

Intubation of bleeding patients in the emergency department or the operating room: A medical decision to be justified

To the Editor:

We read with attention the recently published online work of Dunton et al.¹ analyzing the outcomes of patients undergoing immediate hemorrhage control surgery intubated in an emergency department (ED) or an operating room (OR). The analysis of 9,667 patients shows that patients intubated in the ER die significantly more than those intubated in the OR (17.4% Vs 7.1%, $p < 0.001$).¹ To minimize confounding, the authors take the choice to exclude patients dead-on-arrival, undergoing ED thoracotomy, or with clinical indications for intubation (severe head/neck/face injury or GCS < 8).¹ Despite this, a certain number of missing elements, whether in the profile of the patients or the timeline of their management, limit us in the analysis of the results.

The patients intubated in the ED are more severe (median injury severity score 22 Vs 17, $p < 0.001$) and more frequently suffer chest trauma (50% Vs 34.6%, $p < 0.001$) than those intubated in the OR.¹ However, we have no clinical (saturation or respiratory rate) or para-clinical (arterial blood gas) data to determine their degree of respiratory failure. There is a great risk of comparing patients who present a double failure, respiratory and circulatory, with patients presenting only a circulatory failure. We also do not know whether patients had extended focused assessment with sonography in trauma (e-FAST) or CT scan, to search for lung or pleural lesions that could decompensate after intubation. This knowledge or lack of knowledge comes into play in the medical decision to intubate. The indications of intubation were not collected by Dunton et al.¹ but with the clinical status of the patients showing a median Glasgow coma scale of 15 and systolic blood pressure of 107 mm Hg, it is not possible for us to assess the eligibility of intubation for patients in the ED.

More than the place, it is the moment of the intubation in severe trauma management that is important. As military physicians, we are very sensitive to optimizing evacuation times and reducing delays from the point of injury to the OR. As the authors state, rapid transport to the OR is a major process. But we unfortunately either do not have data on the time between the intubation and the surgery, to observe whether intubation in the ED slows down the surgery.

Another confounding factor may be the intubation protocol for patients in hemorrhagic shock. Indeed, if no induction drug has proven to be superior,² as well as preventive fluid bolus administration,³ this risky procedure must be the object of particular attention of the teams. A recent international high-quality observational study used a 30-minute threshold to collect data on adverse peri-intubation events.⁴ The small difference in median ED dwell time for patients who are intubated (9 minutes¹) there could reflect a lack of surveillance. Moreover, the better results reported by Dunton et al. in trauma centers are probably a reflection of this standardized management by trained teams.

One of the approaches to limit the mortality of patients requiring immediate hemorrhage control surgery is the choice made in France of prehospital medicalization. An early evaluation by a physician, at the point of injury, allows a rapid search for the causes of preventable deaths in trauma patients: hemorrhages, whether externalized or occult, airways injuries and compressive pneumothorax. This assessment is based on clinical examination, point-of-care biology and e-FAST. Damage-control resuscitation can be started quickly and continued during transport, with the military *en-route* care strategy. It leads to the referral of the patient directly to the OR, to the CT scan or to the ED. Continuous monitoring of vital parameters allows for anticipating and reacting to vital distress. This standardized management prioritizes the essential actions to be taken, as any delay has an impact on mortality.⁵ Delay intubation for saving time is a true medical decision.

Simon-Pierre Corcostegui, MD
French Military Health Service
Paris Fire Brigade
Paris, France

Julien Galant, MD
Nicolas Cazes, MD
French Military Health Service
Emergency Medical Service
Bataillon de Marins Pompiers de Marseille
13233 Marseille Cedex 20, France

The authors declare that they have no conflict of interest or funding.

REFERENCES

1. Dunton Z, Seamon MJ, Subramanian M, Jopling J, Manukyan M, Kent A, et al. Emergency department versus operating room intubation of patients undergoing immediate hemorrhage control surgery. *J Trauma Acute Care Surg*. 2023; Publish Ahead of Print.
2. Smischney NJ, Nicholson WT, Brown DR, Gallo De Moraes A, Hoskote SS, Pickering B, et al. Ketamine/propofol admixture vs etomidate for intubation in the critically ill: KEEP PACE randomized clinical trial. *J Trauma Acute Care Surg*. 2019;87(4):883–891.
3. Russell DW, Casey JD, Gibbs KW, Ghamande S, Dargin JM, Vonderhaar DJ, et al. Effect of fluid bolus administration on cardiovascular collapse among critically ill patients undergoing tracheal intubation: a randomized clinical trial. *JAMA*. 2022;328(3):270–279.
4. Russotto V, Myatra SN, Laffey JG, Tassistro E, Antolini L, Bauer P, et al. Intubation practices and adverse peri-intubation events in critically ill patients from 29 countries. *JAMA*. 2021; 325(12):1164–1172.
5. Gauss T, Ageron FX, Devaud ML, Debaty G, Travers S, Garrigue D, et al. Association of prehospital time to in-hospital trauma mortality in a physician-staffed emergency medicine system. *JAMA Surg*. 2019;154(12):1117–1124.

Intubation of bleeding patients in the emergency department or the operating room: A medical decision to be justified—reply

To the Editor:

Thank you to Corcostegui et al. for their interest in our recent article entitled “Emergency Department Versus Operating Room Intubation of Patients

J Trauma Acute Care Surg
Volume 95, Number 4

Undergoing Immediate Hemorrhage Control Surgery”.¹

In this article, we evaluated whether the location of intubation (emergency department [ED] vs. operating room [OR]) was associated with adverse outcomes among patients undergoing a hemorrhage control operation within 60 minutes of arrival at Level I or Level II trauma centers participating in the National Trauma Data Bank. Naturally, such a study using observational data is prone to confounding bias. For this reason, we excluded patients that were likely to have hard, clinical indications for intubation in the ED, such as those with severe head, face, or neck trauma, GCS \leq 8, or those undergoing ED thoracotomy. As a result, the median GCS and systolic blood pressure of the study cohort were 15 mm Hg and 108 mm Hg, respectively. It is therefore reasonable to conclude that, on average, the timing for intubation among patients in our study was guided by physician discretion, local protocol, or both.

After risk-adjusting for remaining differences in patient baseline and injury characteristics, intubation in the ED vs. OR was associated with higher mortality, longer ED dwell time, greater blood transfusion, and risk of major complications. In our hospital-level analysis, which minimized confounding by indication at the patient level, we found striking variation in use of ED intubation across the 253 trauma centers studied that could not be explained by differences in case mix. This variation was associated with adverse patient outcomes. Specifically, patients treated at “high ED intubation” compared with “low ED intubation” hospitals were 5-times more likely to be intubated in the ED (40% vs. 8%) and were 46% more likely to experience in-hospital cardiac arrest.

Corcostegui et al. have made several comments.

First, they point out the potential for residual confounding due to inherent differences between patients intubated in the ED vs. the OR. Specifically, that patients intubated in the ED suffered more severe chest injuries. They also point out that respiratory rate, O₂ saturation, arterial blood gas, eFAST, and CT imaging were not accounted for. Indeed, it is a limitation of a dataset such as NTDB that specific clinical information is often not available. Therefore, it is incumbent upon us as the investigators to take care in our study design to minimize

the possibility that our findings are due to confounding. We believe we achieved this, first by restricting our cohort to exclude patients with hard clinical indications for intubation (as described above), and subsequently through multivariable logistic regression. In our regression, we accounted for mechanism of injury, global (ISS) and anatomic injury severity (AIS by body region), as well as granular thoracic injury patterns such as rib fractures, lung injury, thoracic vascular injury, and cardiac injury. It is therefore unlikely that respiratory rate or O₂ saturation would confound our results in a manner not accounted for by the covariates included in our models. Furthermore, hemodynamically unstable trauma patients in need of urgent hemorrhage control surgery are not intubated on the basis of arterial blood gas, eFAST, or CT findings.

Second, they infer that we were unable to determine whether ED intubation delayed time to surgery because we did not directly evaluate the time interval between intubation and the surgery. We found that, after risk-adjustment, patients intubated in the ED spent 25% longer in the ED compared with their counterparts intubated in the OR. This “time lost” in the ED is not likely to be earned back, even under the best of circumstances. The hemodynamic consequences of intubation are better managed in the OR, where resuscitation can continue concurrently with surgical hemorrhage control. Therefore, it is reasonable to interpret the prolonged ED dwell times we found to be associated with ED intubation as an unfavorable outcome.

Third, they refer to the median 9-minute difference in ED dwell time between patients intubated in the ED versus the OR as “small.” Among patients with hemorrhage, 9 minutes is no small amount of time, and can mean the difference between life and death.²

Fourth, they correctly point out that differences in local protocols, standardized management, and team training is likely to affect both location of intubation and patient outcomes. We discuss this in our article. Specifically, we found that deferral of intubation to the OR was significantly more common at university-affiliated Level I trauma centers that treated the highest volumes patients requiring hemorrhage control surgery. These data suggest that the decision for ED intubation is heavily influenced by

institutional resources and experience in caring for bleeding trauma patients. There remains a need to clarify which structures and processes of care are characteristic of trauma centers that perform highly in caring for patients that undergo hemorrhage control surgery.

Finally, Corcostegui et al. suggest that greater prehospital medicalization will improve the mortality of patients that require hemorrhage control surgery. While this is a tangent to the purpose of our study, we do agree that select prehospital interventions such as tourniquet application, TXA, and transfusion are important strategies that may benefit some patients. However, the balance of evidence supports that “scoop and run” is the preferred system-level approach among bleeding patients treated at urban centers in the United States.^{3,4} Our study cohort were primarily hemodynamically unstable patients with penetrating injuries (firearm injury, 51%; stab injury, 21%). The study cited by Corcostegui et al.⁵ of a physician-led prehospital system included predominantly blunt trauma patients (92%), many with severe head injury (27%) and long prehospital times (median, 65 minutes), and is therefore not informative to optimizing prehospital or in-hospital processes of care for bleeding trauma patients.

Our study supports that, where feasible, intubation of patients that require urgent hemorrhage control should be deferred in favor of rapid resuscitation and transport to the OR. There is need to clarify which structures and processes of care are optimal, with the goal of elevating the quality of care at all trauma centers.

Madhu Subramanian, MD

Jeffrey Jopling, MD

James P. Byrne, MD, PhD

Division of Trauma and Acute Care Surgery
Department of Surgery
Johns Hopkins University School of Medicine
Baltimore, Maryland

The authors declare no funding or conflicts of interest.

REFERENCES

1. Dunton Z, Seamon MJ, Subramanian M, Jopling J, Manukyan M, Kent A, et al. Emergency department versus operating room intubation of patients undergoing immediate hemorrhage control surgery. *J Trauma Acute Care Surg*. 2023; Publish Ahead of Print.

2. Meizoso JP, Ray JJ, Karcutskie CA 4th, Allen CJ, Zakrisson TL, Pust GD, et al. Effect of time to operation on mortality for hypotensive patients with gunshot wounds to the torso: the golden 10 minutes. *J Trauma Acute Care Surg*. 2016; 81(4):685–691.
3. Seamon MJ, Fisher CA, Gaughan J, Lloyd M, Bradley KM, Santora TA, et al. Prehospital procedures before emergency department thoracotomy: “scoop and run” saves lives. *J Trauma*. 2007;63(1):113–120.
4. Winter E, Byrne JP, Hynes AM, Geng Z, Seamon MJ, Holena DN, et al. Coming in hot: police transport and prehospital time after firearm injury. *J Trauma Acute Care Surg*. 2022; 93(5):656–663.
5. Gauss T, Ageron FX, Devaud ML, Debaty G, Travers S, Garrigue D, et al. Association of prehospital time to in-hospital trauma mortality in a physician-staffed emergency medicine system. *JAMA Surg*. 2019;154(12):1117–1124.

Trauma care as health diplomacy

To the Editor:

In Jerusalem in March 2023, with great thanks to the dedicated efforts of leaders/health care workers in trauma, surgery, and emergency care, we were able to hold Operating Together's inaugural “Updates in Trauma Surgery” conference, marking a significant milestone in the ongoing efforts to enhance trauma care in the region. Our goal was to bring together Israeli and Palestinian health care workers dedicated to the care of trauma victims, provide an academic conference with the highest of standards, together with a platform for idea exchange, and strengthen the scaffold of interaction between regional colleagues.

Our philosophy is that optimizing trauma demands teamwork and regional cooperation.

For our reality, this means optimizing and standardizing the “trauma system” across political boundaries, which we believe will generate an immediate and sustainable improvement to the region's public health system. Cooperation, sharing, and professional development are vital to improving health care outcomes and providing optimal care in our communities. In the trauma field, these factors become even more significant where teamwork is key to optimizing patient care. Despite an increase in access to care through the use of improved technologies, injury and trauma are blind to socioeconomic status, religion, and geography and prevalent in every corner of society. The demand for trauma care is therefore universal, and to

achieve the highest level of care, neighbors need to work together. The tragic earthquake in Turkey and Syria is a reminder that disaster (or conflict) respects no borders, and we must work together for regional disaster preparedness and response plans.

Given the small geographical region and disparities in trauma care in the Palestinian and Israeli communities, trauma constitutes the ideal bridge for cooperation and formation of enduring professional and personal relationships. Operating Together of the Wolfson Medical Center has the primary goal of providing practical training and clinical experiences that will enhance the trauma team's level of care while indirectly creating a regional community of trauma care providers, which will also optimize the care of the trauma victim. This quilt of trauma care providers working together for the common goal of humanity has the potential to inspire policy change between Israelis and Palestinians.

This conference by Operating Together and the Hadassah Medical Center, together with the NGO Project Rozana and Rotary International, was the culmination of a year-long program that united more than 120 Israeli and Palestinian physicians to participate together (10 Israelis

with 10 Palestinians) in Advanced Trauma Life Support (ATLS) courses. These ATLS courses were made possible through the generous support of the ALTS Israel Chapter, which has been at the forefront of trauma care and education in Israel. For more than 25 years in Israel, the course methods and outcomes have stood up to significant scientific analysis and critical appraisal to ensure modernization and improvement both medically and educationally. Objective data from the Operating Together ATLS courses gave an average of 9.4/10 about the “overall feelings about the course,” and 93% of participants stated that they would want to maintain contact with their peers and work together for academic and/or patient care. These results demonstrate that our program is creating the framework for sustainable change at both the individual and community levels, which may have influence both locally and regionally.

This conference was a first of its kind for the trauma community, aiming for equal attendance and involvement by both Israeli and Palestinian health care workers, completely conducted in the common language of English, and free of charge for the participants. Despite occurring on a day and during a period of time, with an increase in violent conflicts,



Figure 1. One of the panel discussions.