

Great Expectations: Care Bundles can only be as Effective as the Component Elements!

Lalita Gouri Mitra¹, Atul Prabhakar Kulkarni²

Received on: 18 September 2022; Accepted on: 19 September 2022; Published on: 30 September 2022

Keywords: Endotracheal intubation, Intensive care unit, Intubation bundle, Intubation complication, Quality improvement.

Indian Journal of Critical Care Medicine (2022): 10.5005/jp-journals-10071-24340

Tracheal intubation (TI) is one of the most frequent procedures performed in intensive care units (ICUs). Performed routinely and safely in the operating rooms, it can have disastrous effects on critically ill patients due to “physiological” difficulties in addition to the usual anatomical difficulties. The problems are compounded by the location as well as inexperienced operators. Tracheal intubation, therefore, is a high-risk procedure in the ICU. Multiple studies have shown TI in critically can carry risks of severe hypoxemia and cardiovascular collapse, apart from metabolic acidosis, and other physiologic derangements.^{1,2} These complications are associated with increased 28-day mortality, and they may result in cardiac arrest, cerebral anoxia, and death.³

The goal of airway management in the critically ill is not only to secure the airway but also to ensure cardiorespiratory stability, by optimizing cardiorespiratory status prior to intubation and minimizing the number of intubation attempts to shorten the duration of intubation.

Care bundles, a set of evidence-based (three to five) straightforward practices, when performed collectively in a reliable manner, improve patient outcomes, are commonly used in critically ill patients.⁴ It must be emphasized here that a care bundle will likely be as effective as the elements which lend it its final form. Jaber et al. used an intubation bundle in a before and after study and found a significant reduction in TI-related complications. They termed this bundle, comprising ten interventions, the “Montpellier Bundle”⁵ Not many studies have validated this “bundle” independently. Natesh et al. tried to assess the effect of compliance with the interventions in the intubation bundle and patient outcomes. They found similar patient outcomes, regardless of whether the compliance with the bundle was partial or complete. They suggested that since many of the bundles were not evidence-based and some bundles had no direct effect on the outcomes of intubation, there was a need to revisit the bundle.⁶

The commonest complication of TI in the critically ill is cardiovascular collapse and cardiac arrest in many studies.^{1,3,7-9} Two recent randomized controlled trials have tried to address whether administering a fluid bolus before TI in critically ill patients will prevent this dreaded complication.^{10,11} These two trials called preventing cardiovascular collapse with administration of fluid resuscitation before endotracheal intubation (PrePARE and PREPARE II), infused 500-mL fluid bolus to prevent cardiovascular collapse in patients who were undergoing emergent intubation in the ICU. Cardiovascular collapse was defined as either systolic blood pressure below 65 mm Hg increased dose or need of vasopressors

¹Department of Anaesthesia, Critical Care and Pain, Homi Bhabha Cancer Hospital and Research Centre, New Chandigarh, Punjab, India

²Department of Anaesthesia, Critical Care and Pain, Division of Critical Care Medicine, Tata Memorial Hospital, Homi Bhabha National Institute, Mumbai, Maharashtra, India

Corresponding Author: Lalita Gouri Mitra, Department of Anaesthesia, Critical Care and Pain, Homi Bhabha Cancer Hospital and Research Centre, New Chandigarh, Punjab, India, Phone: +91 9971792343, e-mail: lgmitra@hotmail.com

How to cite this article: Mitra LG, Kulkarni AP. Great Expectations: Care Bundles can only be as Effective as the Component Elements! *Indian J Crit Care Med* 2022;26(10):1074–1075.

Source of support: Nil

Conflict of interest: Nil

or a systolic blood pressure below 65 mmHg between, or cardiac arrest or death in the immediate peri-intubation period. Both trials found that prophylactic administration of fluid bolus did not affect the primary outcome.

In this issue of the *Indian Journal of Critical Care Medicine*, Ghosh et al. report the effects of the implementation of the modified Montpellier Protocol in their unit on complications immediately following intubation.¹² They modified the Montpellier Protocol in the following ways: 1) Allowed use of propofol for induction; 2) Use of intermittent positive pressure ventilation (IPPV) after muscle relaxant; 3) Use of stylet for all intubations; and 4) Recruitment maneuver post-intubation. The routine use of stylet could have speeded up the intubation and this along with the administration of post-intubation recruitment maneuver could have possibly prevented profound hypoxia in their study. A recent study showed an increased success rate at the first attempt with the use of a stylet.¹³ The addition of propofol is a little perplexing since it can cause a precipitous fall in blood pressure, however, it was used only in two patients, thereby not compromising their overall outcomes. Similarly using positive pressure ventilation (PPV) with mechanical ventilation may be hazardous as it can lead to aspiration and so is the modified RSI technique which incorporates gentle mask ventilation without actually suggesting how much pressure to be used. Again, thankfully, it was used only in four patients, not affecting their results. The reduction in the incidence of hypotension due to fluid preloading is difficult to explain, particularly in view of the two randomized controlled trials PrePARE and PREPARE II which found that prophylactic fluid

preloading did not reduce the incidence of hypotension after intubation.^{10,11}

Lastly, the overall compliance with the modified bundle was only 14.3%, however, the authors report over 92% compliance with three elements of the bundle. A below 15% whole bundle compliance is astonishing. There are many reasons for non-compliance with the bundles. A systematic review found that if the number of elements in the bundle exceeds seven, there is a decrease in compliance, similarly, compliance with an element goes down with increasing complexity.¹³

Even though it is a small study, its importance stems from the fact that it stresses the importance of the need for an effort to reduce complications during intubation in the ICUs. Though a previous Indian study did not find difference in outcomes of intubation with the use of bundled intervention, both studies perform the most important function: they focus our attention on the fact that intubation is not without hazards, sometimes even fatal, and that all efforts should be made to reduce these attendant risks to improve outcomes.

ORCID

Lalita Gouri Mitra  <https://orcid.org/0000-0003-0253-6397>

Atul Prabhakar Kulkarni  <https://orcid.org/0000-0002-5172-7619>

REFERENCES

- De Jong A, Rolle A, Molinari N, Paugam-Burtz C, Constantin JM, Lefrant JY, et al. Cardiac arrest and mortality related to intubation procedure in critically ill adult patients: A multicenter cohort study. *Crit Care Med* 2018;46(4):532–539. DOI: 10.1097/CCM.0000000000002925.
- Cook TM, Woodall N, Harper J, Benger J. Fourth National Audit Project. Major complications of airway management in the UK: Results of the Fourth National Audit Project of the Royal College of Anaesthetists and the Difficult Airway Society. Part 2: Intensive care and emergency departments. *Br J Anaesth* 2011;106(5):632–642. DOI: 10.1093/bja/aer059.
- 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. DOI: 10.1001/jama.2021.1727.
- Resar R, Griffin FA, Haraden C, Nolan TW. Using Care Bundles to Improve Health Care Quality. IHI innovation series white paper. Cambridge, Massachusetts: Institute for Healthcare Improvement, 2012. Available at: www.IHI.org. Accessed date: 17 September 2022.
- Jaber S, Jung B, Corne P, Sebbane M, Muller L, Chanques G, et al. An intervention to decrease complications related to endotracheal intubation in the intensive care unit: A prospective, multiple-center study. *Intensive Care Med* 2010;36(2):248–255. DOI: 10.1007/s00134-009-1717-8.
- Natesh PR, Chaudhari HK, Kulkarni AP, Dangi M, Bhagat V, Siddiqui SS, et al. Compliance with intubation bundle and complications in critically ill patients: A need to revisit the bundle components! *Trends in Anaesthesia and Critical Care* 2022;42:26–33. DOI: 10.1016/j.tacc.2021.10.001.
- Perbet S, De Jong A, Delmas J, Futier E, Pereira B, Jaber S, et al. Incidence of and risk factors for severe cardiovascular collapse after endotracheal intubation in the ICU: A multicenter observational study. *Crit Care* 2015;19(1):257. DOI: 10.1186/s13054-015-0975-9.
- Russotto V, Tassistro E, Myatra SN, Parotto M, Antolini L, Bauer P, et al. Peri-intubation cardiovascular collapse in patients who are critically ill: Insights from the INTUBE study. *Am J Respir Crit Care Med* 2022;206(4):449–458. DOI: 10.1164/rccm.202111-2575OC.
- Marin J, Davison D, Pourmand A. Emergent endotracheal intubation associated cardiac arrest, risks, and emergency implications. *J Anesth* 2019;33(3):454–462. DOI: 10.1007/s00540-019-02631-7.
- Janz DR, Casey JD, Semler MW, Russell DW, Dargin J, Vonderhaar DJ, et al. Effect of a fluid bolus on cardiovascular collapse among critically ill adults undergoing tracheal intubation (PrePARE): A randomised controlled trial. *Lancet Respir Med* 2019;7(12):1039–1047. DOI: 10.1016/S2213-2600(19)30246-2.
- 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. DOI: 10.1001/jama.2022.9792.
- Ghosh S, Salhotra R, Arora G, Lyall A, Singh A, Kumar N, et al. Implementation of a revised montpellier bundle on the outcome of intubation in critically ill patients: A quality improvement project. *Indian J Crit Care Med* 2022;26(10):1106–1114.
- Jaber S, Rollé A, Godet T, Terzi N, Riu B, Asfar P, et al. STYLETO trial group. Effect of the use of an endotracheal tube and stylet versus an endotracheal tube alone on first-attempt intubation success: a multicentre, randomised clinical trial in 999 patients. *Intensive Care Med* 2021;47:653–664. DOI: 10.1007/s00134-021-06417-y.