



Basic versus advanced life support for medical emergencies

A retrospective cohort study of US data found that people with major trauma or stroke who received basic life support from ambulance crews had better survival than those who received advanced life support.

Overview:

- A US study found that in people taken to hospital for major trauma or stroke, basic life support from paramedics was associated with better short- and long-term survival than advanced life support.
- The effects of basic life support versus advanced life support were less clear for people with respiratory failure or acute myocardial infarction.



Background: Basic life support refers to providing initial airway, breathing and circulation support to a person experiencing out-of-hospital cardiac arrest ([Resuscitation Council \[UK\] 2015](#)). An automated external defibrillator (AED) may also be used, but no other equipment aside from a protective barrier device. This support can be provided by a bystander or a paramedic.

Advanced life support is emergency care that involves drugs or invasive procedures, such as tracheal intubation, after basic life support has started and when appropriate an AED has been used ([Resuscitation Council \[UK\] 2015](#)). This care is delivered by paramedics at the site of the emergency and on the way to hospital.

Whether advanced life support is associated with better outcomes than basic life support is unclear ([Jayaraman et al. 2014](#)). Evidence suggests that advanced life support improves survival in patients with myocardial infarction, and basic life support is more appropriate for people with trauma ([Ryynänen et al. 2010](#)).

Current advice: The Resuscitation Council (UK) has produced guidance on [adult basic life support and automated external defibrillation](#) and on [adult advanced life support \(NICE accredited\)](#).

The guidance on adult basic life support for people who experience out-of-hospital cardiac arrest emphasises calling for an ambulance immediately, starting cardiopulmonary resuscitation (CPR) and using an AED.

The guidance on adult advanced life support recommends defibrillation for people who have cardiac arrest and shockable rhythms (ventricular fibrillation or pulseless ventricular tachycardia). People with non-shockable rhythms (asystole or pulseless electrical activity) should receive CPR. The guidance also recommends a number of invasive and pharmaceutical interventions, such as tracheal intubation and administration of adrenaline.

The NICE guideline on [major trauma](#) recommends drug-assisted rapid sequence induction of anaesthesia and intubation as the definitive method of securing the airway in patients with major trauma who cannot maintain their airway and/or ventilation. This should be performed as soon as possible and within 45 minutes of the initial call to the emergency services, preferably at the scene of the incident.

The NICE guideline also has recommendations on management of chest trauma, haemorrhage and pain in pre-hospital settings.

New evidence: A retrospective cohort study by [Sanghavi et al. \(2015\)](#) compared survival rates between people who received basic life support and those who received advanced life support.

The authors analysed data from a random sample of 20% of people in the US Medicare programme (a health insurance scheme for people over 65 years and those with disabilities) who lived in non-rural areas.

The study cohort comprised people who had received basic or advanced life support from paramedics for trauma, acute myocardial infarction, stroke or respiratory failure. Mortality data were taken from Medicare records. Data were analysed using propensity score matching (to account for observed patient, hospital and geographic differences) and instrumental variable analyses (to account for variation in whether advanced life support was available).

In propensity score analyses, the proportion of people with trauma (n=79,687), stroke (n=119,989) or respiratory failure (n=82,530) who were still alive at hospital discharge, 30 days, 90 days, 1 year and 2 years was higher with basic life support than with advanced life support. For example, among people taken to hospital with trauma, 82.3% of people who had basic life support were still alive at 90 days after hospital discharge compared with 76.2% who had advanced life support (difference=6.1 percentage points, 95% confidence interval [CI] 5.4 to 6.8 percentage points)

The association between basic life support and higher survival persisted in instrumental variable analyses of people with trauma or stroke but not in those with respiratory failure, where advanced life support was associated with better survival at 1 and 2 years.

In people with acute myocardial infarction, advanced life support was associated with better survival rates than basic life support in propensity score analyses. This changed in instrumental variable analyses, where basic life support was associated with better survival rates.

Limitations of this study include that the data did not capture people who died before they reached hospital. The study groups may have differed in unobserved characteristics such as illness severity or the quality of hospital care, causing residual confounding. In addition, the results are specific to the US healthcare system, so may not be applicable to other countries (for example, those where advanced life support is provided by doctors rather than paramedics).

Commentary by Dr Bob Winter, National Clinical Director for Critical Care and Emergency Preparedness, Resilience and Response, NHS England:

“This study by Sanghavi et al. (2015) found that basic life support was associated with better survival than advanced life support for people with trauma or stroke. One possible explanation for this result could be the nature of care for these diagnoses. Major trauma and stroke are 2 conditions where definitive care can be delivered only in a hospital setting. The fact that basic life support seemed superior in people with these 2 diagnoses raises the possibility that patients benefited from the more rapid transport to hospital by providers of basic life support.

“Pre-hospital advanced life support may have added more value in people with respiratory failure or myocardial infarction. Although people with these conditions may not have experienced a clear cut survival advantage from advanced life support, they did not show a disadvantage. It is possible that those patients designated as being appropriate for advanced life support were more severely ill, although the authors attempted to control for this with propensity matching.

“The recently published NICE guideline on major trauma recommends drug-assisted rapid sequence induction of anaesthesia and intubation in people with major trauma. This approach initially appears to be inconsistent with the results of this study, which found that advanced life support, which often includes intubation, was associated with lower survival than basic life support in people with trauma. On the other hand, it is possible that drug-assisted intubation has different outcomes to advanced life support without the provision of anaesthesia. The results for cardiac arrest are consistent with other studies of advanced life support versus basic life support.

“This study has some limitations because it is a retrospective analysis based on insurance data, which may not accurately reflect physical diagnoses. Some patients who were in the advanced life support cohort may not have actually received advanced life support, but would have been designated as such if advanced life support was considered necessary at the point of ambulance dispatch.

“In addition, these data were from the Medicare insurance programme, which covers people over 65 years and those with disabilities, so the findings may not be generalisable to the whole population. The study was conducted in the USA, so the results may not be generalisable to other healthcare systems, where paramedics have different skill sets and in some cases do not offer advanced life support.”

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