



Article Appraisal

Article: Association Between Tracheal Intubation During Adult In-Hospital Cardiac Arrest and Survival
Andersen LW et al. JAMA. 2017 Feb 7;317(5):494-506

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Background and Study Objective(s):

The relationship of tracheal intubation with survival in cardiac arrest remains unclear. The aim of this study was to evaluate the association between intubation during adult in-hospital cardiac arrest and survival to hospital discharge.

Study Design:

This retrospective observational cohort of 108,079 in-hospital cardiac arrest patients at 668 US hospitals from a large AHA sponsored arrest registry covered the years 2000 to 2015. Tracheal intubation during the first 15 minutes of the arrest was compared to no intubation between propensity matched patients from the same cohort. The primary outcome was survival to discharge; secondary outcomes were ROSC and functional outcome at discharge. Pre-specified subgroups included initial cardiac rhythm and respiratory distress prior to arrest. Propensity score matching was used to adjust for measured covariates between these groups. Matching was time-dependent because of the time-dependent impact of interventions (such as epinephrine and intubation) during cardiac arrest. Furthermore, intubated patients were 'risk-matched' to a comparable a non-intubated patient during the same minute of arrest, although the 'non-intubated' comparator might be intubated at a later minute. This accepted approach allows for better patient matching during an arrest (see supplement) by the principle that compared patients have the same 'risk' of being intubated during that particular minute. Inclusion criteria: >18 years, index arrest, no invasive airway in place; employees and visitors were excluded.

Results:

Median patient age was 69 years, 42% were female and 22.4% survived to hospital discharge. A total of 43,314 patients who were intubated within 15 minutes were matched 1:1 with patients who were not intubated during the same minute. Overall, 68% of the 'no intubation' group was intubated at some time point after the matching, with a median time to intubation of 8 minutes, whereas the median time to intubation in the 'intubation' group was 4 minutes. In the propensity-adjusted analysis, survival was lower among patients who were intubated compared with those not intubated at that moment: 16.3% vs 19.4%, respectively (risk ratio [RR] = 0.84; 95% CI, 0.81-0.87; P < .001). The proportion of patients with ROSC was slightly lower among intubated patients than those not intubated: 57.8% vs 59.3%, respectively (RR = 0.97; 95% CI, 0.96-0.99; P < .001). Good functional outcome was also lower among

intubated patients than those not intubated: 10.6% vs 13.6%, respectively (RR = 0.78; 95% CI, 0.75-0.81; P < .001). In summary, intubation resulted in a 3% absolute risk reduction (ARR) in survival to hospital discharge, 2% ARR in ROSC and 3% ARR in good functional outcome. Subgroup analysis found that intubation was associated much more strongly with decreased survival among patients with an initial shockable rhythm, whereas intubation was not significantly associated with negative outcomes in patients with preexisting respiratory insufficiency.

Validity of Results:

This study has appropriately recruited patients and a clearly focused question. Exposure and outcomes were both appropriate and appear to have been accurately measured. However, potential confounders such as CPR quality, (chest compression depth / fraction / rate) cause of arrest, (ie primary cardiac versus hypoxia) and failed intubation attempts were not measured. Given that the 2010 AHA guidelines emphasized CPR over airway management, and that the study spanned this change in practice, it is possible that the improved outcomes in the 'non-intubated' group were due to better CPR quality. These concerns ensure that ensure validity of the results may be challenging.

Generalizability of Results:

The large sample sizes and multicenter nature of this study make the results applicable to a broad inpatient demographic. However, the observational nature of this study is subject to many potential unmeasured confounders (CPR quality, cause of arrest, intubation attempts, etc.) making it very difficult to generalize these results to any specific setting. The evolution of CPR quality in AHA guidelines has fundamentally altered the focus of arrest care and is a barrier in generalizing this study's results to today's practice. Other variables such as repeated intubation attempts may also have influenced measured outcomes. Two subgroups that do appear to be more generalizable are the initial rhythm and respiratory distress group. The potential detrimental effects of intubation were more pronounced in patients with a shockable rhythm, for whom other interventions such as early defibrillation are likely more relevant. Of all subgroup analyses, only patients with respiratory distress did not have worse outcomes with intubation.

The Bottom Line:

This paper suggests that intubation during in-hospital arrest is associated with worse survival to discharge, ROSC and functional outcome. While this large retrospective observational cohort was constructed from a robust registry, the study design was vulnerable to important unmeasured cofounders, most notably CPR quality. This is likely to have influenced outcomes as the trial was conducted both before and after the change in arrest guidelines to de-emphasize airway management (ABC -> CAB). Accordingly, we are unable to conclude that survival outcome was negatively influenced by intubation and the decision to intubate should be made on a case-by-case basis and especially for patients with preceding respiratory distress.