

Simulation Improves the Safety of Pre-hospital Emergency (RSI) Anaesthesia

Batchelder AJ, Steel A, Daniels T, Holding N, Hormis A, Mackenzie R
Magpas Emergency Medical Charity



Brief outline of context

Six experienced doctors and six experienced paramedics underwent a 12-day intensive simulator-based, pre-hospital critical care course, hosted by a faculty of pre-hospital doctors and paramedics. It was held in a simulated pre-hospital environment within a training facility in the east of England (www.magpas.net).

Brief outline of problem

NCEPOD recently criticised pre-hospital trauma management and proposed that pre-hospital services should include a rapid sequence intubation (RSI) capability.¹ Pre-hospital emergency anaesthesia is a rarely performed skill that benefits a small but important number of patients with critical injuries or illness. The ability to perform any task safely is generally improved by repetition and experience, but there is no evidence as to whether experience gained through simulated pre-hospital emergency anaesthesia might improve the safety of its delivery.

Assessment of problem and analysis of its causes

As the number of critical incidents increases for any given activity, the Swiss cheese model of errors dictates that the risk of eventual patient harm also increases.² In addition, research and our own organisational audit has shown repeatedly that a significant proportion of safety-critical incidents are due to human factors/poor crew resource management (CRM).³ We designed a training course with the aim of reducing the occurrence of critical incidents and to improve CRM behaviours during the delivery of pre-hospital emergency anaesthesia.

Strategy for change

A 10-day training course using full-immersion medium fidelity simulation together with focused lectures and discussion groups was composed for twelve candidates (six doctors, six paramedics, all selected with a background of critical illness management and an interest in critical care delivery). Each simulation was video-taped with the participants' consent and lasted approximately 30 minutes. Each candidate underwent a total of 43 simulations during the course.



Measurement of improvement

Videos from day 3 and days 9 or 10 of the course were analysed by a panel of experienced pre-hospital physicians and paramedics, including an independent simulation fellow. The panel were blinded as to which day the video was from and the videos were shown in random order. Safety-critical incidents were pre-defined based on an existing simulation assessment tool. Eight human behaviours were independently scored subjectively and based on a 7-point Likert scale. The panel were reminded of the characteristics of each behaviour prior to viewing the videos.

Effects of changes

The median number of safety critical incidents per simulation was 3.5 at the beginning of the course and 1.0 at the end ($p=0.011$).

CRM behaviour scores were better in all eight categories at the end of the course. The improvement in two categories – situational awareness and use of standardised language – met statistical significance ($p<0.05$).

The time interval between the decision to anaesthetise and the commencement of pre-induction checks was significantly increased towards the end of the course ($p=0.013$).

Lessons learnt

Simulation-based training can reduce the number of critical incidents and improve CRM behaviours.

The increase in the interval between decision to intubate and initiation of pre-induction checks at the end of the training is believed to be as a result of greater attention to pre-anaesthetic optimisation of the patient, equipment and surroundings, which resulted in the reduction of the number of critical incidents observed.

Message for others

Simulation-based training may improve the safety of pre-hospital emergency anaesthesia delivery.

References

- 1 National Confidential Enquiry into Patient Outcome and Death (NCEPOD). *Trauma: who cares?* London, 2007.
- 2 Reason J. *Human Error*. Cambridge University Press 1990
- 3 Donchin Y, Gopher D, Olin M, Badihi Y, Biesky M, Sprung CL, et al. A look into the nature and causes of human errors in the intensive care unit. *Crit Care Med*. 1995; 23:294–300.