Intubation checklist performance in a simulation model

Background

Timely performance of life-saving critical procedures is a cornerstone of Emergency Medicine (EM). Airway management is an example of a procedure about which EM specialists must have both knowledge and technical skill. Endotracheal intubation (ETI), a fundamental airway management skill, is often performed in the ED without luxury of time for preparation of patients or equipment. The uncontrolled and time-critical nature of ED ETI, combined with the fact that the procedure itself can be technically difficult, translates into ED ETI's representing a relatively high-risk situation for medical errors. Previous studies have shown value of checklists for other medical procedures (*e.g.* central venous access, surgery) also associated with patient safety risk.

Objectives

The study aimed to develop a checklist for ED ETI, and to assess the impact of use of the checklist during a simulated ETI on three endpoints: 1) Time required to complete ETI, 2) Success in completing required ETI critical actions, and 3) Operator perception of ETI safety and efficiency.

Methods

In a university-setting high-fidelity simulation lab, a case scenario consisting of a hypoxic/bradypneic adult was presented to a team of two EM residents and 2 ED nurses. The EM residents, who ranged in training from postgraduate year (PGY) 1 to PGY3, were randomly paired; no team contained residents from the same PGY year. Each team executed a rapid sequence ETI scenario with a difficult airway (*i.e.* the initial attempt was guaranteed to fail due to laryngospasm). Timing of the scenario's execution included times required for teams to meet three *a priori-*defined critical actions: 1) preoxygenation including apneic oxygenation with nasal cannula oxygen, 2) recognition of difficult airway/laryngospasm, and 3) recognition of, and response to, intra-ETI hypoxemia. Each team performed the scenario first using the checklist, and then again without use of the checklist (this approach was intended to assure any ordering bias was against the checklist). Critical action performance (including times required to complete all critical actions) was assessed during the simulation. Post-simulation survey of the residents assessed operators' perceived utility of the checklist. Statistical analysis (STATA 13MP, StataCorp, College Station, TX) included assessment of central tendency using means with standard deviation and 95% confidence interval (CI); proportions were reported with binomial exact 95% CIs. Significance was set at the $p < 0.05$ level.

Results

All critical actions were met in both checklist and control simulations. The checklist-facilitated airway simulation was associated with significantly shorter time intervals to complete each critical action (mean o f 12 *vs.* 27 seconds, $p = .004$). Post-simulation survey for the 20 pairs of residents executing the simulation revealed that 100% (97.5% one-sided CI, 83-100%) indicated checklist use would reduce chances of medical errors during ED ETI.
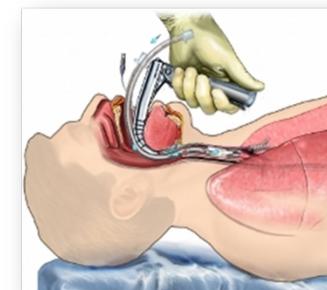
RIGOR Digital Checklist
Endotracheal Intubation Study

Conclusion

In a high-fidelity simulation environment with a difficult airway, use of a checklist allowed operators to move approximately three times faster to meet airway-related critical actions. These results, in addition to the unanimous indication by participating residents that checklists had a favorable impact on care, strongly suggest utility in continuing to assess checklist incorporation into selected ED procedures.

Authors:

Dan Himelic MD, Annette O. Arthur PharmD, Joshua Gentges DO, Boyd Burns DO, Stephen H. Thomas MD MPH

http://www.annemergmed.com/article/S0196-0644%2814%2900807-5/fulltext