EDITORIAL

Cardiovascular issues in the ICU: a call for papers

Antoine Vieillard-Baron^{1,2,3*} and Anders Aneman^{4,5,6,7}

© 2017 Springer-Verlag GmbH Germany and ESICM

The cardiovascular performance is pivotal for organ perfusion through the generation of pressure and flow, and the associated pathophysiology and therapies are key determinants of outcome in many patients admitted to the ICU. The complexities of ventriculo-arterial coupling and the variability of systemic to regional haemodynamic coherence are still incompletely understood and challenging to monitor, rendering their associated management arguably overly simplistic and targeting pattern recognition rather than the idiosyncrasies of single patients. The incidence of circulatory failure in patients admitted in the ICU is around 30% [1]. Atrial fibrillation may be observed in as high as 25% of critically ill patients [2] and is associated with increased length of ventilation and mortality [3]. In a large retrospective observational study in more than 14,000 unselected critically ill patients, in-ICU mortality was 9% in the overall population, while it was 78% in the subgroup of patients with severe hyperlactatemia [4]. The main causes of severe hyperlactatemia were septic (34%), cardiogenic (19%), and haemorrhagic (12%) shock and cardiopulmonary resuscitation (14%) [4]. In the SOAPII trial including 1679 patients, the main cause of circulatory failure was septic (62%), followed by cardiogenic (17%), hypovolaemic (16%), other types of distributive shock (4%) and obstructive (2%) shock [5].

While the management of cardiac arrest has improved [6], mortality associated with out-of-hospital cardiac arrest remains high. Novel, innovative and readily applicable scoring systems for early prediction of neurological outcome [7] are needed. They may serve to guide patient's selection for full code life support such as veno-arterial

extracorporeal membrane oxygenation (VA-ECMO) in patients with refractory cardiogenic shock following resuscitation [8]. Recent advances in VA-ECMO technology helped improve outcomes in subgroups of patients with cardiogenic shock related to acute myocardial infarction [9] or fulminant myocarditis [10]. Whether such maximally invasive support in refractory cardiac arrest should be regionally coordinated within clinical networks deserves additional investigation.

Recent technological development allows better haemodynamic monitoring in patients using less invasive devices, more particularly, the use of echocardiography [11]. Modern ultrasound equipment is smaller, even down to pocket size, and provides better quality imaging. The role of miniaturized transoesophageal probes should be explored [12]. Future clinical trials need to address how monitoring of heart function and haemodynamics by echocardiography may impact on delivered therapies and ultimately patient-centred outcomes. The development of artificial intelligence and machine learning will allow monitors to become smart with the addition of decision support. This leads to interesting opportunities to improve the workflow within the ICU clinical team of doctors and nurses. While optimization of systemic haemodynamics has remained the cornerstone of clinical research and clinical trials over the last decades, especially focusing on fluid resuscitation [13] and blood pressure targets [14], optimization of the microcirculation will likely get more attention in the future as new modalities of monitoring become applicable at the bedside. With the ageing population, an increasing number of elderly patients will become critically ill, meaning that the impact of ageing on cardiovascular physiology will need to be increasingly considered in a frail population [15].

The evolution of electronic medical records, the potential to analyse big data and the development of new

*Correspondence: antoine.vieillard-baron@aphp.fr

¹ Intensive Care Unit, Section Thorax-Vascular

Disease-Abdomen-Metabolism, Assistance Publique-Hôpitaux de Paris, University Hospital Ambroise Paré, 92100 Boulogne-Billancourt, France

Full author information is available at the end of the article

clinical trial designs using more extensive networks put cardiovascular studies in critically ill patients of a similar magnitude to cardiological cohorts within reach. Alongside such progress, clinical governance and audit are likely to improve with potential for more rapid and comprehensive guidelines to be embedded in practice. The understanding of heart function and central haemodynamics in the critically ill patient remains fundamentally insufficient unless the impact of the respiratory system and its management are also considered. In the most complex ICU patients, this comes close to ‘a riddle, wrapped in a mystery, inside an enigma.’

An earlier call for papers on acute respiratory distress syndrome, sepsis and acute kidney injury proved immensely successful and resulted in the May 2016, December 2016 and June 2017 thematic issues of *Intensive Care Medicine*. A new call for papers focusing on cardiovascular issues in the ICU is now launched to be included in 2018. All manuscripts addressing any cardiovascular aspects of the critically ill patient will be considered. *Intensive Care Medicine* gives priority to high quality data, including large and multicentre well-designed cohorts, prospective studies, randomized trials, and studies that use patient-reported outcomes. We hope that this call for papers will be successful and look forward to receiving manuscripts before the deadline of January 1st, 2018.

Author details

¹ Intensive Care Unit, Section Thorax-Vascular Disease-Abdomen-Metabolism, Assistance Publique-Hôpitaux de Paris, University Hospital Ambroise Paré, 92100 Boulogne-Billancourt, France. ² Faculty of Medicine Paris Ile-de-France Ouest, University of Versailles Saint-Quentin en Yvelines, 78280 Saint-Quentin en Yvelines, France. ³ INSERM U-1018, CESP, Team 5 (EpreC, Renal and Cardiovascular Epidemiology), UVSQ, 94807 Villejuif, France. ⁴ Intensive Care Unit, South Western Sydney Local Health District, Liverpool Hospital, Locked Bag 7103, Liverpool BC, NSW 1871, Australia. ⁵ The Ingham Institute for Applied Medical Research, Liverpool, NSW, Australia. ⁶ South Western Sydney Clinical School, University of New South Wales, Kensington, Australia. ⁷ Australian School of Advance Medicine, Macquarie University, Sydney, Australia.

Compliance with ethical standards

Conflicts of interest

The authors declare that they have no conflict of interest.

Received: 27 July 2017 Accepted: 9 August 2017

Published online: 25 September 2017

References

1. Sakr Y, Reinhart K, Vincent JL, Sprung CL, Moreno R, Ranieri VM et al (2006) Does dopamine administration in shock influence outcome? Results of the sepsis occurrence in acutely ill patients (SOAP) study. *Crit Care Med* 34:589–597
2. Walkey AJ, Greiner MA, Heckbert SR, Jensen PN, Piccini JP, Sinner MF et al (2013) Atrial fibrillation among Medicare beneficiaries hospitalized with sepsis: incidence and risk factors. *Am Heart J* 165:949–955
3. Annane D, Sébille V, Duboc D et al (2008) Incidence and prognosis of sustained arrhythmias in critically ill patients. *Am J Respir Crit Care Med* 178(1):20–25. doi:10.1164/rccm.200701-031OC
4. Haas SA, Lange T, Saugel B, Petzoldt M, Fuhrmann V, Metschke M, Kluge S (2016) Severe hyperlactatemia, lactate clearance and mortality in unselected critically ill patients. *Intensive Care Med* 42:202–210
5. De Backer D, Biston P, Devriendt J, Madl C, Chochrad D, Aldecoa C, SOAP II investigators et al (2010) Comparison of dopamine and norepinephrine in the treatment of shock. *N Engl J Med* 362:779–789
6. Cariou A, Vieillard-Baron A, Aneman A (2016) Focus on cardiac arrest. *Intensive Care Med* 42:1525–1527
7. Nishikihimi M, Matsuda N, Matsui K, Takahashi K, Ejima T, Liu K et al (2016) CAST: a new score for early prediction of neurological outcomes after cardiac arrest before therapeutic hypothermia with high accuracy. *Intensive Care Med* 42:2106–2107
8. De Chambrun MP, Bréchet N, Lebreton G, Schmidt M, Hekimian G, Demondion P et al (2016) Venoarterial extracorporeal membrane oxygenation for refractory cardiogenic shock post-cardiac arrest. *Intensive Care Med* 42:1999–2007
9. Muller G, Flecher E, Lebreton G, Luyt CE, Trouillet JL, Bréchet N et al (2016) The ENCOURAGE mortality risk score and analysis of long-term outcomes after VA-ECMO for acute myocardial infarction with cardiogenic shock. *Intensive Care Med* 42:370–378
10. Mirabel M, Luyt CE, Leprince P, Trouillet JL, Léger P, Pavie A et al (2011) Outcomes, long-term quality of life, and psychological assessment of fulminant myocarditis patients rescued by mechanical circulatory support. *Crit Care Med* 39:1029–1035
11. Mayo P, Mekontso-Dessap A, Vieillard-Baron A (2015) Myths about critical care echocardiography: the ten false beliefs that intensivists should understand. *Intensive Care Med* 41:1103–1106
12. Begot E, Dalmay F, Etchecopar C, Clavel M, Pichon N, François B et al (2015) Hemodynamic assessment of ventilated ICU patients with cardiorespiratory failure using a miniaturized multiplane transesophageal echocardiography probe. *Intensive Care Med* 41:1886–1894
13. Cecconi M, Hofer C, Teboul JL, Pettit V, Wilkman E, Molnar Z et al (2015) Fluid challenges in intensive care: the FENICE study: a global inception cohort study. *Intensive Care Med* 41:1529–1537
14. Asfar P, Meziani F, Hamel JF, Grelon F, Megarbane B, Anguel N et al (2014) High versus low blood-pressure target in patients with septic shock. *N Engl J Med* 370:1583–1593
15. Brummel NE, Bell SP, Girard TD, Pandharipande PP, Jackson JC, Morandi A et al (2017) Frailty and subsequent disability and mortality among patients with critical illness. *Am J Respir Crit Care Med* 196:64–72