



In reply: Remarks on autoresuscitation—Polish analysis of Lazarus syndrome

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To the Editor,

We read with interest Grześkowiak *et al.*'s letter¹ describing their systematic review of 66 cases of autoresuscitation following in-hospital or out-of-hospital cardiac arrest (OHCA), published as a brief report.² In contrast, we included reports of witnessed and monitored autoresuscitation occurring in any context after circulatory arrest, including withdrawal of life-sustaining measures with or without organ donation.³ Our review was limited to studies published in English or French, for feasibility, and excluded commentaries and editorials. Our search strategy was updated on 28 August 2021 (prior to publication of Grześkowiak *et al.*'s review) and considered the results of large contemporary observational studies, including Dhanani *et al.*'s Death Prediction and Physiology after Removal of Therapy study and Kuisma *et al.*'s study in OHCA patients.^{4,5}

With the focus squarely on providing evidence that ensures certainty and trust in the criteria for death

determination, it is important to examine if Grześkowiak *et al.*'s report identifies unique findings on autoresuscitation that differ from our systematic review. Among the 66 cases of autoresuscitation events, only 12 (18%) described any blood pressure monitoring, four of which reported invasive monitoring.² Twenty-two cases (33%) had no reported continuous monitoring.² The longest time to autoresuscitation was 180 min in a case report of unsuccessful resuscitation of OHCA, with no subsequent monitoring as the patient was transported to the morgue when spontaneous respirations were noted.⁶ Paucity of continuous vital sign monitoring among many case reports of autoresuscitation was also noted in our review. We also identified that, in the context of unsuccessful resuscitation of cardiac arrest, an observation time longer than five minutes may be needed for death determination.

The variability in observation and monitoring techniques in case reports of autoresuscitation underscores their potential bias and importance of appropriate vital sign monitoring during death determination by circulatory criteria in any context. The multicentre study by Dhanani *et al.* reported that, among 13 clinically identified autoresuscitation events, only five were corroborated by invasive blood pressure monitoring waveforms showing pulsatility.⁴ Considering this, we restricted our primary analysis of observation time following cessation of circulation to the observational studies with active monitoring. Resultantly, recommendations regarding the observation time for death determination by circulatory criteria following unsuccessful resuscitation of cardiac arrest reflect this uncertainty.⁷

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References

1. Grzeszkowiak M, Gaczkowska AD, Kluzik A, Rzeźniczek P, Pytliński A. Remarks on autoresuscitation—Polish analysis of Lazarus syndrome. *Can J Anesth* 2024; <https://doi.org/10.1007/s12630-023-02656-3>
2. Grzeszkowiak M, Gaczkowska AD, Bekata A, et al. People who survived their death. Advice for medical professionals based on the analysis of published cases worldwide. *Kardiol Pol* 2021; 79: 1375–7. <https://doi.org/10.33963/kp.a2021.0170>
3. Zorko DJ, Shemie J, Hornby L, et al. Autoresuscitation after circulatory arrest: an updated systematic review. *Can J Anesth* 2023; 70: 699–712. <https://doi.org/10.1007/s12630-023-02411-8>
4. Dhanani S, Hornby L, van Beinum A, et al. Resumption of cardiac activity after withdrawal of life-sustaining measures. *N Engl J Med* 2021; 384: 345–52. <https://doi.org/10.1056/nejmoa2022713>
5. Kuisma M, Salo A, Puolakka J, et al. Delayed return of spontaneous circulation (the Lazarus phenomenon) after cessation of out-of-hospital cardiopulmonary resuscitation. *Resuscitation* 2017; 118: 107–11. <https://doi.org/10.1016/j.resuscitation.2017.07.022>
6. Guven AT, Petridis G, Ozkal SS, et al. Lazarus phenomenon in medicolegal perspective: a case report. *Bulletin Leg Med* 2017; 22: 224–7. <https://doi.org/10.17986/blm.2017330661>
7. Shemie SD, Wilson LC, Hornby L, et al. A brain-based definition of death and criteria for its determination after arrest of circulation or neurologic function in Canada: a 2023 clinical practice guideline. *Can J Anesth* 2023; 70: 483–557. <https://doi.org/10.1007/s12630-023-02431-4>

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