Response to Cardiac arrest in ICU (*J Intensive Care Soc* 2017; 18: 173)

Thank you for providing the opportunity to ICNARC to respond to the Letter to JICS from Cook and Thomas (2017)[1] in which they report their results on the incidence, case mix, outcome and length of stay for admissions experiencing cardiac arrest and receiving CPR during the ICU stay at Southmead Hospital, Bristol. We would advise that their results on adjusted mortality (assuming the standardised mortality ratios are based on acute hospital mortality) are interpreted with caution, as risk prediction models developed and validated in one population (all admissions) are not accurate when reported for specific sub-populations (those experiencing cardiac arrest during the ICU stay).

As Cook and Thomas highlight in their letter, it is true that neither of the two national clinical audits (the Case Mix Programme – CMP – and the National Cardiac Arrest Audit – NCAA) co-ordinated by ICNARC routinely capture data on cardiac arrest during the ICU stay. The rationale for this lies behind the current aims for each of these audits.

The aim of the CMP is to try to ensure that a critically ill patient presenting to ICU in any acute hospital has the same chance of surviving to hospital discharge. The CMP collects information on evidence-based risk factors for acute hospital mortality for all patients at/around admission to ICU (including whether CPR was received in the prior 24 h). These risk factor data are combined into an expected risk of hospital mortality, estimated using an accurate, up-to-date risk prediction model, and the expected is compared with the observed hospital mortality and reported for a group of patients (usually all admissions during a three-month period). It is then intended that any differences between expected and observed hospital mortality are investigated locally. Clearly, one of many possible explanations for higher observed hospital mortality than expected might be due to a high rate of cardiac arrests occurring during the ICU stay. It is important, however, that these data do not form part of the patient's initial risk profile.

The aim of the NCAA is to try to ensure that a patient having an in-hospital cardiac arrest attended by the resuscitation team (or equivalent) in any acute hospital has the same chance of surviving to hospital discharge. The NCAA collects information on evidence-based risk factors for acute hospital survival for a patient at/around the incident of an in-hospital cardiac arrest. As per the CMP, these risk factor data are combined into an expected risk of hospital survival, using a different risk prediction model, and the expected is compared with the observed hospital survival and reported for a group of patients. At this time, the NCAA audits outcomes for the potentially most vulnerable patients experiencing in-hospital cardiac arrest (i.e. those occurring outside monitored areas with skilled staff available) where the resuscitation team (or equivalent) are involved (i.e. those where a 2222 call is made).

ICNARC hears the view of Cook and Thomas. However, prior to (i) burdening ICUs with collection of more routine data and (ii) to promoting case mix adjusted incidence of cardiac arrest during the ICU stay as a "key performance indicator for quality of care," we feel it is important that the role of all potentially important risk factors is studied and an accurate risk prediction model for cardiac arrest in the ICU developed and validated to ensure fair comparison. We agree that better data would allow exploration of this and that, ultimately, through audit this could lead to strategies to predict and prevent cardiac arrest during the ICU stay with the aim of improving outcomes. Resources/ethical approval permitting, ICNARC would be delighted to nest such a research study within routine data collection for either the CMP or NCAA to ensure efficient design.

Declaration of conflicting interests

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Reference

1. Cook J and Thomas M. Cardiac arrest in ICU. *J Intensive Care Soc* 2017; 18: 173.

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