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Paediatric Life Support: Safety in 2 Major Fast Lanes

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Abstract

Observations in medical publications on cardiac arrest and resuscitation are in agreement that the most susceptible age group are infants who are less than 12 months. However, all children who suffer a critical incident are at high risk to succumb to severe neurological sequel or mortality without expedient medical life support. Emergency life support interventions are administered by trained and competent personnel. They are literally fulfilling the safety-first rule: to establish a minimum reasonable return or return threshold. The aetiology, challenges and areas for improvement are dissimilar in both in-hospital and out-of-hospital paediatric collapse. However, the desired outcome is similar: safety and survival.

Keywords: Paediatric resuscitation; In-hospital life support; Out-of-hospital life support

Introduction

Cambridge Dictionary drives home the intention of safety in its simplicity and brevity: the state of being protected from danger or harm. Undoubtedly, children are defenceless and necessitate deliverance from serious harm and consequent disability in any injurious situation. Safety and survival clearly occupy a central role in ethos of medical life support outreach.

The scope of interest is supported by numerous medical communications and publications that focus on life support mechanisms for children. This commentary does not address life support concerns in traumatic cardiopulmonary collapse.

Discussion

In-hospital life support

In-hospital paediatric cardiac arrest is a universal health burden. The document on the Annual Incidence of Adult and Paediatric In-Hospital Cardiac Arrest in the United States [1] noted that paediatric events remained more stable whereas in adults the incidence increased over time. The estimated incidence can be extrapolated to 9.7: 1000 and 2.7: 1000, respectively. Further understanding into survival statistics after cardiopulmonary resuscitation is obtained from a meta-analysis and systematic review based on twenty-five studies [2]. The analysis showed that at least 54% of children were not discharged alive.

Paediatric basic/advanced life support described in AHA/PALS Guidelines provides core reading material for clinicians and health workforce on the resuscitation concept and implementation [3]. Major policies and recommendations are accessible from an equally academic and professional body, namely, the European Resuscitation Council Guidelines [4].

Both institutions generate substantial scientific clarifications that enable international medical institutions to streamline their regional statements on paediatric life support according to each domestic clinical practice [5]. However, there is

great disparity in hospital leadership, safety education and economic affordability that raise the likelihood for the least developed nations taking a back-seat in executing rapid responses within the hospital.

The gravely ill child in hospital is closely observed but collapse may happen anywhere within the hospital, for example, in the ward or MRI suite. The preoperative environment is different and critical incidents may be anticipated or unanticipated. The anaesthetist is acknowledged as a successful anaesthesia safety officer [6]. He or she is responsible for the safety and stability of vital functions while the child is in a pain-free and unconscious state for the surgical procedure. During general anaesthesia, three independent factors increase the risk of collapse, namely, ASA status, emergency surgery and young infants [7]. A culture of safety is ingrained into trainees who understand that the best defence against deterioration lies in preparedness and vigilance.

There are at least 20 Paediatric Anaesthesia Societies worldwide, including 6 in Asia. A notable mention is the Paediatric Asian Society of Paediatric Anaesthesia (ASPA) that reaches out to major hospitals in the Asian region with specific scientific literature, intense skills workshops and interactive case discussions [8].

Improvements in monitoring, diagnosis, treatment and accessibility of post-CPR advanced care are requisite resources that can raise the chance of survival. To advance to a higher level of proficiency, medical personnel in-charge of children should enhance their technical skills and clinical acumen through scientific channels and networking with peers.

Out-of-hospital life support

It is a fast lane that is seldom travelled: cases are few and mortality is high.

This section does not address labile situations that cannot be reverted by the sole abilities of the local paramedic rescue team without outside reinforcement, different position of leadership and even national supervision.

The paramedic response team faces an arduous mission in the fast lane whenever a call for help is activated at the emergency duty station. Excluding traumatic life and death settings, frequent places for harm are the homes with children, public buildings and recreational outlets. It is reported that survival from non-traumatic cases is higher when victims are transported for advanced management in paediatric ED than in a general ED [9].

A retrospective analysis conducted in a tertiary referral medical centre in Taiwan studied children in the age group under 18 years (n=152) who were transferred to the ED pulseless and demanding CPR [10]. The article reported that the common non-trauma causes included sudden infant death syndrome, airway-related events, drowning, intoxication and cardiac causes. It emphasized three predictors that would be useful in rescue undertaking:

1. Most of the incidents occurred at homes
2. The most common age group affected was early infancy and
3. The primary trigger for physiological danger was respiratory in nature.

The Canadian Resuscitation Outcomes Consortium noted the dismal impact of the paramedic service response over the years 2012 to 2020 [11]. All survivors had a sad neurological outcome. Medication deviations, delay in vascular access and airway problems were the common obstacles. In resuscitation endeavours early administration of epinephrine contributes to the likelihood of survival during CPR. The document stated that epinephrine administration was delayed and vascular access was held up in nearly half of the events. Vascular access is challenging when it is performed in a distracting and unfamiliar non-hospital environment, particularly in a shock child with hypothermia.

Intraosseous access is an alternative to IV drug administration but the former has not proven better cardiac arrest outcomes [12].

Paediatric out-of-hospital life supports responses are challenging from the start. There are limited literature and publications on out-of-hospital paediatric collapse to examine and discuss. Residences are the commonest locations to flag for help. The reduction of tragedies at home would call for commitment from champions of children safety to be heard in society. A guardian who has an

informed mind concerning preventive measures can influence the safety of the child.

Preventive measures in the community certainly reduce the call for paramedic rescue life support, for example, providing early warning signboards and safety rules that are prominently displayed in public facilities. Safety advocates in community organizations should partake in bringing information on lifelines to caregivers and the public, such as, through e-platforms.

Conclusion

Every medical institution should provide leadership in charting safety guidelines in the resuscitation of children. A concerted effort by clinical experts is required to collectively report updates of in-hospital care bundle for resuscitation. The mitigation of tragedies outside the hospital environment would call for commitment from public leaders of paediatric safety. The participation of key-players can raise awareness and provide early instructions through networking among parents and caregivers living with children.

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