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EDITORIAL

Hemodynamic monitoring development: helpful technology or expensive luxury?

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The real question is not whether machines think but whether men do. BF Skinner (1904–1990)

Few problems in intensive care demand finer judgment, further experience, and greater skill than the assessment of patient physiological variables and this is especially true in case of cardiopulmonary instability [1]. Therefore, during the last two decades many intensivists have come to regard shocks as carrying a high enough mortality risk to deserve an advanced hemodynamic monitoring. Indeed, new monitoring techniques in intensive care may improve the prognosis for shock, so that full advantage can be taken of these new skills [2]. However, in spite of increased availability of the monitoring process and monitoring equipment, hemodynamic monitoring has not significantly improved survival rate.

As part of the present special issue of the Journal of Clinical Monitoring and Computing, appreciated opinion leaders provide an outline of the important technologic advance in hemodynamic monitoring to manage critically ill patients. The present reviews take a deeper look at physiology principles, main beliefs which are the basis of intensive care medicine [1]. In fact, the assessment of physiological principles (by these various techniques described in these reviews) at the bedside, reinforces our use of these principles in clinical decision making [3]. As example, previous works have pointed out that classical thermodilution technique, transpulmonary thermodilution, and pulse-plethysmography, are valuable tools in evaluating the hemodynamic status of critically ill patients [4–6]. On the other hand, when occurrences not in accord with these principles are observed and unintelligible observations are documented [7], a new conception is gained concerning human pathophysiology [7, 8]. In this specific case, such new scheme should improve our care and the outcome for ICU patients.

For many years it was commonly taught that we should insist on adequate evaluation of hemodynamic monitoring before it is implemented. In this regard, over the last decades, anesthetists and intensivists had the support and resources to determine the meaning of hemodynamic monitoring using rigorous scientific methods (Fig. 1). However, it seems quite dangerous to make robust clinical recommendations in the absence of proofs on the usefulness of these techniques regarding patient outcome [9]. Similarly, it could be pertinent to ask whether it would not be easier to forgo the advantages resulting from such a technologic advance as hemodynamic monitoring. However, sometimes, our knowledge of these devices and techniques, we use, is imperfect and our understanding should be improved [10].

Of course, the most significant advantage of hemodynamic monitoring is that patients will have a more rapid and complete circulatory state recovery and we should define what we need to measure and monitor to do that. This should be done before the technology is too widely available; a detail that underlines the magnitude of pathophysiological studies. As well, it must be established and accepted that specific hemodynamic monitoring is essential if an appropriate form of intervention or treatment could be administered with safety. And, in the situation where these techniques could have the potential to improve patient

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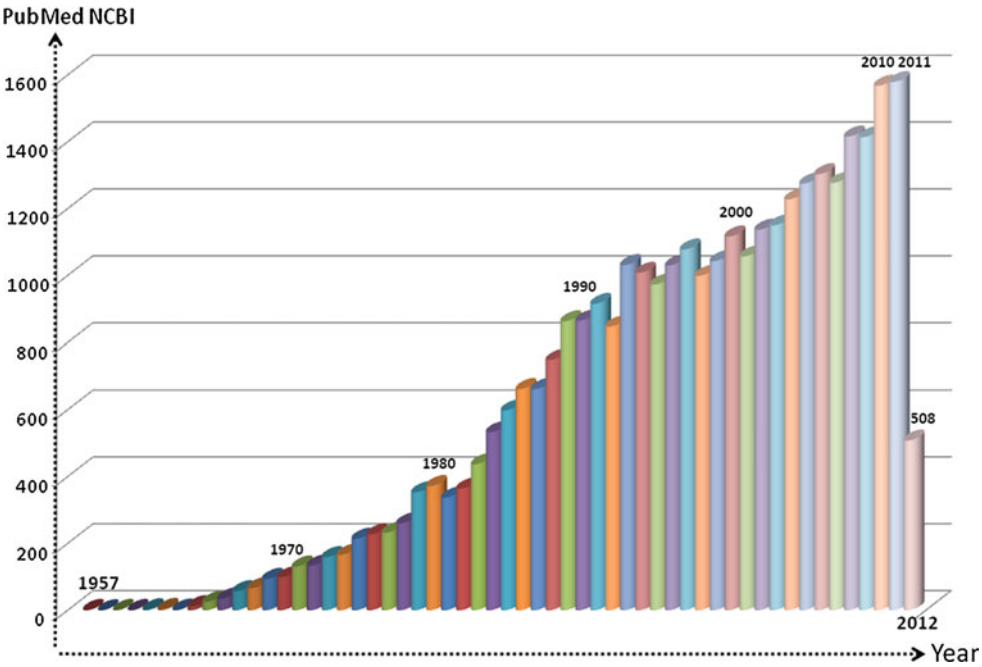

Fig. 1 Trend of the number of manuscripts, related to hemodynamic monitoring, published in peer reviewed journal, over time (according to PUBMED [Medline, 1957–July 2012])

outcome, it would be unethical to forgo its use. I do not underestimate the difficulty of providing this information for critically ill patients (in comparison with the perioperative setting [11, 12]) at a time when several recent clinical investigations failed to demonstrate that hemodynamic monitoring improve survival rate [9, 13]. However, there is considerable confusion and numerous misconceptions which arise from the particularity of ICU patients and the point in time when a hemodynamic monitoring is needed [14].

Finally, another challenge is expense and the formidable financial charge for intensive care services. Indeed, the cost of these hemodynamic monitoring techniques is constantly increasing and such devices consumables are generally not reusable. What is the solution to this dilemma? Every technologic development of a device is based on the central fundamental value of the technique used [15]. On the other hand, a huge development (bubble) may represent an increase or rise over that fundamental value. In this regard, there are many theories regarding the formation of economic bubbles and one of them maintains that bubbles are related to the communication of economic players. By analogy, in our complex modern society, with its increasing emphasis on the fact that everyone deserves quality health care, the role of hemodynamic expert as both a health advocate and a modifier of care processes is fundamental. Indeed, health has no price but it has a cost!

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