

Commentary

Optimizing the gift of life: Respiratory therapist-led, EIT-guided donor lung management

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Brain death initiates a pathophysiological cascade where neurogenic pulmonary edema and systemic inflammation jeopardize organ viability. Ventilator-induced lung injury can compound this damage, reducing the number of transplantable lungs. This commentary suggests that the next advancement in donor management may lie in transitioning from protocol-driven ventilation toward personalized, respiratory therapist (RT)-led lung protection guided by real-time bedside imaging. Drawing on the emerging role of Electrical Impedance Tomography (EIT), this commentary discusses how EIT may inform a practical model for RT-guided titration of care. Realizing this potential would require a concerted effort to generate evidence and develop structured training pathways. Such an approach would represent both a technical enhancement and an ethical obligation to honour the donor's gift through progressive respiratory stewardship.

THE LUNG AS THE EPICENTER OF ORGAN LOSS

The potential for organ donation is often compromised by preventable physiological collapse originating in the lungs. The brain death cascade involves a catecholamine surge causing neurogenic pulmonary edema, followed by systemic inflammatory activation that damages distant organs, but the lungs are often the first and most critically affected.¹⁻³ Iatrogenic ventilator-induced lung injury (VILI) can exacerbate this process.⁴ The result is a persistent shortfall: lungs that could save lives are lost, undermining donor autonomy and perpetuating the waitlist crisis. For RTs, bridging this gap requires a shift from generic, parameter-driven support to proactive, personalized lung management.

FROM GENERIC SUPPORT TO PERSONALIZED STEWARDSHIP

Donor management has evolved from basic physiological support to evidence-based, lung-protective bundles. The landmark trial by Mascia et al. established that a protective ventilator strategy (low tidal volume, higher PEEP, recruitment maneuvers) significantly increased lung transplantation eligibility.⁵ This was codified in subsequent consensus guidelines.⁶

Despite these advances, an important limitation persists. Management remains largely generic, with ventilator settings applied based on population-derived protocols, not the dynamic, heterogeneous physiology of the individual donor lung. The logical next step is a transition to visualized, personalized care.

The professional scope of respiratory therapy has consistently evolved alongside advancements in critical care technology. This evolution is underpinned by the development of structured education and credentialing pathways for novel bedside modalities, as demonstrated by the integration of lung ultrasound into RT practice.^{7,8} Early evidence for ultrasound in donor-specific lung assessment exists,⁹ yet its limited translation to routine management shows a gap between technological capability and clinical implementation. This precedent suggests that successful integration of EIT will similarly require collaborative implementation rather than technological availability alone.

THE TRANSFORMATIVE POTENTIAL OF ELECTRICAL IMPEDANCE TOMOGRAPHY (EIT)

If the injured donor lung represents a dynamic and evolving physiological environment, RTs would benefit from access to a real-time functional map. EIT is a non-invasive bedside technology that provides continuous, cross-sectional images of regional lung ventilation. In patients with hypoxemic respiratory failure, EIT has been extensively studied as a tool to support personalized mechanical ventilation by revealing the heterogeneous distribution of ventilation that cannot be inferred from respiratory mechanics alone.^{10,11} EIT's applications align closely with RT expertise and responsibilities.

The donor lung presents a unique and precarious pathophysiology. The combination of neurogenic edema, systemic inflammation, and the need for aggressive recruitment and pulmonary hygiene creates a volatile environment where the risk of VILI is high.¹⁻⁴ This is where EIT's capabilities offer its potential value.

EIT has been used to guide individualized PEEP titration by estimating regional lung collapse and overdistension, allowing clinicians to select ventilator settings that balance recruitment of dependent lung regions against the risk of overdistension in nondependent areas.¹⁰⁻¹² Instead of relying on fixed tables or estimates, RTs can use visual feedback

to titrate PEEP to the optimal balance between recruited lung and overdistention for the specific donor.

Beyond ventilator settings, EIT provides immediate intervention feedback. The efficacy of recruitment maneuvers or therapeutic lateral positioning can be confirmed in real-time, helping to confirm whether these interventions are effective. Studies demonstrated that EIT can visualize regional derecruitment associated with pulmonary hygiene procedures such as endotracheal suctioning or bronchoalveolar lavage, offering insight into procedure-related ventilation loss that would otherwise go undetected.¹³⁻¹⁵

In essence, EIT moves management from inference to direct guidance. While donor-specific data are currently lacking,¹⁶ these established physiologic capabilities suggest that EIT could plausibly enable RTs to tailor ventilation to the unique, shifting physiology of the donor lung, integrating seamlessly with diligent pulmonary hygiene and collaborative hemodynamic support.

A PROFESSIONAL AND ETHICAL IMPERATIVE

Adopting advanced monitoring, such as EIT, is not merely a technical decision. It reflects an ethical commitment to donation practice: respecting the donor's autonomous wish to save lives.¹⁷ RTs, as stewards of the ventilator, contribute directly to fulfilling that wish. Professional stewardship is informed by the prevailing standard of care. When technologies exist that may reduce preventable organ injury, thoughtful evaluation and integration may support this responsibility. EIT provides objective data, enhancing the RT's role as an evidence-based practitioner within the donor team and helps ensure reasonable efforts are made to honour the donor's gift.

A CALL TO ACTION FOR THE RESPIRATORY THERAPY COMMUNITY

This commentary proposes a collaborative, RT-led approach to integrating EIT into donor lung management. This perspective is informed by experience in critical care and involvement in donor management. Progress in this area may benefit from action across five fronts.

As an initial and feasible step, donor management programs could explore integrating EIT capability and pilot RT-led, EIT-guided ventilation strategies. Concurrently, professional respiratory therapy societies may collaborate with transplant organizations to support the development and implementation of evidence-informed clinical guidance that formalizes the RT's role in EIT-guided donor management. Building on existing competency-based models for advanced bedside monitoring, RT educational programs could develop structured pathways for EIT acquisition and

interpretation, supporting the emergence of a specialized donor lung stewardship role. To strengthen the evidence, RT-led or RT-involved research may evaluate whether EIT-guided management increases transplantable lung yield and improves recipient outcomes. Finally, RTs may contribute to articulating the value proposition to hospital administrations, demonstrating that investing in EIT and advanced training may improve organ utilization and reduce waitlist mortality.

CONCLUSION

Donor management is approaching a threshold of precision care, where real-time visualization may complement protocol-driven inference. By incorporating EIT, RTs can visualize lung physiology to personalize ventilation and more precisely target interventions. This approach has the potential to protect more lungs, preserve more organs, and more fully honour the profound gift offered by every donor.

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