Resuscitation 85 (2013) 15–16

Contents lists available at ScienceDirect

Resuscitation

journal homepage: www.elsevier.com/locate/resuscitation

Editorial

Towards global reporting of every paediatric cardiac arrest

The rarity and lethality of paediatric cardiac arrest renders it a difficult problem to study. This is unfortunate, as it is hard to imagine a clinical situation where evidence-based treatment guidelines and prediction tools are more desirable. The solution to this problem is to collect and publish standardised data from multiple clinical settings. Since the development of Utstein-style templates, researchers have had the tools to do just this.[1] Large cohort studies of paediatric cardiac arrest are beginning to appear in the literature,[2–4] and sizeable registries of cardiac arrest in adults and children have been developed.[4,5] The body of useful data is slowly growing. We are now able to read about the epidemiology and outcomes of cardiac arrest in children and adults from several different clinical, geographical and economic settings.[6]

Although clearly useful in principle, interpretation of these data is hampered by a number of limitations. Of particular concern is the risk of selection bias in large registry data, such as the Get With The Guidelines Resuscitation (GWTG-R) registry, to which data contribution is voluntary. Are data from these registries representative of the wider population? Another important problem is the difficulty in interpreting and comparing studies with inconsistent study design. For example, in a review of out-of-hospital paediatric cardiac arrest, Donoghue and colleagues found that studies varied according to their inclusion or exclusion of sudden infant death syndrome or trauma; diagnoses that are highly likely to influence the survival statistics.[7] Another example is only including post arrest patients with sustained return of spontaneous circulation (ROSC) and reaching PICU; ideal for assessment of post cardiac management (e.g. therapeutic hypothermia) but not initial resuscitation.[8,9]

An answer to this latter problem is to conduct large, multicentre, prospective studies, with a priori definitions of relevant patient groups. In the largest published study of paediatric in-hospital cardiac arrest (IHCA) to date, Matos et al. demonstrated differences in outcomes of resuscitation of paediatric cardiac arrest amongst diverse diagnostic groups (surgical cardiac, medical cardiac, general medical, general surgical and trauma).[10] This study described survival to hospital discharge and neurological outcome according to duration of CPR in each diagnostic group. In doing so, the authors were able to challenge the dogma that prolonged CPR (>20 min) is always futile.

This provides practical information to the clinician faced with a child in cardiac arrest in certain clinical scenarios, but we are still a long way off producing robust decision rules (e.g. "how long should we continue CPR?") for all paediatric cardiac arrests. Before we can reach that goal, we need to collect much more data, from a wider range of clinical settings.

In last month's issue of Resuscitation, Zeng et al.,[11] present data on the epidemiology and outcome of IHCA in children from 4 hospitals in Beijing. Data on 174 episodes of CPR for IHCA in children (1 month to 18 years) were captured from over 100,000 hospital admissions over a 2 year study period. Utstein-style templates were used for data collection. The majority of the CA occurred in PICU patients (83.5%), consistent with the recently described trend from US registry data.[12] Encouragingly, outcome data on survival to hospital discharge (28.2%) are comparable to previously published data from other IHCA studies, ranging from 20% to 30%.[13–15]

A major strength of the study is the reporting of longer-term survival and neurological outcome at 12 months post-hospital discharge. The data demonstrate a cautionary trend of significant attrition of survivors from hospital discharge (28.2%) to survivors at 1 year post-discharge (12.1%). The majority of deaths in this attrition were in children with poor paediatric cerebral performance categories (PCPC) of 4 or 5. Although this metric is rarely reported in the literature, previously published studies have suggested that neurological status at discharge is not significantly different from status at 1 year post-discharge,[13] identifying a significant difference with the data from Zeng et al. Why the difference? This question is not directly answered by the study, but the authors suggest that lack of financial resources may be partly responsible. The authors go on to conclude that neurological status amongst long-term (1 year) survivors is good (18 out of 21 long-term survivors had PCPC category 1 or 2). However, it is worth pointing out that the high proportion of favourable neurological status is partly explained by the high mortality of survivors with a poor neurological status prior to 1 year post-discharge.

In keeping with many other CA studies, this study is limited by heterogeneity of the patient cohort in terms of age and diagnostic categories. The study did not include cardiac surgery patients, so comparison with the matched published registry data of IHCA is not possible.

This study raises two important themes for future research. Firstly, it is important that future studies gather information on longer-term outcomes, including survival and neurological status. These metrics are rarely reported after hospital discharge, and the findings of this study suggest that longer-term outcomes may not be as good as we think. These investigations will become more important as short-term survival from CA improve. Secondly, it is important to continue to collect CA data using Utstein template, allowing uniform reporting from diverse clinical, geographic and economic settings. In addition to providing important epidemiological data, this will also allow comparison between settings with different levels of resources. For example, none of the patients in this study received ECMO, compared with 6.7% of the IHCA patients in the largest registry study from the US.[10]

0300-9572/$ – see front matter
http://dx.doi.org/10.1016/j.resuscitation.2013.10.012

Paediatric cardiac arrest is rare but every case is a tragedy. For us to advance our resuscitation knowledge and potentially turn every tragedy into something meaningful, collection of 'correct' data from all paediatric cardiac arrests, from all corners of the globe is a goal to which we must aspire.

Towards global reporting of every paediatric cardiac arrest.

1. Conflict of interest statement

None declared.

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8 October 2013

13 October 2013