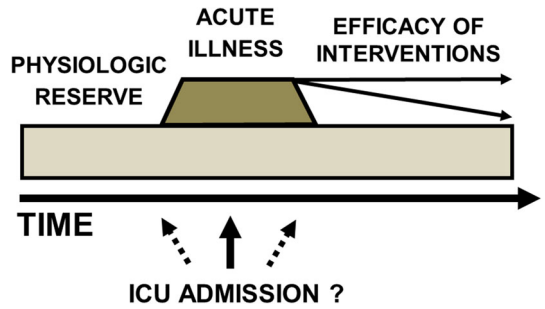

Fig. 1 The determinants of ICU outcome

has to be some time limit for outcome prediction and, pragmatically, follow-up at hospital discharge is easier than follow-up at a later time point. The Sequential Organ Failure Assessment (SOFA) score, which was developed more to quantify the degree of organ dysfunction than to predict outcome, may, nevertheless, predict outcome better than the aforementioned outcome prediction scores [4].

Numerous efforts have been made to improve severity scores by introducing more sophisticated techniques (e.g., APACHE III, IV, SAPS III, etc.). We are not convinced that this exercise is rewarding, because no system will ever be perfect, largely because of the complexity of the intensive care unit population, which raises problems when trying to calibrate for specific diseases and specific groups of patients. Personal preferences regarding end-of-life issues also influence the validity of such scores.

Another possible way to predict outcome is to consider the type of support that a patient requires. A patient receiving mechanical ventilation plus extracorporeal membrane oxygenation (ECMO) plus renal replacement therapy (RRT) plus a norepinephrine infusion clearly has less chance of surviving than a patient with a similar condition but who does not require any organ support; we do not need a complex scoring system to tell us this! The Therapeutic Intervention Scoring System (TISS) is based on this approach, using the type of support that the patient requires [5]. It is important to remember that sedation can confound outcome prediction: a patient still under the influence of anesthesia and sedation after major surgery may well require mechanical ventilation, but the impact of this organ support on outcome is unlikely to be the same as in a patient requiring mechanical ventilation for acute respiratory failure.

So, is it important to calculate and use these prediction scores? For research purposes they are, of course, useful to help define and characterize populations and cohorts. The SOFA score may also be considered when a catastrophic event (natural disaster, pandemic, major accident, etc.) results in rapid saturation of available resources and equipment so that some form of triaging is necessary to ensure that treatments are reserved for those most likely to benefit [6]. But, outside these specific situations, we do not think prediction scores have any real implications for everyday patient management and do not measure any of these scores routinely in our department of intensive care, except for research purposes. More than 20 years ago, Atkinson et al. [7] published the results of a study in which they used a modified APACHE II score and an algorithm to make daily predictions of individual outcome. In a series of 3600 patients, 137 patients were predicted to die; of these, 131 (96 %) had died within 90 days of discharge from hospital, yielding quite a low sensitivity (23.4 %) but a very high specificity (99.8 %) and a false-positive rate of 4.4 %. Because the patients who were predicted to die stayed for a total of 1492 days in the ICU, application of such a system could potentially reduce costs. The authors concluded that, if used prospectively, this system could be used to identify the futility of continued intensive care, but that this would come at a cost of one in 20 patients who would have survived if ICU care were continued. Such an approach has not really been adopted. In practical terms, the system used by Atkinson presented different colors on the computer screen to indicate different predicted outcomes, with the worst outcome being represented by a coffin flashing on the screen if the patient was predicted to die within 90 days! Employing such a system would certainly have a negative effect on staff morale and may impact on patient management. Another concern is that individual preferences, increasingly supported in recent years, are not taken into account.

Next time we hear the question “Is this critically ill patient going to survive?”, we should remember that the severity scores used to predict outcomes were developed for *groups* of patients, and they should be applied with extreme caution to *individuals*. Scores can provide guidance, but must be integrated with individual choices. Moreover, survival per se should not be our only aim, rather survival with a good quality of life, or at least a quality of life that matches the patient’s preferences.

Compliance with ethical standards

Conflicts of interest None.

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