

## London fog here, there and everywhere

Hannah Luu <sup>1,2</sup>, Jeremy W Cannon <sup>1,2</sup>

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**Commentary on** “Identification of Major Hemorrhage in Trauma Patients in the Pre-hospital Setting: Diagnostic Accuracy and Impact on Outcome” (Short Title: Pre-hospital Identification of Major Traumatic Hemorrhage) by Jared M Wohlgemut, *et al.* (tsaco-2023-001214.R1)

Level of Evidence: NA

In December 1952, a toxic fog enveloped London for 5 days resulting in thousands of deaths. This tragic event finally prompted life-saving air pollution mitigation policies in London and elsewhere.<sup>1</sup> It appears we need a similar wake-up call with haemorrhage. Despite initiatives such as STOP THE BLEED®, prehospital tranexamic acid and prehospital transfusion, haemorrhage remains the leading cause of preventable death in trauma patients in both civilian and military settings.<sup>2–4</sup> The present study by Wohlgemut *et al* examined the accuracy of London Air Ambulance physician diagnosis of traumatic major haemorrhage (MH) in the prehospital setting.<sup>5</sup> The authors found that MH was correctly identified in 97 out of 138 patients (sensitivity of 70%) and accurately excluded in 764 out of 809 (specificity 94%). Penetrating mechanism and abdominal injury were independently associated with missed MH diagnosis, and delayed diagnosis was independently associated with a threefold increase in mortality.

This study underscores the challenges of early recognition of MH, most likely due to early physiological compensation. Indeed, MH was missed in 41 of 138 patients by attending physicians of anaesthesia, intensivist and emergency medicine backgrounds resulting in increased risk of mortality. Overdiagnosis also represents a significant challenge leading to wasted hospital resources. Although this study could not presently be replicated in the USA due to limited physician presence in the prehospital environment, in Philadelphia, we face the same challenges with early recognition and diagnosis of MH due to rapid police transport of at-risk patients to trauma centres.<sup>6</sup>

Artificial intelligence (AI) and machine learning (ML) may facilitate early recognition of MH and increased diagnostic accuracy by leveraging very subtle cues indicating compensated haemorrhagic shock that may quickly spiral into uncompensated shock.<sup>7</sup> In a similar fashion, use of AI or ML in the prehospital setting could augment physician and medic or paramedic assessment leading to improved diagnostic accuracy. With increased awareness of

the diagnostic challenges associated with early MH recognition, and eventually the assistance of AI, we will hopefully clear the fog that continues to envelop our massively bleeding trauma patients here, there and everywhere.

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#### ORCID iDs

Hannah Luu <http://orcid.org/0000-0001-8585-6948>

Jeremy W Cannon <http://orcid.org/0000-0002-2969-9316>

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<sup>1</sup>Perelman School of Medicine at the University of Pennsylvania, Philadelphia, Pennsylvania, USA

<sup>2</sup>Department of Surgery, University of Pennsylvania, Philadelphia, Pennsylvania, USA

**Correspondence to**  
Dr Jeremy W Cannon; [jeremy.cannon@penmedicine.upenn.edu](mailto:jeremy.cannon@penmedicine.upenn.edu)