Do Not Throw the Intubation Checklist Out With the Bath Water!

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In the current issue of *CHEST*, Janz et al[1] accurately reported the effect of a written, verbally performed, preintubation checklist compared with usual care on two coprimary outcomes: lowest arterial oxygen saturation and lowest systolic BP in critically ill adults undergoing endotracheal intubation.

The authors performed a nice prospective randomized controlled study in five ICUs (four medical ICUs, and one neurologic ICU) enrolling 267 patients. In the usual care group and in the checklist group, 130 and 132 patients, respectively, were included. The use of a preintubation checklist in the checklist group was not associated with significantly higher median lowest arterial oxygen saturation (from 92% in the usual care group to 93% in the checklist group; $P = .34$) or median lowest systolic BP (from 108 mm Hg [interquartile range, 90-132 mm Hg]) in the usual care group to 112 mm Hg (interquartile range, 94-133 mm Hg) in the checklist group ($P = .61$)). The authors concluded that the verbal performance of a written preprocedural checklist does not increase lowest arterial oxygen saturation or lowest systolic BP during endotracheal intubation of critically ill adults compared with usual care.

Checklists are designed to provide practical tools that help with planning and optimizing a procedure. Checklists are composed of a list of items required, things to be done, or points to be considered and is used as a reminder. Tracheal intubation seems an ideal situation for applying the checklist. Managing the airway of at-risk patients presents some unique challenges for intensivists.[2] The combination of a limited physiological reserve in these patients and the potential for difficult mask ventilation and intubation[3] mandates careful planning with a good working knowledge of alternative tools and strategies in case of conventional attempts at securing the airway fail. Preoxygenation techniques such as noninvasive ventilation[4] and high-flow nasal oxygen[5] can be combined to limit the risk of hypoxia during the intubation attempt. Fluid loading and early introduction of vasopressors may decrease the occurrence of hemodynamic intubation-related complications.[6,7] To limit the incidence of severe complications occurring after this potentially hazardous procedure, it is now well demonstrated that the whole process before, during, and after the intubation procedure should be guided by protocols geared toward patient safety.[8] A multicenter study described how implementation of a bundle protocol could improve the safety of airway management.[7]

In the study by Janz et al,[1] the checklist was constituted of the following items: preoxygenation performed; suction hooked up and functioning; laryngoscope and tracheal tube set up and tested; difficult airway devices immediately available; capnography available; MACOCHA score[3] assessment; presence of a supervising attending physician, respiratory therapist, and nurse; IV access functioning; drugs used for intubation reviewed; and verbalization of the airway management and backup plan. As was well underlined by the authors, the checklist was composed of items almost always performed and a guideline-recommended routine. However, the checklist did not include items that could further improve BP and arterial oxygen saturation and reported as being efficient in reducing complications

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in the literature.[5,7] Items specifically directed at improving physiological parameters could have been added, including the method of preoxygenation, noninvasive ventilation[4] or apneic oxygenation,[5,9] and hemodynamic optimization using fluid loading and vasopressors[7] before intubation. The integration in the checklist of a specific ICU-dedicated intubation algorithm[8] in case of predicted or unpredicted difficult intubation, allowing the use of material for difficult intubation such as stylets or video laryngoscopes,[10,11] might also have reduced the complications related to intubation. In the study of Janz et al[1] the choice of simple verbal items performed routinely, without additional interventional approaches in a nonstandardized intubation procedure, therefore limits the interpretation of the results regarding the efficacy of the implementation of a checklist for the intubation procedure in the ICU.

It is worth noting that the most patients with severe conditions were excluded if "intubation was so emergent that a randomization envelope could not be obtained, or treating clinicians felt a specific preintubation checklist or patient positioning was needed." However, a checklist could be most efficient in patients with the most severe conditions. The usual care group already had a low saturation and quite high systolic BP compared with the literature.[12] It seems difficult to further improve these variables using a verbal checklist.

In addition, the study was conducted in centers expert in the field of airway management, with a high penetrance of the checklist in the usual care group. Other less experienced centers could have their intubation-related complications further improved. It bears noting that a Hawthorne effect triggered by the use of the checklist in one of the groups is highly possible and could have biased the results. The Hawthorne effect is a psychological phenomenon in which individuals modify an aspect of their behavior in response to their awareness of being observed. In the nonblinded study of Janz et al,[1] contamination from the checklist group could have artificially increased the items performed in the control group (without the use of a checklist) and therefore decreased the complications related to intubation in the same control group. To avoid this effect, cluster randomization would have been interesting.

Finally, methodological limitations exist. First, for a convenience sample size, the authors defined as the primary outcome a surrogate end point "the lowest arterial oxygen saturation or systolic blood pressure during intubation." However, checklists are prepared for reducing procedural errors, which were used here as secondary end points. Second, the number of incomplete checklists (protocol violations) was quite high. Third, the sensitivity analysis was not forecast a priori in the protocol.

To conclude, Janz et al[1] showed that the use of a simple verbal checklist with restricted items does not increase the lowest arterial pressure or saturation during the intubation procedure. Maybe the checklist could be more efficient in patients with the most severe conditions, with less-trained teams, or in the case of a change in usual practice, with the implementation of new methods of preoxygenation or hemodynamic optimization all along the intubation procedure. A large multicenter clustered randomized study, involving expert and nonexpert centers and using a more complete checklist, could be performed before throwing out the checklist and could confirm the results reported by the first multicenter study that showed an improvement of the intubation procedure using a bundled checklist.[7]

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