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Review

Critical care of burn patients. New approaches to old problems



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ABSTRACT

Recent publications on treatment options in critically ill patients change beliefs and clinical behaviors. Many dogmas, which the modern management of critical illness relies on, have been questioned. These publications (consensus articles, reviews, meta-analysis and original papers) concern some fundamental issues of critical care: interventions in acute respiratory distress syndrome (ARDS), hemodynamic monitoring, glucose control and nutritional support and revise our views on many key points of critical care of burn patients.

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Contents

1. More is not always better...	14
1.1. Glucose control	14
1.2. Nutritional support	14
1.2.1. Calories supply	15
1.2.2. Micro and micronutrients supply	15
2. ... but less is sometimes more	16
2.1. Hemodynamic monitoring	16
2.2. ARDS treatment	16
References	17

The complexities of dealing with critical illnesses brings to mind the mythic labyrinth of King Minos, full of hard choices, winding paths and multiple directions. Sometimes in our routine practice we try to correct certain parameters and bring them back to physiological levels, believing that their return to normal levels will help us to reverse the course of disease, forgetting that “physiological” is very different for different patients and for different clinical situations. Other times we

look for complex solutions, when the actual solutions are much simpler than we had imagined. Occasionally we follow a particular path of dealing with clinical situations believing that only this path will obtain the best results and that other alternatives do not exist. The belief that there is only one right way to address various clinical situations is merely an illusion and this illusion does nothing but lead to conflict and confusion.

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Recent publications on treatment options in critically ill patients shook the world of critical care changing beliefs and clinical behaviors. Many dogmas, which the modern management of critical illness relies on, have been questioned. These publications (consensus articles, reviews, meta-analysis and original papers) concern some fundamental issues of critical care: interventions in acute respiratory distress syndrome (ARDS), hemodynamic monitoring, glucose control and nutritional support. These new changes can be divided into two groups expressed by the two parts of this ancient saying: *ουκ εν τω πολλώ το ευ αλλά εν τω ευ το πολύ*, more is not always better, but less is sometimes more.

1. More is not always better. . .

1.1. Glucose control

Acute illness is accompanied by the development of abnormal physiology which the clinicians monitor and attempt to correct believing that rapid correction and reversal of pathophysiological states will help to better patient outcomes. The pathophysiological changes, however, reflect the severity of the situation and their correction to perfectly normal levels does not always coincide with patient recovery. The concept of tight glucose control in critically ill patients could be mentioned here as a supporting example. The rigorous glucose control approach recommended previously also maintains the levels of glucose within normal range but conveys a risk of hypoglycemia and does not contribute to a better recovery of critically ill patients [1]. Hyperglycemia and insulin resistance in the setting of acute illness could be an evolutionarily preserved adaptive response that increases the host's chances of survival; and attempts to interfere with this exceedingly complex multi-system adaptive response may be harmful [2]. Additionally there is evidence that in patients with preexistent diabetes higher blood glucose levels during ICU stay were associated with lower mortality [3]. Glucose levels that are considered safe and desirable in other patients might be undesirable in diabetic patients with chronic hyperglycemia, and rapid and substantial lowering of their blood glucose levels during their acute illness/surgery may worsen clinical outcome [4]. Moderate glucose control for higher glucose target levels was recommended by the recent Surviving Sepsis Campaign guidelines in septic patients with high quality of evidence on this recommendation (GRADE 1 A). This recommendation is based on the results of randomized controlled trials (RCTs) [5–9] and meta-analyses [10–14] of intensive insulin therapy which had been performed during the last years. The RCTs studied mixed populations of surgical and medical ICU patients [5–9] and found that intensive insulin therapy did not significantly decrease mortality. All studies reported a much higher incidence of severe hypoglycemia (glucose ≤ 40 mg/dl) (6–29%) with intensive insulin therapy. Several meta-analyses also confirmed that intensive insulin therapy was not associated with a mortality benefit in surgical, medical, or mixed ICU patients [10–14].

Recent guidelines on nutritional support in burn patients reflect this trend and target higher levels of glucose than were previously recommended [15]. Also the exact cut off for

beneficial glucose levels has not yet been defined in burn patients, these guidelines recommend that clinicians follow general ICU recommendations of glucose targets between 100 and 150 mg/dl. Observed benefits are shown in both retrospective and prospective studies in burn patients and include better graft take, fewer infectious complications, and decreased mortality rate [16–20].

1.2. Nutritional support

Critical illness is hallmarked by a severe catabolic response leading to energy and protein deficiency and skeletal muscle wasting. Many nutritional interventions are implemented during the acute phase of critical illness in an attempt to reverse this potentially harmful energy and protein deficiency. Whether it is beneficial to give highly targeted nutritional support early during critical illness in an attempt to reverse this catabolic response remains to be answered. Current evidence does not show benefits in trying to interfere with catabolic response in the early phase of critical illness. Moreover, the inability to tolerate sufficient nutritional support via enteral route early after disease onset is considered to be a part of the acute physiologic response to severe illness. The recent review article of Casaer, and Van den Berghe, on nutrition in the acute phase of critical illness [21] emphasizes that enteral nutrition intolerance may indicate how ill the patient is, may be a marker of the severity of illness (i.e., patients who can be fed enterally are less ill than those who cannot) rather than a mediator of complications and poor outcomes.

Uncertainty exists about the most effective route for delivery of early nutritional support in critically ill patients. Studies in animals and humans have shown a trophic effect of enteral nutrients on the integrity of the gut mucosa, and a lower risk of infection. These findings provided the rationale for instituting enteral nutrition early during critical illness in older publications [22–24]. However, the most effective route for early nutritional support in critically ill patients has continued to be discussed in the recent literature [25–27]. A recent CALORIES trial, evaluated the hypothesis that the parenteral route is not inferior to the enteral route for the delivery of early nutritional support in adult patients admitted to 33 Intensive Care Units in England [28]. Patients who could be fed through either the parenteral or the enteral route were randomly assigned to a delivery route, with nutritional support initiated within 36 h after admission and continued for up to 5 days. There were significant reductions in the parenteral group, as compared with the enteral group, in rates of hypoglycemia ($P = 0.006$) and vomiting ($P < 0.001$). However, there were no significant differences between the parenteral group and the enteral group in the mean number of treated infectious complications (0.22 vs. 0.21; $P = 0.72$), in 30-day and 90-day mortality rates, and in rates of other secondary outcomes, or adverse events. By 30 days, 393 of 1188 patients (33.1%) in the parenteral group and 409 of 1195 patients (34.2%) in the enteral group had died. Caloric intake was similar in the two groups, and the target intake not achieved in most patients. The authors of this study concluded that the early nutritional support through the parenteral route is neither more harmful nor more beneficial than such support through the enteral route.

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