

Commentary

Mechanical Insufflation-Exsufflation in Acutely Ventilated Children: A useful tool or another white elephant?

Colin Hamilton¹ , Zoe Foster¹, Holly Brown¹

¹ Physiotherapy, Cambridge University Hospitals NHS Foundation Trust

Keywords: Paediatrics, Mechanical Insufflation-Exsufflation, PICU

<https://doi.org/10.56792/DNNO9966>

Journal of the Association of Chartered Physiotherapists in Respiratory Care

Vol. 57, Issue 2, 2025

How best to support the secretion clearance and lung mechanics of our children who are acutely ventilated on the Paediatric Intensive Care Unit (PICU) is a challenge that physiotherapists face every day.¹ Whilst we have a variety of techniques that we have used for many years, we must acknowledge the risks that come with physiotherapy in such a vulnerable population² and continually question whether we are doing the best for our patients. This questioning brings with it the challenge to always be thinking about how we can improve our practice and being open to changes in care.

Recently, we were joined on our PICU by two wonderful rotational physiotherapists who again challenged us on our lack of use of Mechanical Insufflation-Exsufflation (MI-E) with our children who are acutely ventilated. They had worked in our adult units and seen its use there. Using the age-old educator trick,³ we encouraged them to go find the evidence and come back to us. After a thorough but fruitless search by our librarians, and a generous discussion with an adult physiotherapist who had published in the area,⁴ they ultimately came back largely empty-handed, apart from a survey looking at current practice.⁵

This raises the head of the age-old challenge for Children's Physiotherapists who work in many areas, but especially PICU. How do we know what the best treatments are for the children in our care? Do we stick with our old favourites, which inevitably sees me reaching for the Mapleson bag time and time again, along with the majority of my colleagues,⁵ or do we embrace the new techniques with no evidence to support us? I have been practicing long enough to remember the excitement around High-Frequency Chest-Wall Oscillation, for example "The Vest".⁶ I have therefore seen its trajectory from being a panacea to finding relatively niche (but anecdotally effective) use in a small number of patients. In the end, work was done which found it was not better than traditional techniques, and may even be worse in some situations.⁶ This and its high price point, appears to be what has limited its practice.

MI-E has broken through in the adult world,⁴ with dedicated researchers investigating its use. In paediatrics as well, MI-E has been a staple in neurodisability and long-term ventilation for a decade.⁷ A survey of PICUs in the UK found that a majority of clinicians who responded are us-

ing MI-E in ventilated children,⁵ and we have recently published on our unit's use of MI-E in children with cystic fibrosis.⁸ We still, however, do not have the data in children to convince me that it is better in safety or clinical effectiveness than the standard manual hyperinflation (MHI).

As we know, it is used in many PICUs.⁵ I, myself, have used it on self-ventilating and long-term ventilated patients a great deal. The acutely ventilated cohort I would argue is different, and as always in paediatrics we have the privilege of dealing with neonates whose lungs are taking their first breath in a fundamentally different way to adults, all the way through to young people who if they had been admitted a day later would have been admitted to an adult intensive care.⁹ During our rotational staff's 7 months with us, they only identified one acutely ventilated child who had an impaired cough secondary to a neurological condition and who, despite the use of all the treatment modalities in our toolkit, the patient continued to deteriorate, and we felt MI-E may possibly benefit the child over traditional techniques. This leads my "gut" to tell me that MI-E will find its place in a limited number of patients for whom MHI is too risky. However, I am excited to be proved wrong.

I haven't answered the question that I have set in this commentary, and at this point, I can't. My greatest hope is that a researcher takes on this question, as has happened in adults, and provides us with the answers on safety and effectiveness that we need. In the meantime, however, I would encourage my colleagues who use MI-E in practice to start publishing their data on safety and effectiveness to allow all to benefit from their experience. In paediatrics, again and again, we have said the children in our care are not little adults,⁹ so like our medical colleagues do, we should take note of evidence in adults but not rely on them for our evidence base.

Also, again, I am reminded of the benefits that passionate rotational staff bring to a unit through the pollination of ideas and challenging of established practice. To all rotational staff out there, please know that yes, you are here to learn, but also know that without you patient care would stagnate. Until you decide to become static, keep rotating, keep challenging, you are a vital part of a living paediatric team.

Key points

- Mechanical Insufflation-Exsufflation is being used in many Paediatric Intensive Care Units in acutely ventilated children.
- There is no evidence to show its effectiveness in children.
- While it is important to take into account adult data, significant risks exist if we do not understand how children respond to this treatment.

DECLARATION OF INTEREST

No authors have any interests to declare.

FUNDING

No funding was received for this work.

ACKNOWLEDGEMENTS

We were supported by Dr Veronica Phillips, Liaison Librarian (School of Clinical Medicine), University of Cambridge Medical Library, for the literature review.

Submitted: July 01, 2025 GMT. Accepted: September 18, 2025 GMT. Published: November 01, 2025 GMT.

.....



This is an open-access article distributed under the terms of the Creative Commons Attribution 4.0 International License (CCBY-4.0). View this license's legal deed at <http://creativecommons.org/licenses/by/4.0> and legal code at <http://creativecommons.org/licenses/by/4.0/legalcode> for more information.

REFERENCES

1. Shkurka E, Wray J, Peters M, Shannon H. Chest Physiotherapy for Mechanically Ventilated Children: A Systematic Review. *J Pediatr Intensive Care*. 2021;13(2):109-118.
2. Hussey J. Effects of Chest Physiotherapy for Children in Intensive Care after Surgery. *Physiotherapy*. 1992;78(2):109-113.
3. Ricotta DN, Richards JB, Atkins KM, Hayes MM, McOwen K, Soffler MI, et al. Self-Directed Learning in Medical Education: Training for a Lifetime of Discovery. *Teaching and Learning in Medicine*. 2022;34(5):530-540.
4. Swingwood E, Tume L, Cramp F. A survey examining the use of mechanical insufflation-exsufflation on adult intensive care units across the UK. *J Intensive Care Soc*. 2020;21(4):283-289.
5. Shkurka E, Wray J, Peters MJ, Shannon H. Chest physiotherapy for mechanically ventilated children: a survey of current UK practice. *Physiotherapy*. 2023;119:17-25.
6. Belli S, Prince I, Savio G, Paracchini E, Cattaneo D, Bianchi M, et al. Airway Clearance Techniques: The Right Choice for the Right Patient. *Front Med*. 2021;8. doi:[10.3389/fmed.2021.544826/full](https://doi.org/10.3389/fmed.2021.544826/full)
7. Hull J, Aniapravan R, Chan E, Chatwin M, Forton J, Gallagher J, et al. British Thoracic Society guideline for respiratory management of children with neuromuscular weakness. *Thorax*. 2012;67(Suppl 1):i1-40.
8. Lock K, Hamilton C. Investigating the use of Mechanical Insufflation – Exsufflation in young people with Cystic Fibrosis during inpatient admission. *ACPRC Journal*. 2025;57(1):21. <https://www.acprc.org.uk/media/4ykpurks/137043-investigating-the-use-of-mechanical-insufflation-exsufflation-in-young-people-with-cystic-fibrosis-during-inpatient-admission-1.pdf>
9. Anwar F, Mee H, Allanson J, Mendis E, Hamilton C. Pattern of injuries and management of adolescent trauma in a combined adult and paediatric major trauma centre in United Kingdom. *Trauma (United Kingdom)*. 2021;23(1):44-50. doi:[10.1177/1460408620921709](https://doi.org/10.1177/1460408620921709)