# Survival of out-of-hospital cardiac arrest following a return of spontaneous circulation beyond 30 minutes

This article was published on 23 Aug 2023 at www.hkmj.org.

Hong Kong Med J 2023;29:564–5
https://doi.org/10.12809/hkmj219365

*To the Editor*—There was a local blog report in Hong Kong of a 5-year-old girl who experienced out-of-hospital cardiac arrest (OHCA) with return of spontaneous circulation (ROSC) after 31 minutes and was discharged with an implantable cardioverter defibrillator.[1] However, ROSC within 30 minutes is usually required for a favourable outcome.[2,3]

We performed a literature search to determine the longest time to ROSC and survival rates of OHCA in children (Table). Out-of-hospital cardiac arrest in children has a poor prognosis and prolonged in-hospital resuscitation beyond 30 minutes does not improve survival.[3] Predictors of survival to discharge include witnessed arrest (P=0.012), delivery of bystander cardiopulmonary resuscitation (P=0.003), and duration of resuscitation (P=0.028). However, none who received more than 30 minutes of in-hospital resuscitation survived.[4] A prospective study found that no patients who required >2 doses of adrenaline or in-hospital resuscitation for longer than 20 minutes survived to discharge.[5] However, it is possible that ROSC beyond 30 minutes has not been reported, or that this case is an exception.

Evidence suggests that either death or a poor outcome is inevitable if OHCA occurs more than 30 minutes from the nearest healthcare facility or the resuscitation exceeds 30 minutes.[6,7] A 2017 study reported that the survival rate to discharge in Hong Kong was only 2.3%, which was considerably lower than the global survival rate in adults (8.8%).[8,9] As OHCA in children has not been evaluated in Hong Kong until 2018,[3] and prospective evaluation of OHCA in children has not yet been conducted, we concur with Wu[10] who suggested the establishment of an OHCA registry.

Many parents and family members who are present during a resuscitation attempt would want to be in attendance if their child were likely to die, and this experience can help with later grieving without impacting on the resuscitation process. If appropriate, family-centred care should be practised and parents should be involved in the decision-making process.[6] As paediatricians, although our patient is the child, his/her family members are also important—after all, if the child passes away, it is the family who must shoulder the lifelong emotional burden.

In summary, OHCA in children has a poor prognosis and prolonged resuscitation does not improve survival or outcome.

## Author contributions

All authors contributed to the drafting of the letter and critical revision for important intellectual content. All authors approved the final version for publication and take responsibility for its accuracy and integrity.

## Conflicts of interest

As an editor of the journal, KL Hon was not involved in the peer review process. Other authors have disclosed no conflicts of interest.

TABLE. Selective paediatric references on out-of-hospital cardiac arrest following return of spontaneous circulation

| Population and study type | Conclusions | Year of publication and reference |
|---|---|---|
| 101 children, prospective | No patients who required more than two doses of adrenaline or resuscitation for longer than 20 minutes in the emergency department survived to hospital discharge. | 1996[5] |
| 85 children, retrospective | The positive predictors for survival to hospital discharge in a bivariate analysis were witnessed arrest (P=0.012), delivery of bystander cardiopulmonary resuscitation (P=0.003), and duration of resuscitation (P=0.028). No survival if >30 minutes of resuscitation in the emergency department. | 2005[4] |
| 53 children, retrospective | Return of spontaneous circulation within 30 minutes (odds ratio=90.0; 95% confidence interval=11.1-727; P<0.0005) was associated with survival to discharge. No data on survival if return of spontaneous circulation >30 minutes. | 2018[3] |
| 22 brain-dead children, retrospective | No survival of children diagnosed with brain death. | 2020[2] |

## Funding/support

This letter received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

**KL Hon**[1] *, MB, BS, MD, **Karen KY Leung**[1], MB, BS, MRCPCH, **KL Chan**[1], MB, ChB, MRCPCH, **WF Hui**[1], MB, ChB, MRCPCH, **KT Chau**[1], MB, BS, FRCPCH, **SY Qian**[2], MD

[1] *Department of Paediatrics and Adolescent Medicine, Hong Kong Children's Hospital, Hong Kong SAR, China*

[2] *Pediatric Intensive Care Unit, Beijing Children's Hospital, Capital Medical University, Beijing, China*

* Corresponding author: ehon@hotmail.com

## References

1. Philip. 死去31分鐘的女兒 [in Chinese]. Available from: https://todecidenow.wordpress.com/2021/01/31/死去31分鐘的女兒！/. Accessed 24 Jul 2023.
2. Hon KL, Tse TT, Au CC, et al. Brain death in children: a retrospective review of patients at a paediatric intensive care unit. Hong Kong Med J 2020;26:120-6.
3. Law AK, Ng MH, Hon KL, Graham CA. Out-of-hospital cardiac arrest in the pediatric population in Hong Kong: a 10-year review at a university hospital. Pediatr Emerg Care 2018;34:179-84.
4. Tham LP, Chan I. Paediatric out-of-hospital cardiac arrests: epidemiology and outcome. Singapore Med J 2005;46:289-96.
5. Schindler MB, Bohn D, Cox PN, et al. Outcome of out-of-hospital cardiac or respiratory arrest in children. N Engl J Med 1996;335:1473-9.
6. American College of Surgeons Committee on Trauma; American College of Emergency Physicians Pediatric Emergency Medicine Committee; National Association of EMS Physicians; American Academy of Pediatrics Committee on Pediatric Emergency Medicine; Fallat ME. Withholding or termination of resuscitation in pediatric out-of-hospital traumatic cardiopulmonary arrest. Pediatrics 2014;133:e1104-16.
7. American Heart Association. Highlights of the 2020 American Heart Association Guidelines for CPR and ECC. 2020. Available from: https://cpr.heart.org/-/media/cpr-files/cpr-guidelines-files/highlights/hghlghts_2020_ecc_guidelines_english.pdf. Accessed 3 Apr 2021.
8. Fan KL, Leung LP, Siu YC. Out-of-hospital cardiac arrest in Hong Kong: a territory-wide study. Hong Kong Med J 2017;23:48-53.
9. Yan S, Gan Y, Jiang N, et al. The global survival rate among adult out-of-hospital cardiac arrest patients who received cardiopulmonary resuscitation: a systematic review and meta-analysis. Crit Care 2020;24:61.
10. Wu WY. Out-of-hospital cardiac arrest: the importance of a registry. Hong Kong Med J 2019;25:176-7.