Intensive Care Med (2020) 46:1249–1251
https://doi.org/10.1007/s00134-020-06034-1

LESS IS MORE IN INTENSIVE CARE

Checklists and protocols in the ICU: less variability in care or more unnecessary interventions?

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"There is always a well-known solution to every human problem—neat, plausible and wrong".

H. L. Mencken. "The Divine Afflatus", New York Evening Mail, November 1917.

The use of checklists and protocols is proposed as a neat, plausible solution to the complex problem of providing the best possible care to critically ill patients. Checklists and protocols are components of the safety culture translated from the aviation industry to medical practice [1]. There is no doubt that checklists and protocols can play an important role in certain circumstances in the management of critically ill patients. However, the complexity of attending to the individual needs of critically ill patients and the nonlinear nature of many critical care interventions not only limits the utility of checklists and protocols but also brings an inherent risk that excessive interventions will be delivered.

Checklists work well for processes that are complicated but linear (Fig. 1, Panel a), where the process and outcome are the same in every case [2]. Under these conditions the use of a checklist ensures that in a single process pathway, each step is completed and verified. Protocols are somewhat more adaptable, but still require set interventions to be provided which are dependent upon initial conditions and subsequent circumstances, limiting the responses available to clinicians [3]. The use of checklists has been associated with improved patient outcomes, in circumstances where the checklist can be used for a largely linear process such as the generic conduct of a surgical procedure [4] or the preparation for central venous catheter insertion [5]. However, even under these circumstances, the supporting evidence is derived predominantly from cohort studies with historical controls [4, 5], a method that is known to produce results that favour interventions significantly more frequently than results from randomised studies [6]. It is also an oversimplification to attribute any observed improvement in outcomes solely to the use of the checklist. In order to obtain these benefits, the multifaceted intervention, of which the checklist is only one part, that leads to the change in clinical practice must be undertaken [7], which requires a significant input of resources. In spite of the limited high-quality evidence to support the use of checklists and protocols, they are widely and increasingly used in acute care medicine.

The apparently simple and effective nature of checklists and protocols has seen them applied in inappropriate circumstances. Checklists can be problematic when applied to clinical problems that require nonlinear responses. Protocols are not well suited to clinical scenarios that require multiple adaptive responses (Fig. 1, Panel b). When used for conditions that require nuanced, adaptive responses, there is a risk of therapeutic misalignment [3], with the delivery of excess, inappropriate interventions. Sepsis is one such condition. Sepsis is a major global health problem that requires a concerted effort to reduce the unacceptably high mortality and morbidity. Sepsis is a complex syndrome, with disparate manifestations depending on a combination of host factors and comorbidities, the nature of the inciting infection and the specifics of the infecting organism. As such, the treatment for sepsis is not well suited to management with checklists and protocols. The Surviving Sepsis Campaign

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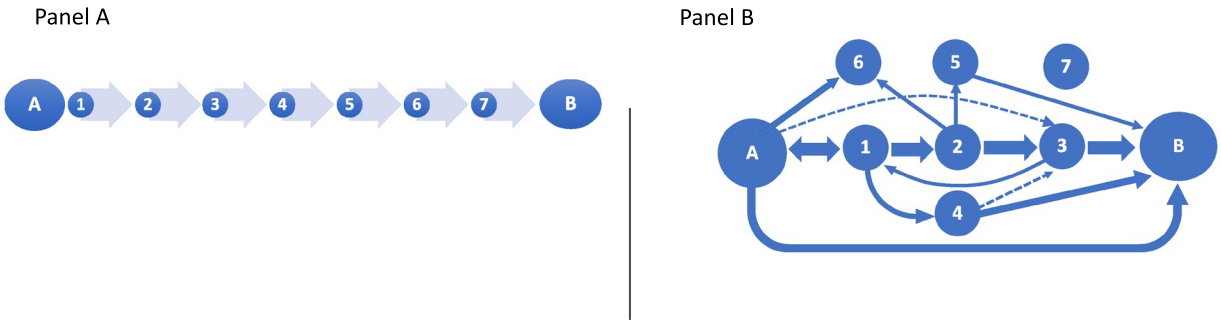

Fig. 1 **a** A linear process, well suited to a checklist or protocol. In order to safely navigate from A to B, each step in the process is required to be undertaken in the same order each time. Examples include donning and doffing personal protective equipment or preparation for insertion of a central venous catheter. **b** A non-linear process, common in the management of critically ill patients, and not well suited to a checklist or protocol. In order to safely navigate from A to B, it is necessary to vary the process to deal with multiple contingencies. For example, in the management of a patient with severe sepsis, in some cases fluid therapy is required prior to commencement of vasopressors, in other cases vasopressors take precedence. In most cases reassessment of previous steps is required. Divergence from a straight path to consider corticosteroids or urgent source control may be required

treatment protocol includes the recommendation to provide all patients with 30 ml/kg of crystalloid fluid, along with a recommendation to measure lactate as a guide for resuscitation, often prompting further interventions. It is true that observational data have demonstrated that the implementation of a sepsis protocol based on the surviving sepsis campaign bundles is associated with lower risk-adjusted mortality [8]. However, the provision of the fluid component of the intervention has not shown to be associated with improved outcomes [8]. In fact, the provision of excessive fluid to patients with sepsis has been shown to be associated with harm [9]. Some of this harm could be in part explained by the fact that up to 25% of patients with sepsis have comorbidities such as heart failure and renal failure [10, 11]. The administration of excessive fluids, simply given to satisfy the requirements of a protocol, to patients with heart failure or renal failure could lead to adverse consequences. Checklists and protocols are ill equipped to deal with the variations and adaptations required to deal with the complexity required to treat sepsis. There is substantial evidence to support the conjecture that protocolised therapy for sepsis is not superior to treatment guided by clinician judgement and is associated with increased cost of care [11].

The use of checklists and protocols for the general management of critically ill patients can be even more problematic. Protocols and checklists are used in the aviation industry for processes that are well established; the mechanism by which each item on the checklist contributes to achieving the goals of the checklist is well understood, having been extensively tested. When commencing a takeoff procedure, all aircrafts of the same type require the same linear combination of steps to be undertaken to safely become airborne. The same cannot be said for the checklists and protocols used in critical care. One of the most widely used checklists in critical care is the FAST-HUG checklist [12] advocated to be used for all critically ill patients. The checklist advocates the use of interventions such as tight glucose control and widespread use of prophylaxis for gastrointestinal bleeding and interventions that have been subsequently shown to not be beneficial [13] or to be harmful [14]. Furthermore, checklists can lead to excessive interventions by elevating the status of components for which only lower-quality evidence exists, thus increasing the likelihood of implementation by clinicians adopting the checklist. In the FAST-HUG checklist for example [12], elevating the head of the bed, for which there is a paucity of high-quality evidence [15], is given the same weighting as consideration of sedation for which substantial high-quality evidence is available to inform practice. Clinicians are not only prompted to provide these interventions, they can be held accountable if they do not follow the protocol [16]. In some jurisdictions, clinicians can be manipulated into providing unproven interventions for fear of litigation should adverse outcomes be linked to the non-delivery of a non-beneficial intervention advocated by the checklist [17]. Checklists make practitioners feel better about the care they are delivering, make them feel like they are doing the right thing [18], even when these interventions, like the routine replenishment of electrolytes beyond physiological levels, are not associated with benefits to patients [19]. Clinicians seeking to improve outcomes may need to consider alternate methods, such as the adoption of continuous quality improvement methods [20], rather than rigidly applying set checklists and policies.

Checklists and protocols are tools that have a place in critical care medicine. Like many of the tools wielded by clinicians, used in the right way, for the right purpose, checklists and protocols can play an important role in helping to provide safe and appropriate care to critically ill patients. While they can appear to be a simple, plausible solution to the provision of safe care to all critically ill patients, this appearance can be deceiving. Checklists and protocols can provide the illusion of providing safer care, when in fact they simply encourage clinicians to provide interventions of no proven benefit. We need to subject all the tools used in critical care to objective scrutiny to ensure that excessive intervention is avoided.

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Acknowledgements
The authors would like to thank Sarah Grattan for help assistance in the preparation of the figure in this manuscript.

Compliance with ethical standards

Conflicts of interest
The authors declare that they have no conflicts of interest.

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Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Received: 18 March 2020 Accepted: 31 March 2020
Published online: 23 April 2020

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