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Abstracts

☐ CORONARY ANGIOGRAPHY AFTER CARDIAC ARREST WITHOUT ST-SEGMENT ELEVATION.

Lemkes JS, Janssens GN, van der Hoeven NW, et al.
The New England Journal of Medicine. 2019;
380:1397-1407

Out of hospital cardiac arrest is a common cause of death in both the United States and Europe and coronary artery disease is the most frequent cause of cardiac arrest. Current international guidelines recommend coronary angiography and percutaneous coronary intervention (PCI) on an immediate basis in patients who have evidence of ST-segment elevation myocardial infarction (STEMI) in the setting of cardiac arrest. These guidelines on resuscitative care also recommend the same interventions in post-arrest patients without any evidence of STEMI if they do not have an obvious non-cardiac cause of arrest. However, there is limited evidence to currently support this practice for the patients without STEMI. Current evidence consists only of observational studies with varying outcomes.

The objective of this study was to determine if there is an increased survival benefit from immediate versus delayed coronary angiography in patients who were successfully resuscitated after out of hospital cardiac arrest (OHCA) without any evidence of STEMI. Researchers conducted a prospective, randomized controlled, open-label multicenter trial in the Netherlands of patients who presented to the emergency department (ED) in participating hospitals with return of spontaneous circulation (ROSC) after OHCA. Patients eligible for the study were randomized 1:1 while in the ED to either immediate or delayed coronary angiography. The immediate angiography group received angiography, and PCI if needed, within 2 hours of being randomized. The delayed angiography group received coronary angiography and PCI after they showed neurologic recovery. The primary outcome was 90-day survival. Secondary outcomes focused on 90-day survival with good cerebral performance, defined as a score of 1 or 2 on the Cerebral Performance Category (CPC) scale), laboratory markers, as well as duration and need for various other treatments, such as ICD placement, use of vasopressors, type and location of stent placement, and type of anticoagulant use. Factors such as anticoagulant choice and revascularization technique were left to physician discretion and were also listed in the secondary outcomes.

Of the 538 patients enrolled, 273 were assigned to the immediate angiography group and 265 to the delayed angiography group. 38 patients in the delayed angiography group ended up having urgent intervention performed due to development of symptoms such as STEMI, recurrent ventricular arrhythmia, and cardiogenic shock. Baseline characteristics were similar between the two groups. At 90 days they found that there was no difference in survival between the immediate and delayed angiography groups, with an odds ratio of 0.89 (95% CI: 0.62-1.27). Similarly, there was no difference in survival with good cerebral outcomes at 90 days (OR 0.94, 95% CI: 0.66-1.31). Other outcomes such as biomarkers, markers of shock, duration of ventilation, duration of pressure support, also did not show any difference.

The authors concluded that immediate cardiac angiography and PCI does not lead to increased survival at 90 days compared to delayed angiography in patients who achieved ROSC after cardiac arrest and did not have a STEMI.

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Comment: While these European patients may differ from the patient population in the United States, this study suggests that there is no survival benefit to immediate angiography for patients without evidence of STEMI after cardiac arrest. This deviates from current practice guidelines, which recommend emergent catheterization even in patients who do not present with a STEMI. These guidelines, though, were written based on observational data. Being the first randomized controlled trial to investigate the benefit of immediate angiography, these negative findings may lead to a shift toward a more conservative approach for this patient population.

☐ BAG-MASK VENTILATION DURING TRACHEAL INTUBATION OF CRITICALLY ILL ADULTS.

Jonathan D Casey, David R Janz, Derel W. Russell et al.
NEJM. 2019; 380: 811-821

Up to 40% of tracheal intubations are complicated by hypoxemia, which increases patients' risks for cardiac arrest and death. Bag-mask ventilation (BVM) is often used to prevent hypoxemia during intubation. This technique however, may increase the patient's chance of aspiration. The risk of gastric or oropharyngeal aspiration versus the benefit of preventing hypoxemia has been debated for over many years and thus the guidelines for oxygenation during tracheal intubation remains controversial.

The goal of this randomized trial was to determine the effect of bag-mask ventilation on preventing hypoxemia between induction and tracheal intubation. Patients over 18 years who were undergoing endotracheal intubation were eligible. Exclusion criteria included being pregnant or incarcerated, needing

immediate airway intervention preventing randomization, or if the treatment team felt BVM was either required or contraindicated. Patients were selected from seven academic intensive care units in the U.S and were randomized in a 1:1 ratio to receive either bag-valve mask ventilation or no-ventilation during the interval between induction and laryngoscopy. The primary outcome was the lowest recorded oxygen saturation on continuous pulse oximetry between induction and two minutes after tracheal intubation. The secondary outcome was the number of patients who had severe hypoxemia, defined as oxygen saturation below 80% during the same time interval. Additionally, authors recorded the number of operator-reported aspiration events as well as new opacities identified on chest x-ray within 48 hours of tracheal intubation that were consistent with aspiration. Intention-to-treat as well as per-protocol analyses were performed.

This study enrolled 401 patients with 199 patients assigned to the bag-mask ventilation and 202 assigned to no ventilation. At the time of induction, the oxygen saturation was not significantly different between each group. For the primary outcome, the median lowest oxygen saturation in the bag-mask ventilation group was 96% (interquartile range, 87 to 99) compared to 93% (interquartile range, 81 to 99) in the no-ventilation group (p=0.01). For the secondary outcome, 21 patients (10.9%) in the bag-mask ventilation group had oxygen saturations less than 80% compared to 45 patients (22.8%) in the no-ventilation group (relative risk, 0.48; 95% CI, 0.30 to 0.77). With respect to the additional outcomes, the two groups did not have a significant difference in operator reported aspiration (2.5% vs. 4.0%; absolute risk difference, -1.5 percentage points; 95% CI, -4.9 to 2.0; p=0.41) or new opacity on chest XR within 48 hours of tracheal intubation that was consistent with aspiration (16.4% vs. 14.8%; absolute risk difference, 1.6 percentage points; 95% CI, -5.6 to 8.9; p=0.73). The per-protocol analysis showed similar results.

The authors have concluded that patients who receive bag-mask valve ventilation between induction and intubation maintain higher oxygen saturations and are less likely to have severe hypoxemia compared with patients who receive no-ventilation. Additionally, there does not appear to be an increased risk of aspiration with BVM, although a much larger study would be needed to definitively measure those adverse events.

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Comment: The purpose of this study was to examine the use of bag-mask ventilation in preventing hypoxemia between induction and tracheal intubation as well as to determine if there is an associated increased risk of aspiration. This trial showed that bag-mask ventilation does improve oxygen saturation between induction and intubation. The findings here suggest that there is not an increased risk for aspiration in selected critically ill patients who are ventilated with a bag-mask during induction. Understanding that we would need to have a much larger trial to definitively show that there is no increased aspiration risk, it seems that BVM during induction may be appropriate to prevent severe hypoxemia. Next steps would be to compare BVM to noninvasive ventilation, a widely used technique for oxygenation during the interval between induction and laryngoscopy.

☐ ASSOCIATION OF ANTIBIOTIC TREATMENT WITH OUTCOMES IN PATIENTS HOSPITALIZED FOR AN ASTHMA EXACERBATION TREATED WITH SYSTEMIC CORTICOSTEROIDS.

Stefan MS, Shieh MS, Spitzer KA, et al. *JAMA Internal Medicine*. 2019;179(3):333-339

For patients admitted to the hospital for asthma exacerbation, current guidelines do not recommend treating with antibiotics; however previous studies have shown a high rate of patients being prescribed antibiotics. It is unclear how treatment with antibiotics affects outcomes for hospitalized patients treated for asthma exacerbation. The purpose of this study was to determine if there is any added benefit in early antibiotic treatment in addition to systemic steroids for patients hospitalized with asthma exacerbation.

This retrospective cohort study analyzed data from 543 acute care hospitals for asthma patients over the age of 18 who were admitted with acute asthma exacerbation between January 1, 2015, through December 31, 2016. The study compared a group of patients who received early antibiotic therapy with a "no treatment" group who did not receive early antibiotics. To be included in the "early antibiotic group," antibiotic treatment had to be started during the first 2 days of hospital admission and therapy had to be prescribed for at least 2 days. Patients who were excluded included those not treated with systemic corticosteroids at a dose equivalent to 20 mg/d of prednisone, those who had other indications for antibiotics, those who had cultures of blood or sputum collected at the time of admission, and patients transferred from another hospital. The primary outcome of this study was hospital length of stay. Additional secondary outcome measures included treatment failure within 30 days of discharge, defined as transfer to the Intensive Care Unit (ICU) after hospital day 2, in-hospital mortality, requirement of mechanical ventilation, or readmission for asthma. Other secondary outcomes were hospital costs and antibiotic adverse effects, including allergic reactions and antibiotic-associated diarrhea. Asthma patients who received early antibiotics were compared to those who did not receive antibiotics using absolute standardized differences. Differences greater than 10% were considered meaningful. Additionally, to compare the effect of antibiotics on length of stay, cost, and treatment failure, a multivariate predictive model was developed and propensity scores were used to match similar patients in each treatment group in order to account for potential confounding.

Of the 19,811 patients included in the study, 8,788 (44.4%) were treated with early antibiotic therapy. Of all patients who met inclusion criteria, treatment failure was noted in 470 (5.4%) of the early antibiotic treatment group and in 634 (5.8%) of the patients who did not receive early antibiotic therapy. Using propensity matching scores, 6833 patients in the early antibiotic group were matched with similar patients who did not receive early antibiotic treatment. The median (IQR) length of stay for patients who received early antibiotic therapy was 4 (3-5) days compared to 3 (2-4) days for patients in the group that did not get early antibiotics ($p < 0.001$) with a length of stay ratio of 1.29 (95% CI, 1.27-1.31). Early antibiotic therapy was also associated with increased hospital costs (median [IQR] cost, $4776 [$3219-$7373] vs $3641 [$2346-$5942];