BET 2: SHOULD REAL RESUSCITATIONISTS USE AIRWAY CHECKLISTS?

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ABSTRACT

A short cut review was carried out to establish whether the use of preprocedural checklists prior to intubation of critically ill patients outside a theatre environment can reduce the incidence of adverse events. Four directly relevant papers were found using the reported search strategy and presented the best evidence to answer the

Table 2 Relevant papers

Author, date and country	Patient group	Study type (level of evidence)	Outcomes	Key results	Study weaknesses
Conroy *et al*, 2014,[1] USA	Major trauma patients undergoing RSI in the ED before and after checklist was instituted	Retrospective 'before and after' unmatched cohort	Vital signs postintubation Complications during intubation Mortality	No significant difference No significant difference No significant difference	No data on proportion of patients that received intervention (all intubations after institution of checklist were assumed to have used it). Outcome measures not specified in plan. 67% of intubations in comparison group were performed by ED doctors, 99% in intervention group.
Shanmugasundaram *et al*, 2014,[2] UK	Patients undergoing intubation in the ED or ICU before (n=47) and after (n=52) a quality improvement initiative including use of a checklist.	Retrospective 'before and after' unmatched cohort	Major adverse incidents (MAI) as defined by NAP4 criteria	10.8% incidence of MAI preintervention, compared with 0% postintervention.	Small size and no power calculation. Retrospective closed loop audit (conference abstract). Intervention comprised several changes, unable to clarify effect of checklist individually. Difficult to gauge proportional use of checklist during the intervention period.
Kerrey *et al*, 2015,[3] USA	Critically ill children undergoing RSI in a paediatric ED, before and after institution of four quality improvement measures, including a checklist.	Retrospective 'before and after' unmatched cohort study	Incidence of desaturation (SpO_2 <90%) during RSI	Desaturation occurred in 33% of historical controls vs 16% of intervention cohort. ARR 17% (95% CI 4% to 28%)	Retrospective design. Multiple interventions studied at once, making if difficult to assess effect of checklist alone. Airway interventions restricted to certain operators as one aspect of the QI measures.
Smith *et al*, 2015,[4] USA	Major trauma patients undergoing RSI in the ED before and after introduction of a preprocedural checklist	Prospective observational 'before and after' unmatched cohort study	Complications (composite outcome) Paralysis to intubation time Adherence to recognised safety measures	Overall complication rate 1.5% in intervention group, 9.2% in control. ARR 7.7% (CI 0.5% to 14.8%) Median 92 s prechecklist, compared with 82 s postchecklist. 17.1% adherence prechecklist, improved to 69.2% postchecklist	No power calculation. Composite outcome—individual outcome measures show no significant difference. Incomplete compliance with checklist in treatment cohort. Significant likelihood of Hawthorne effect contributing to improved outcome measure.

clinical question. The author, date and country of publication, patient group studied, study type, relevant outcomes, results and study weaknesses of these papers are tabulated. It is concluded that preprocedural checklists may reduce adverse events in these patients, but that the evidence level is low and further matched cohort studies are needed to prove effectiveness.

CLINICAL SCENARIO

Your trauma patient rolls through the door. The blood pressure looks good and there does not appear to be any chest injuries. Disappointed, you put your new thoracotomy shears back in your pocket. You brighten up when you realise the patient has sustained a serious head injury and will need intubating. As you brandish your prefilled syringes of ketamine and rocuronium towards the patient the anaesthetist on the trauma team starts reading from the rapid sequence induction (RSI) checklist. Rolling your eyes, you point out that this is major trauma, not a Friday morning elective cholecystectomy and demand that they proceed with the intubation immediately. Anyway, you have already given the 'ROCKET' induction while you have been talking, so they better start doing something fast…

Later, while pulling on your lycra shorts and downing a seventh can of Monster energy drink, you reflect on the case. Initially, you are clear that the SpO_2 of 65% for a few minutes was unavoidable. Then you remember that the suction was found not to be working initially, the first laryngoscope failed and your plan B consisting of 'get out of my way and let me do it' seemed a surprise to everyone. You experience an unfamiliar twinge of self-doubt, and decide to read up on this checklist business after crossfit later…

THREE-PART QUESTION

In [critically ill patients requiring endotracheal intubation] does [the use of a preprocedural checklist] reduce [the incidence of adverse events].

SEARCH STRATEGY

A literature search of EMBASE, MEDLINE and CINAHL was conducted via NHS Evidence. Reference lists of relevant articles were also hand searched.

1. exp INTENSIVE CARE/
2. exp RESUSCITATION/
3. exp EMERGENCY CARE/
4. exp EMERGENCY PHYSICIAN/
5. exp EMERGENCY TREATMENT/
6. exp EMERGENCY WARD/
7. exp EMERGENCY MEDICINE/
8. (prehospital OR emergency OR critical OR intensive)ti.ab
9. exp ENDOTRACHEAL INTUBATION/
10. (intubation OR induction).ti,ab
11. exp CHECKLIST/
12. checklist.ti,ab
13. 1 OR 2 OR 3 OR 4 OR 5 OR 6 OR 7 OR 8
14. 9 OR 10
15. 11 OR 12
16. 13 AND 14 AND 15

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MeSH descriptor: [Checklist] explode all trees AND MeSH descriptor: [Intubation] explode all trees OR intubation ti, ab, kw 0 results

OUTCOME

184 articles were found and abstracts reviewed for inclusion. Four articles were directly relevant to the three-part question and are presented in table 2.

COMMENTS

Rapid sequence intubation in the critically ill patient is a high-risk procedure. Adverse events are common and can precipitate underlying injury, delay effective care and occasionally result in catastrophic patient outcome (Cook *et al* 2011, Fogg *et al* 2012).[5 6]

The use of checklists to reduce error rates in acute settings has been the subject of much debate. The WHO surgical checklist has been widely adopted as standard procedure in UK operating theatres.[7] The use of checklists for emergency situations outside of the operating theatre is more variable. In 2011, the UK Royal College of Anaesthetists carried out a national audit regarding complications of airway management in the UK (NAP4). High adverse event rates were noted within an ED/critical care setting and some of these complications were attributed to action teams with limited experience working in unfamiliar territory. As such one of the ensuing recommendations was the use of a checklist to facilitate a shared mental model and optimise the chance of first pass success. The level of evidence to directly support this recommendation is weak; most studies before or after NAP4 addressing the issue of airway checklists are observational, unmatched, before and after quality improvement measures comprising multifaceted interventions. As such they are prone to significant Hawthorne effect and confounding (Goodacre 2015).[8]

When recommending the use of a checklist the authors of NAP4 cite a prospective multicentre-controlled cohort study (Jaber *et al* 2010)[9] suggesting a significant decrease in life-threatening complications after introduction of an intubation management protocol. This study assessed the effectiveness of a bundled intervention including mandatory capnography, dual operator, positive pressure preoxygenation and other features now considered to be routine elements of emergency airway management, rather than the benefit of the checklist itself.

Despite the dearth of high-quality evidence airway checklists have become increasingly adopted, usually as part of local Quality Improvement initiatives designed to reduce adverse event rates. Indeed, evidence exists to support their benefit regarding information exchange, teamwork and perception of safety.[10] Use of checklists is intuitive and likely to be of benefit, providing regular educational update and review within a robust governance structure.

Clinical bottom line

Current evidence suggests there may be a potential reduction in adverse events with the use of preprocedural checklists, during intubation of the critically ill patient outside a theatre environment. However, this evidence is level 3 at best and should be considered hypothesis generating. Further evidence is required before airway checklists can be considered a standard of care.

Provenance and peer review Not commissioned; internally peer reviewed.

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