

Critical Review Form

Meta-analysis

Emergency intubation for acutely ill and injured patients.
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Objectives: “To determine in acutely ill or injured patients who have real or anticipated problems in maintaining an adequate airway, whether endotracheal intubation compared to other airway management methods improves outcome in terms of:

- reduction in hospital mortality or disability on leaving hospital
- reduction in the incidence of the following complications: aspiration pneumonia, multiple organ failure, cervical spine injury, length of hospital stay”. (p. 3)

Methods: Investigators conducted an electronic search (1950 thru December 2006 where applicable) of the Cochrane Injuries Group Specialized Register, Cochrane Central Register of Controlled Trials, MEDLINE, EMBASE, CINAHL, National Research Register, BIDS, ICNARC, and Zetoc for all randomized trials or controlled trials of injured or acutely ill patients of any age presenting to an ED. Adults with long-standing respiratory disease acute decompensation were excluded (because they are the subject of a [separate Cochrane Review](#)). Additionally, systematic review (SR) authors evaluated relevant study’s reference lists and contacted the first author of included studies to identify additional trials.

Endotracheal intubation did not have to be rapid sequence intubation (RSI) or pre-hospital. The primary outcomes were all-cause mortality and hospital discharge disability as measured by the Glasgow Outcome Scale. Secondary outcomes included the incidence of aspiration pneumonia, documented cervical spine injury, multiple organ failure, and hospital LOS.

Two SR authors independently examined titles, abstracts, and keywords of citations from the electronic database search results. Relevant records were obtained in full text for two (different?) authors to independently assess for pre-defined inclusion criteria. Data were extracted independently by two authors and trials were graded for adequacy of randomization, allocation concealment, and follow-up (Higgins JPT, et. al. Assessment of Study Quality,

Cochrane Reviewers' Handbook 4.2.5, Section 6, Cochrane Library 2005, volume 3). Due to the heterogeneity of patients, practitioners, and the alternatives to intubation used the results of this SR were not combined into a meta-analysis.

Guide	Question	Comments
I	<i>Are the results valid?</i>	
1.	Did the review explicitly address a sensible question?	Yes – does pre-hospital or ED emergent intubation decrease mortality or injury/illness related morbidity.
2.	Was the search for relevant studies details and exhaustive?	Yes, the SR authors conducted a well-described and extensive electronic and bibliography search. They did <u>not</u> conduct a hand-search of research abstracts which are not electronically archived, nor did they contact commercial interests. Surprisingly, they failed to identify Potter's controlled trial (PGY-III paper).
3.	Were the primary studies of high methodological quality?	Yes – two trials received grade D for allocation concealment (because they used a calendar day allocation scheme), while the other received a B. Neither those performing airway intervention nor outcome assessors were blinded in any study.
4.	Were the assessments of the included studies reproducible?	Uncertain since the SR authors do not report rater discrepancies or any measure of reproducibility (Kappa).
II.	<i>What are the results?</i>	

1.	What are the overall results of the study?	<ul style="list-style-type: none"> • Search strategy revealed 13,000 articles with full-text review ultimately completed on 452 with 3 RCT's ultimately include in the SR. • Gausche 2000 evaluated paramedic non-RSI ETI vs. bag-valve-mask (BVM) in 830 children <13 years old (71% non-traumatic cardiac arrest, 13% respiratory arrest, 8% status epilepticus) with 57% EMS ETI success rate and no survival (26% vs. 30%; OR 0.82, 95% CI 0.61 – 1.11) or neurological advantage (good outcome 23% vs. 20%; OR 0.87, 95% CI 0.62 – 1.22). <u>Only 42% of the group randomized to EMS ETI actually received it.</u> • Goldenberg 1986 evaluated paramedic ETI vs. paramedic esophageal gastric tube airway (EGTA) on 175 adult non-traumatic out-of-hospital (OOH) cardiac arrest patients demonstrating a non-significant survival advantage for EGTA (11.1% vs. 12.9%, RR 0.86 (95% CI 0.39 – 1.90). <u>Because 17% of subjects received the opposite airway intervention, an adjusted analysis widened this difference (10.9% vs. 15.4%).</u> • Rabitsch 2003 compared physician ETI with physician combitube in a <i>physician-run</i> pre-hospital setting testing 172 adult non-traumatic OOH cardiac arrest patients demonstrating a non-significant improvement in survival favoring the combi-tube (3% vs. 6%, RR 0.43, 95% CI 0.09 – 1.99). • Adverse consequences were only reported by Rabitsch with pulmonary aspiration 2% combitube vs. 0% ETI. • ETI success rates reported as 57% for pre-hospital setting in children vs. 90% for adults via EMS. EMS EGTA had 70% - 90% success rate. Physician pre-hospital ETI success rates were 94% and pre-hospital physician combitube success rates were 98%.
2.	How precise are the results?	See CI above. All studies were under-powered so CIs cross one.
3.	Were the results similar from study to study?	No – different interventions and outcome measures on heterogeneous populations so result cannot be directly compared or combined.

III.	<i>Will the results help me in caring for my patients?</i>	
1.	How can I best interpret the results to apply them to the care of my patients?	Currently there is insufficient high-quality data available to comment on the efficacy of emergency ETI by paramedics in the pre-hospital setting. Although prompt airway management with ETI is advocated as life-saving, current trials do not constitute definitive evidence. Thus, large high-quality randomized trials comparing ETI efficacy to basic maneuvers in urban OOH cardiac arrest patients are needed to refine current practice. In the meantime, pre-hospital definitive airway interventions ought not take priority over rapid transfer to definitive trauma center care.
2.	Were all patient important outcomes considered?	No - adverse consequences (aspiration, esophageal intubation) were not consistently evaluated. Additionally, EMS faculty noted that the most definitive evidence (Gausche 2000) was biased in that study personnel spent much more time training pre-hospital EMS BVM techniques than they did on intubation.
3.	Are the benefits worth the costs and potential risks?	No – based on this evidence best-practice recommendations for urban EMS systems should advocate BVM in scoop and run scenarios pending more definitive research findings.

Limitations

- 1) Incomplete search strategy not assessing abstracts or industrial trials.**
- 2) No assessment for publication bias.**
- 3) Failure to incorporate any of 56 non-randomized or non-controlled studies evaluating this issue. Although the authors detail their rationale for excluding these studies (p. 12 – 20), given the relative absence of available RCTs and the general importance of this question with several large prospective observational trials, additional discussion of these lower quality forms of scientific evidence would have enhanced this discussion.**
- 4) Studies limited to urban settings so cannot necessarily extrapolate to rural EMS systems with longer transport times.**

Bottom Line

Currently there is insufficient high-quality data available to comment on the efficacy of emergency ETI by paramedics in the pre-hospital setting. Although prompt airway management with ETI is advocated as life-saving, current trials do not constitute definitive evidence. Thus, large high-quality randomized trials comparing ETI efficacy to basic maneuvers in urban OOH respiratory arrest or airway-threatened patients are needed to refine current practice. In the meantime, pre-hospital definitive airway interventions should not take priority over rapid transfer to definitive trauma center care. EMS success rates for ETI are reported as 57% for pre-hospital setting in children compared with 90% for adults.

