

Commentary

Gastrointestinal dysfunction in the critically ill: can we measure it?

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Published: 24 September 2008

This article is online at <http://ccforum.com/content/12/5/180>

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Critical Care 2008, **12**:180 (doi:10.1186/cc7001)

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Abstract

Gastrointestinal dysfunction is an intuitively important, yet descriptively elusive component of the multiple organ dysfunction syndrome. Reintam and colleagues have attempted to quantify this dimension using a combination of intolerance of enteral feeding, and the development of intra-abdominal hypertension. While they show that both parameters are associated with an increased risk of death (and therefore that, in combination, the risk of death is even greater), they fall short in developing a novel descriptor of gastrointestinal dysfunction. Nonetheless, and even with its shortcomings, their effort is a welcome contribution to the surprisingly complex process of describing the morbidity of critical illness.

In the previous issue of *Critical Care*, Reintam and colleagues [1] report a novel scale for measuring gastrointestinal dysfunction, using as descriptors, feeding intolerance and intra-abdominal hypertension. They demonstrate convincingly that their Gastrointestinal Failure Score correlates in a graded manner with mortality, and adds prognostic power to the Sepsis-related Organ Failure Assessment (SOFA) score. But while the use of intra-abdominal hypertension as a measure of gastrointestinal dysfunction is novel, and reflects morbidity that was underappreciated 10 years ago, their scale falls short in providing a comprehensive measure of gastrointestinal dysfunction in critical illness.

The concept that the morbidity of critical illness arises through the development of potentially reversible physiologic failure of multiple organ systems was first articulated by Arthur Baue more than 30 years ago [2]. It was further refined by the ACCP/SCCM consensus conference of 1991, which suggested that the process involved graded degrees of organ system dysfunction, and proposed the terminology 'multiple organ dysfunction syndrome' (MODS) to describe it [3]. The concept embodies several key features. First, it recognizes that it is not a single event that jeopardizes the recovery of the critically ill patient, but rather an evolving state

of physiologic insufficiency, often affecting organs remote to the site of the initial insult and necessitating the use of exogenous support to ensure survival. Second, it reflects the clinical reality that the process is variable in its expression, with differing systems being involved in different patients. Finally, and of most pragmatic importance, the process is potentially reversible, and survival is possible, though strongly and inversely correlated with the aggregate severity of the process.

Some 15 to 20 years ago, there emerged a spate of efforts to provide robust and reproducible criteria for the objective measurement of organ dysfunction [4-7]. These are strikingly similar in their architecture, a reflection not only of an emerging consensus on what organ dysfunction is, but also of the substantial intellectual collaboration of those who developed the scores. Although the final products vary in specific details, they reflect an implicit consensus that a valid descriptor of organ dysfunction should meet certain criteria (Table 1).

The rationale for quantifying organ dysfunction is not to provide another tool to predict the outcome of critically ill patients; dedicated prognostic scores such as the Simplified Acute Physiology Score (SAPS) and Acute Physiology and Chronic Health Evaluation (APACHE) do this more than adequately. Rather, their purpose is to measure the evolution over time of a multi-dimensional process, to enable response to specific unmet needs. First, an organ dysfunction scale can serve as a measure of intensive care unit-related morbidity, and so reflect important, but non-mortal, outcomes in a complex patient population. Second, it can provide an aggregate measure of whether an individual patient is improving or deteriorating over time - a common challenge in an illness characterized by improvement in some dimensions, and deterioration in others. Third, it can measure new

MODS = multiple organ dysfunction syndrome.

Table 1**Characteristics of an optimal descriptor of organ dysfunction**

Specific for the function of the organ system of interest
Comprehensive measure of function in that system
Sensitive to clinically important change in function
Recognizable to clinician
Increasing abnormality associated with increasing risk of adverse outcome
Not readily reversed by resuscitation
Objective
Measure of physiologic derangement, rather than treatment decision
Reliably, readily, and reproducibly measured
Inexpensive
Abnormal in one direction only
Single, continuous variable

Adapted from [4].

morbidity arising in a patient whose risk of dying at the time of intensive care unit admission is quantifiable, but unalterable, and for whom the real goal of care is to prevent *de novo* morbidity. Finally, it can serve as a more sensitive and informative outcome measure for a population of patients for whom mortality risk is heavily influenced by pre-morbid conditions, and survival *per se* is of variable importance.

Gastrointestinal failure was a classic feature in early descriptions of MODS, and invariably measured as bleeding from acute stress ulceration of the stomach [8,9]. But stress ulceration has become distinctly uncommon [10], and so other metrics have been sought, including tolerance of enteral feeds, ileus and nasogastric drainage, intestinal ischemia, acalculous cholecystitis, and diarrhea [11]. None of these have satisfactorily met criteria for face validity and utility as summarized in Table 1, and for this reason, gut dysfunction was omitted from the available organ dysfunction scales.

The work of Reintam and colleagues has several limitations. First, tolerance of enteral feeding is subjective, and reflects a clinical decision - to withhold feeds - more than it does an intrinsic characteristic of the patient. One would want to know how reproducible these criteria were when measured by different observers, and whether they showed a graded correlation with mortality risk; the simple measure of nasogastric output does not.

Second, intra-abdominal hypertension is not strictly a measure of gastrointestinal dysfunction, but rather of the combination of increased intra-abdominal pressure and decreased compliance of the abdominal wall, and its risk factors are conditions characterized by a need to administer large amounts of fluid in the setting of significantly increased capillary permeability [12].

These shortcomings notwithstanding, however, the authors are to be complimented on their continuing efforts to improve our ability to describe a common, frustratingly elusive, but intuitively important element of the MODS. In an earlier publication, they found that the development of gastrointestinal failure reflected in a diverse group of gastrointestinal signs and symptoms was associated with an eightfold increase in mortality [13]; clearly, this is a problem that we need to understand better.

Competing interests

The authors declare that they have no competing interests.

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