The OPALS Major Trauma Study: impact of advanced life-support on survival and morbidity

Steill et al., CMAJ (2008)

***Objective**:* to assess any change in survival that might result from the systemwide introduction of advanced life-support programs in cities with existing basic life-support programs provided by EMS.

Design: systemwide "before and after" controlled clinical trial
Setting: 17 cities in Ontario with populations ranging from 20 000 to 750 000
Population: all patients 16 years of age and older who had been injured by any mechanism, injury severity score greater than 12, transported by land ambulance and who had been treated at one of the 13 lead trauma hospitals in Ontario.

***Intervention*:** an advanced life-support program whereby 400 paramedics were trained to perform endotracheal intubation, iv line insertion, and administer medications and fluids through intravenous lines.
***Primary Outcome*:** survival to hospital discharge defines as the patient leaving the hospital alive or transferred to long-term care facility
Secondary Outcome: Disease specific quality of life with the 7-level functional independence measure for survivors

***Sample*:** 1373 patients during the basic life-support phase and 1494 patients during the advanced life-support services. Patients in the advanced life-support phase were slightly older, had higher mean systolic BP, had less severe injuries as indicated by GCS and revised trauma scores.

***Results*:** Patients in the advanced life-support phase had less severe injuries, more likely to have had a fall, less likely to be involved in an MVC and more likely to have been admitted to the lead trauma hospital compared to the basic life-support phase. There was no substantial difference in overall survival to hospital discharge (81.8% for the basic life support vs 81.1% for the advance life-support phase $p = 0.65$). The proportion of early deaths did not differ. There was no difference in morbidity in the phases. Patients with GCS <9 had a lower survival rate in the advanced life-support phase (60.1% vs 51.2%; $p=0.03$). Within the advanced life-support phase, survival was lower for cases in which an advanced life-support crew attended the trauma scene than for those attended by basic life-support crews only (86.4% vs 79.1%, $p<0.0001$). The presence of advanced crews was associated with increased mortality (adjusted OR 1.5, 95% CI 1.1-2), while intubation in the field was associated with increased mortality (adjusted OR 2.8, 95% CI 1.6-5.0) and IV fluid therapy was associated with no benefit (adjusted OR 0.8, 95% CI 0.4-1.4).

***Bottom Line*:** Systemwide implementation of full advanced life-support programs did not decrease mortality or morbidity for major trauma patients. In fact, mortality was greater among patients with GCS < 9 in the advanced life-support phase.

Advanced Life Support for Out-of-Hospital Respiratory Distress
Steill et al. NEJM (2007)

Objective: To assess the incremental benefit with respect to morbidity and mortality that results from the implementation of an advanced life support program for the evaluation and management of respiratory distress before patients arrive at the hospital.

Design: prospective "before and after" controlled trial among all eligible patients with respiratory distress during two distinct phases of the study: the basic life support phase (6 months) and the advanced life support phase (6 months).
Setting: 15 cities throughout Ontario under the direction of 11 base hospital programs ranging in population form 20 000 to 750 000.
Population: all patients 16 years of age and older whose primary symptom was shortness of breath, including those who were assessed by EMS and not transported to hospital. Excluded were patients with full cardiac arrest before EMS arrival, primary symptom of chest pain or any other primary non-respiratory symptom, respiratory distress secondary to trauma, a post ictal state or another non respiratory illness.

Intervention: advanced life support program in which primary care paramedics were trained to perform endotracheal intubation, insert IV lines, and administer IV meds. Medications administered to patients with respiratory distress included IV lasix and morphine as well as salbutamol and sublingual nitroglycerin.
Primary Outcome: mortality defined as the rate of death before hospital discharge.
Secondary Outcome: intubation in the ED, evidence of aspiration, admission to hospital, length of stay in hospital, patient's destination after discharge and functional status.

Sample: 8138 patients, 3920 in the 6 month basic life support phase and 4218 in the advanced life support phase. Both groups had similar baseline characteristics.

Results: During the intervention phase, 56.6% of patients were treated with advanced life support. Endotracheal intubation was performed in 1.4% of the patients and IV drugs were administered to 15% during the intervention phase. There was a significant increase in the use of nebulized salbutamol and sublingual nitroglycerin for relief of symptoms in the intervention phase. The rate of death among all patients decreased significantly from 14.3% to 12.4% (absolute difference 1.9%; 95% CI 0.4-3.4 p = 0.01) from the basic life support phase to the advanced life support phase (adjusted OR 1.3; 95% CI 1.1 to 1.5). The proportion of survivors with the best cerebral performance score of level 1 increased significantly (52.3% to 62.5%, P<0.001). There was a significant decrease in the number of intubations required in the ED (5.3% to 3.1%, P<0.001).

Bottom Line: The addition of advanced life support interventions to an existing EMS system was associated with a decrease in the rate of death of 1.9% among patients with respiratory distress.