

Organ donation in the paediatric intensive care unit: Time for change?

Kristy Xinghan Fu^{1,2} MRCPCH, Sze Lyn Jasmin Jeanette Tan^{3,4} MMed (Anaesthesiology),
Ne-Hooi Will Loh^{3,4} FRCA

Organ transplantation remains the definitive treatment option for improving the lives of patients with end-stage organ failure. To our knowledge, the first solid organ transplantation performed in Singapore in July 1970 involved a kidney from a deceased donor.¹ Since then, rapid advancements in both transplant surgery and immunosuppressive medical therapy have enabled solid organ transplantation to better meet the increasing demands of a growing Singapore population with end-organ diseases. Yet, the supply of donor organs lags behind the demand.²

Singapore has a low deceased organ donation rate of 4.67 persons per million population in 2023, compared to the global average rate of 6.84.³ Addressing the availability of donor organs becomes the crux in sustaining a successful national organ transplantation programme. Paediatric deceased donors represent a small percentage of donors, with lower donation rates than adults and further decreasing with time.⁴ This is mostly due to improved paediatric safety efforts and reduced mortality.^{5,6} Regardless, donor paediatric organs remain an extremely valuable resource for both adults and children.

A possible explanation for the dismal rate of deceased organ donation is the low referral rate of potential donors by intensive care units,^{1,5} coupled with a disappointing conversion rate. A survey done in 2007 revealed that 69.8% of 86 referred donors did not donate because of cardiac arrest prior to the declaration of brain death, early withdrawal of life support, inability to meet brain death certification, and a lack of consent for organ donation¹ as paediatric deceased organ donation requires parental consent under the Medical (Therapy, Education and Research) Act passed by the Singapore Parliament in 1972. Even the first Singapore paediatric donation after circulatory death occurred only in 2020.⁷

In this issue of *Annals*, Low et al.⁸ present a single-centre audit study of 1766 children admitted to a paediatric intensive care unit (PICU) in Singapore with a low mortality rate of 5.6% and standardised mortality ratio of 2.1. The advancements made in paediatric healthcare limits the availability of paediatric organ donors. Among the study population, 7.8% had a prolonged PICU stay of more than 2 weeks. These patients were more likely to be sicker at admission based on Pediatric Index of Mortality 3 (PIM 3) scoring, have an underlying chronic condition, be technologically dependent and have a poorer baseline functional state based on functional status scale (FSS) at admission. Comparing survivors and non-survivors, multivariate analysis revealed that the presence of comorbidities, higher PIM 3 scoring and lower functional status scale at admission were all independent and statistically significant factors associated with PICU mortality. Among the non-survivors, 76.8% were deemed ineligible for organ donation when investigators reviewed perimortem medical records (up to 72 hours before terminal event). Of the remaining 23.2% who were independently deemed to be potential organ donors, more than half were not referred for assessment as potential organ donors.

Paediatric organ donation is almost always preceded by tragedy. The death of a child goes against nature, leaving caregivers in a whirlwind of emotions. Healthcare professionals in the PICU are not spared from the harsh reality as they confront the death of a child in their care—something we know is not commonplace, based on the mortality rates of PICUs in developed countries. These emotional factors, combined with unfamiliarity in leading conversations regarding organ donation amid a multicultural and multi-ethnic backdrop of Singapore's population landscape, and the lack of a well-practised workflow⁷ with the provision of a sufficiently trained organ donation coordinating

The Annals is an open access journal, allowing non-commercial use under CC BY-NC-SA 4.0.

¹ Department of Paediatrics, Yong Loo Lin School of Medicine, National University of Singapore, Singapore

² Khoo Teck Puat – National University Children's Medical Institute, National University Health System, Singapore

³ Department of Anaesthesia, National University Hospital, Singapore

⁴ Division of Critical Care, National University Hospital, Singapore

Correspondence: Dr Ne-Hooi Will Loh, Department of Anaesthesia, National University Hospital, 5 Lower Kent Ridge Road, Zone G, Level 3, Singapore 119074.

Email: will_ne_hooi_loh@nuhs.edu.sg

Accepted: 19 January 2025

team, this could create a general impression that paediatric organ donation is fraught with barriers and should only be considered in rare circumstances. Missed donation opportunities were primarily due to a lack of identification of potential donors and timely referral with some contributory factors, including perceived medical unsuitability and unclear disease processes leading to death.⁵ Therefore, as suggested by Low et al.,⁸ an independent team in charge of screening for organ donation eligibility in patients who are critically ill and have 1 or more risk factors that are associated with a higher probability of mortality (PIM 3 score, FSS, or presence of comorbidities), could be an effective method to optimise identification of potential donors. The subsequent approach for discussion of donation with the family must be thoughtfully planned and executed sensibly. Data suggest that practitioners with specialised training for the approach and consent discussions with families are associated with higher consent rates.^{9,10} Other suggested ideas to improve deceased organ donation rates include having specialised teams approach families for consent for every patient whose end of life is being considered. Patients identified as possible organ donors should be referred early and routinely to the donor transplant coordinator, regardless of the perceived aetiology of the cause of death or past medical history.⁹

Organ donation is an intensely personal decision, particularly following the loss of a child. Families should never feel pressured to make such a decision, as it offers no immediate benefit to the donor. Organ donation can provide a meaningful legacy, but it is essential that families are afforded the support and information necessary to make an informed choice.

Further work needs to be done in Singapore as we move toward establishing local policy and increasing awareness and acceptance towards pediatric organ donations.

Disclosure

The authors declare they have no affiliations or financial involvement with any commercial organisation with a direct financial interest in the subject or materials discussed in the manuscript.

Keywords: consent, organ donation, paediatric intensive care unit, paediatrics, PICU

REFERENCES

1. Kee T, Shridhar Ganpathi I, Sivathasan C, et al. Solid Organ Transplantation in Singapore. *Transplantation* 2018;102:1397-400.
2. Kwek TK, Lew TW, Tan HL, et al. The transplantable organ shortage in Singapore: has implementation of presumed consent to organ donation made a difference? *Ann Acad Med Singap* 2009;38:346-8.
3. IRODaT. Singapore Deceased and Living Organ Donor Evolution. International Registry in Organ Donation And Transplantation; 2017. https://www.irodat.org/?p=database&c=_S. Accessed 16 January 2025.
4. Godown J, McKane M, Wujcik K, et al. Expanding the donor pool: regional variation in pediatric organ donation rates. *Pediatr Transplant* 2016;20:1093-7.
5. Weiss MJ, Pérez Blanco A, Gelbart B. Special issues in pediatric deceased organ donation. *Intensive Care Med* 2019;45:361-3.
6. Workman JK, Myrick CW, Meyers RL, et al. Pediatric organ donation and transplantation. *Pediatrics* 2013;131:e1723-30.
7. Thong WY, Chong PH, Koh PL, et al. First pediatric organ donation after circulatory determination of death in Singapore: Facing challenges in the absence of a local practice guideline. *Pediatr Transplant* 2020;24:e13740.
8. Low JZH, Lim JKB, Tan HL, et al. Epidemiology of paediatric intensive care unit admissions, deaths and organ donation candidacy: A single-centre audit. *Ann Acad Med Singap* 2025;54:17-26.
9. Domínguez-Gil B, Murphy P, Procaccio F. Ten changes that could improve organ donation in the intensive care unit. *Intensive Care Med* 2016;42:264-7.
10. Domínguez-Gil B, Coll E, Elizalde J, et al. Expanding the Donor Pool Through Intensive Care to Facilitate Organ Donation: Results of a Spanish Multicenter Study. *Transplantation* 2017;101:e265-72.