Intensive Care Med (2018) 44:1995–1996
https://doi.org/10.1007/s00134-018-5396-1

EDITORIAL

Cardiovascular focus editorial ICM 2018

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This focus editorial highlights a series of papers on cardiovascular physiology, pathology and treatment strategies that were published in Intensive Care Medicine during 2017 and early 2018, leading up to the June 2018 thematic issue including one position paper, 10 reviews, one systematic review, nine "what's new", three "understanding the disease", two original papers, as well as images, letters, editorials and correspondences.

Interventions to support the cardiovascular system traditionally focus on normalising the mean arterial pressure. The safety and value of the new concept of permissive hypotension during shock resuscitation is questionable [1]. The physiology of heart–lung interactions provides an opportunity to study respiratory induced changes in arterial pulse pressure and stroke volume to assess the dynamics of the cardiovascular system. The ratio of pulse pressure to stroke volume variation gives an estimate of dynamic arterial elastance as recently described in a short review and commentary [2] to a prospective, open-label, randomised study using this variable to titrate the infusion of noradrenaline in 118 patients with vasoplegia following cardiac surgery [3]. Using a dynamic arterial elastance > 0.94 to titrate noradrenaline resulted in reduced duration and cumulative dose of noradrenaline infusion, whereas all other variables reflective of tissue perfusion remained unchanged [3].

An improved understanding and measure of arterial loading is likely to advance the debate on the clinical and prognostic relevance of septic myocardial dysfunction. The importance of arterial load was recently highlighted in a prospective, observational study of 132 septic patients investigated using repeated echocardiography during the first 3 days [4]. The end-systolic arterial elastance that could be assessed in 79% of patients was highly correlated with left ventricular ejection fraction and significantly higher in patients with early (within 24 h of septic shock) hypokinesia. The highest mortality in ICU and in-hospital were observed in patients with low arterial load and associated hyperkinesia [4].

The recently published ICM research agenda on critical care ultrasonography [5] provides an important framework for future developments within this expanding area of clinical practice. This agenda builds on the previous expert round table statement and in particular underlines the importance of certification processes, advanced forms of training with simulation software and new ultrasonography techniques [5]. In regards to the latter, the use of left ventricular strain and strain rate was distinctly different in patients with septic cardiomyopathy, but only feasible in about 40% of patients [4]. Future important trials include the use of critical care ultrasonography instead of more complex and expensive imaging systems in resource limited settings, for example the use of lung ultrasonography to replace chest radiography and potentially chest computed tomography, and specific ultrasound-guided protocols for fluid resuscitation. Recent developments in the training and application of transoesophageal echocardiography as well as technical developments such as miniaturised probes for prolonged, continuous use support the argument to use this modality in haemodynamically unstable ventilated patients [6]. While evaluation of the size of the inferior vena cava is common in practice, it is strongly limited to direct fluid management in patients in shock [7]. Transoesophageal echocardiography and assessment of the superior vena cava is more robust to guide fluid resuscitation. A systematic review and meta-analysis concluded that a de-escalation fluid strategy resulted in an increased number of ventilator-free days and a decreased length of ICU stay compared with standard care in 2051 patients from 11 randomized trials, while the effect on mortality remained uncertain [8]. In the future, one could expect

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new algorithms based on novel technologies for haemodynamic monitoring [9]. Two recently published studies evaluated the value of ultrasonography for central venous catheter placement. A randomised controlled trial in 190 adult patients after cardiac surgery compared the short versus the long-axis approach for infra-clavicular cannulation of the subclavian vein [10]. The short-axis approach shortened the mean insertion time with a higher overall success rate and first-puncture success rate of cannulation. The short axis approach was also associated with lower complications [10]. An observational study in 354 critically ill children (500 procedures) from 26 paediatric intensive care units compared an ultrasound-guided technique to the landmark technique for central venous catheter placement [11]. Ultrasound guidance was associated with increased first attempt success rate and fewer complications [11].

The first European guidelines on post-resuscitation care for cardiac arrest have been followed by an expert review outlining the research agenda on cardiac arrest [12]. The research agenda identified several facets of intensive care for cardiac arrest survivors that are currently the subject of large randomised, controlled trials including targeted temperature management to mild hypothermia or avoiding fever (TTM2, NCT02908308), normocapnia versus mild hypercapnia (TAME, NCT03114033), whereas a trial (XePOHCAS, NCT03176186) to further explore the neuroprotective potential of inhaled xenon is not yet recruiting. A multicentre retrospective study on target temperature management (to 32–34 °C) for intraoperative cardiac arrest included 101 patients from 11 French intensive care units treated between 2008 and 13 [13]. While target temperature management was only established in 30% of patients, no independent association with favourable functional outcome at 1-year follow-up was demonstrated in this specific context [13]. Finally, a commentary on the duration of cardiopulmonary resuscitation for patients in refractory cardiac arrest concluded that good neurological outcomes are still achievable after 30 min or more of resuscitation [14] and underlined the emerging role of extracorporeal cardiopulmonary resuscitation.

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Compliance with ethical standards

Conflicts of interest
Antoine Vieillard-Baron declares to have received financial support from GSK for conducting clinical research. Anders Aneman has no conflicts of interest to declare.

Received: 13 September 2018 Accepted: 25 September 2018
Published online: 4 October 2018

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