Developing an e-learning resource for nurse airway assistants in the emergency department

Peter Hersey and Sean McAleer

Induction of anaesthesia may be required as part of the resuscitation of a critically ill or injured patient in the emergency department. The technique used to anaesthetise a patient who cannot be assumed to have an empty stomach (which includes all patients with a critical illness or who have suffered significant trauma) is a rapid sequence induction of anaesthesia (RSI). The RSI is a sequence of steps designed to minimise the time from rendering a patient unconscious to the insertion of an endotracheal tube.

A doctor undertaking an RSI requires 'dedicated qualified assistance' (Birks et al, 2010). For the emergency department nurse, assisting at an RSI may not be a frequent task or one in which they have received formal training. The authors are unaware of any widely accessible learning addressing this area of practice. Furthermore, the curriculum for emergency care advanced clinical practitioners (ECACPs) specifies that the ability to assist at an RSI is a required competency (Pinate et al, 2015).

Defining the problem

In 1998 James and Milsom conducted a survey of anaesthetists providing general anaesthesia in the emergency department, and found 68% of anaesthetists surveyed thought their assistance was inadequate. In their conclusions, the authors wrote:

> **'Surely it is unreasonable to expect people to perform tasks for which they are not specifically trained and then criticise them for the way in which these tasks are carried out … it seems reasonable that nursing staff should be given the opportunity for suitable training, with regular review, as with other extended roles of the nurse.'**
>
> *James and Milsom, 1998*

Although this study also referred to the conduct of anaesthesia for semi–elective minor surgery, the performance of an RSI

ABSTRACT

The aims of this project were to determine the required competencies for a nurse in the emergency department assisting with a rapid sequence induction of anaesthesia (RSI), and to produce a relevant e-learning resource. A three-round multidisciplinary Delphi process produced the following competencies: ability to describe the steps and sequence of events of an RSI, familiarity with the equipment used during an RSI, ability to recognise and help manage problems occurring during an RSI, ability to prepare for an RSI, ability to apply cricoid pressure, and understanding the modification of an RSI in special circumstances. An interactive e-learning package was produced and made available online. Twelve emergency department nurses took part in an evaluation of the e-learning package. All either agreed or strongly agreed that they had increased their knowledge and found the learning useful, and 11 out of 12 nurses reported being somewhat or very confident in the role of airway assistant following completion of the learning.

Key words: Rapid sequence induction ■ Nursing competency ■ e-learning ■ Delphi process ■ Emergency care

within the emergency department is not rare. Stevenson et al (2007) reported a series of intubations in a single Scottish hospital with an emergency department attendance of 58 000 visits a year. They found a mean frequency of 6 RSIs each month in the emergency department. Benger and Hopkinson (2010) conducted a 2-week audit of RSI in the emergency department, receiving data from 27% of all UK emergency departments. They reported an incidence of 1 in every 800 emergency department attendances, a similar incidence to Stevenson et al (2007). Neither set of authors commented on the role or competence of the airway assistant, although it is reasonable to assume that the emergency department nurse was the assistant in a proportion of the cases.

The fourth national audit project conducted by the Royal College of Anaesthetists and the Difficult Airway Society (Cook et al, 2011) gathered data on all airway complications occurring in UK hospitals over a 1–year period, including within emergency departments. It reported 15 serious adverse events occurring in the emergency department, with four resulting in death and another in significant brain damage. Education and training was highlighted as causal and contributory in 40% of these cases. Cook et al also reported that 1 in 4 of all major adverse airway events occurring in the hospital can be expected

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to occur in the emergency department or the intensive care unit, and that these events are more likely to result in death than those occurring elsewhere.

Once stabilised, the critically ill patient may require transfer to another hospital for ongoing care. The ability of a nurse to assist at an RSI is a competency mandated by the Intensive Care Society for safe patient transfer (Whiteley et al, 2011). Stevenson et al (2005) carried out a survey of critical care transfers from the emergency department, reporting that only 2% of UK emergency departments had formal training for nursing staff in patient transfer. They did not consider training specifically for the airway assistant role, but such results provide further indirect evidence that training may be lacking.

Defining the scope of practice

In 2003, the Scottish Government published a report to address the challenges of variation in training and standardisation of anaesthetic assistants (Scottish Medical and Scientific Advisory Committee, 2003). One of the recommendations of this report was to define a list of competencies, a revision of which was published in 2011 (NHS Education for Scotland, 2011). Although not all of these competencies are relevant to the emergency department nurse, the section entitled 'involvement in airway management' is a useful reference for defining the role of the airway assistant.

Although the competencies produced and revised by NHS Education for Scotland (2011) would provide a useful resource, these were produced for theatre anaesthetic assistants and not emergency department nurses. The emergency department

nurse's practice differs in that it is outside the controlled theatre environment, with more unwell patients and with almost exclusive use of the RSI over other forms of anaesthesia induction. These differences provide justification for defining competencies rather than adopting those already available.

Delphi process

A Delphi process was used to define the competencies required of a nurse in the emergency department assisting at an RSI. This method has been used previously to determine competencies for emergency nurse practitioners. Hoyt et al (2010) conducted a Delphi study with validation by an expert panel, and O'Connell and Gardner (2012) used a focus group with validation by a Delphi process. The Delphi approach allows subjective opinion and consensus to be obtained from experts with different job roles while ensuring that each member's input is uninfluenced by workplace hierarchy. It is also practically useful, as gathering a large group of healthcare experts together, as would be required for a focus group, would be logistically difficult.

Research ethics committee approval was not required for this process, as the participants were NHS staff within an NHS facility. NHS trust approval was granted on 28 November 2014.

A panel of 16 experts was recruited by purposive sampling of stakeholders, with two participants from each of the following job roles: consultant anaesthetists, trainee doctors in anaesthesia, nurse educators, consultants in emergency medicine (each with advanced airway skills), trainee doctors in intensive care medicine, senior nurses in emergency medicine, consultants in intensive care medicine and operating department practitioners or nurses in anaesthesia. All of the experts were recruited from a single NHS trust in the north of England.

In the first round, a single question was sent to the Delphi panel asking participants to list the knowledge and skills they thought an emergency department nurse required in order to assist at an RSI of anaesthesia in the emergency department. Ninety-three items in total were identified. These were added to 12 items of knowledge or skill from the competencies of an airway assistant, as defined by NHS Education for Scotland (2011) that had not been identified by the panel.

In the second round, the participants graded the importance of each of the 105 items using a 4-point Likert scale (not necessary=1, desirable=2, important=3, necessary=4). The mean score for each item was calculated, with a score of more than 3.25 being the criterion for inclusion in the third round of the Delphi process. Participants were also able to suggest additional items at this stage although none were offered. The median of the mean scores was 3.00 (interquartile range 2.60–3.40; range 1.40–3.78). Sixty-eight items (65%) were excluded at this stage.

For the final round of the Delphi process, participants were asked whether they agreed that each item should be included in the final list. Items where they agreed were scored 1 point and no points were allocated if the participants disagreed. Items were included in the final list if the mean score was more than 0.75 (corresponding to 75% agreement).

The response rate for the first and final rounds of the Delphi process was 100%. One participant did not respond in the second round. There was a positive correlation between the

Table 1. Required competencies	
Competency	**Knowledge and skills**
Can explain a rapid sequence induction of anaesthesia (RSI)	Can describe the steps/sequence of events of an RSI
Is familiar with the equipment used during RSI	Can describe the use of a bougie and capnography. Can select an appropriate size of facemask. Can assemble and prepare: suction, capnography, a breathing circuit and a bag valve mask. Can prepare and check an endotracheal tube before use, inflate the cuff and secure it in position. Can check suction equipment and a laryngeal mask airway (LMA)
Is able to recognise and help manage problems occurring during an RSI	Is trained to perform cardiopulmonary resuscitation (CPR). Can locate failed intubation equipment and the resuscitation trolley. Can recognise an obstructed airway, and open an obstructed airway using a 'head-tilt, chin-lift, jaw-thrust' manoeuvre
Is able to prepare for an RSI	Knows the location and storage requirements of commonly used drugs. Can prepare drugs and label syringes correctly. Can arrange equipment in a useful manner. Can list the minimum monitoring requirements for RSI
Applies cricoid pressure	Can describe why cricoid pressure is used, apply the correct amount of pressure, and can describe when it should be released
Understands the modification of the RSI in special circumstances	Can describe the additional steps or modifications required for patients with a suspected cervical spine injury

mean score given in the second round of the Delphi and that given in the third (r=0.69, N=35, p<0.0001).

Using thematic analysis, the items of knowledge and skill defined by the Delphi process were grouped into six competency statements. These are shown in *Table 1*.

Production of the e-learning resource

An e-learning package was constructed using open access software that did not require knowledge of coding (www. smartbuilder.com). Video was edited using Windows Movie Maker version 12.

The characteristics of effective website design as described by Cook and Dupras (2004) and Sisson et al (2010) are shown in *Box 1*, and these were followed. Knowles et al (1998) described features of an educational intervention that would be expected to improve its effectiveness for adult learners. These were adhered to in the design of the resource, for example by the inclusion of case studies and highlighting clinical relevance.

The e-learning package is divided into chapters, each of which

addresses a competency shown in *Table 1*. The competency 'is able to recognise and help manage problems occurring during an RSI' was not included in the e-learning, as the associated knowledge and skills are either location specific (can locate failed intubation equipment and the resuscitation trolley) or are addressed by the basic life support course. Basic life support is
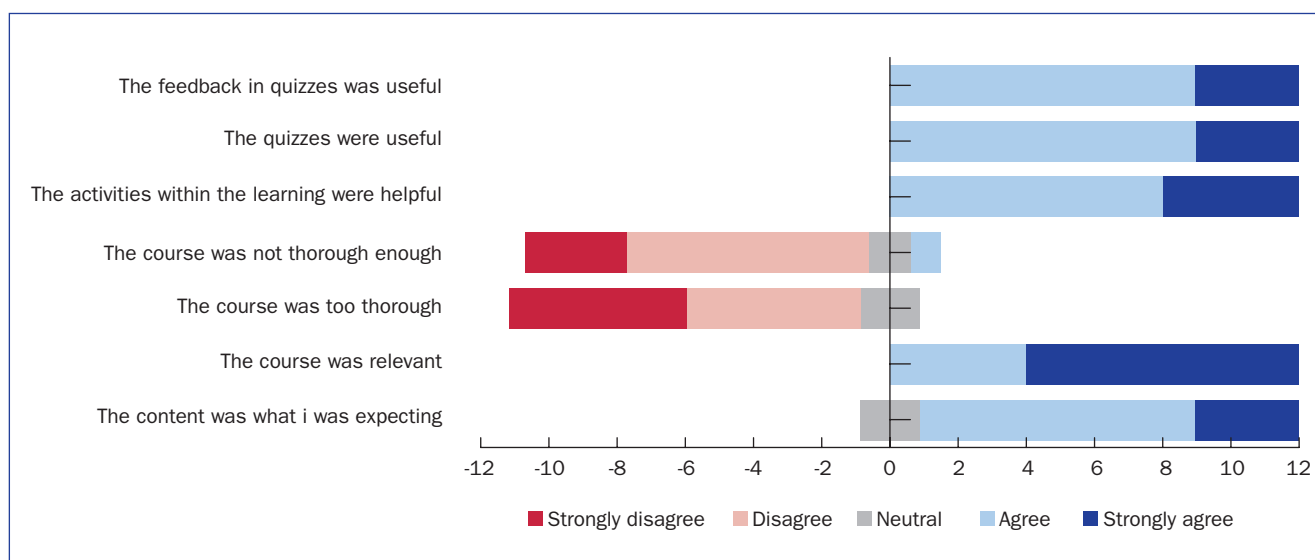
Box 1. Characteristics of effective website design

- Clear and consistent page organisation
- Wise use of space
- Concise text with a conversational style
- Clear and consistent navigation
- Clear and consistent hyperlinks, not excessive
- Balance between words and graphics
- Audio, but not excessive
- Realistic job context
- Learners to be able to control the order of content where appropriate

Source: Cook and Dupras 2004; Sisson et al, 2010

Figure 1. Participants' responses to questions concerning the content of the e-learning
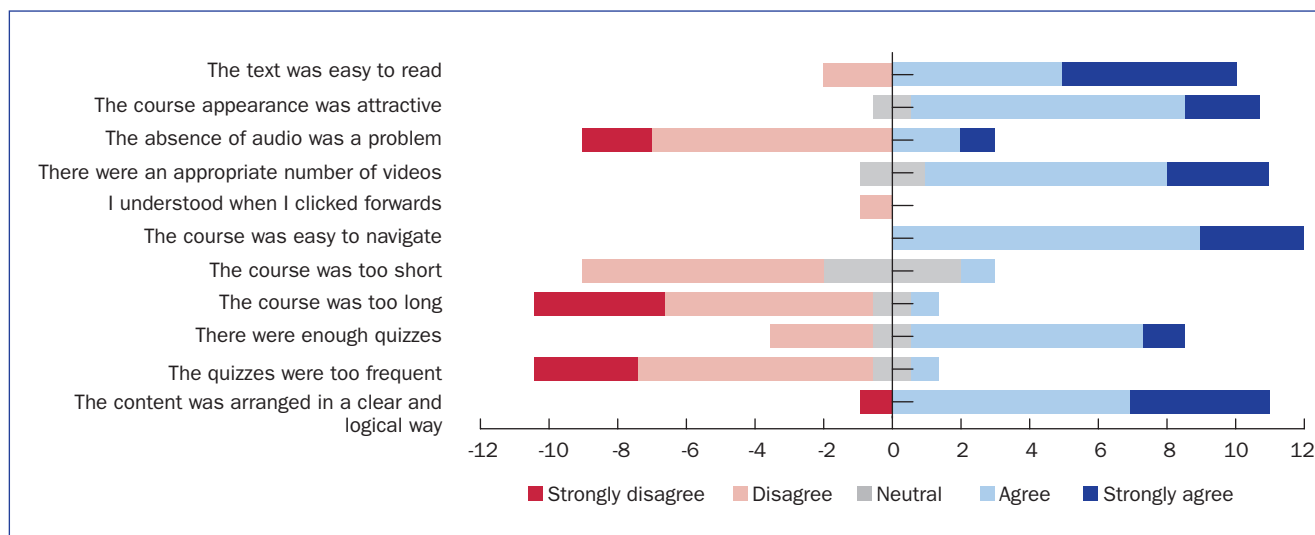

Figure 2. Participants' responses to questions concerning the instructional design of the e-learning
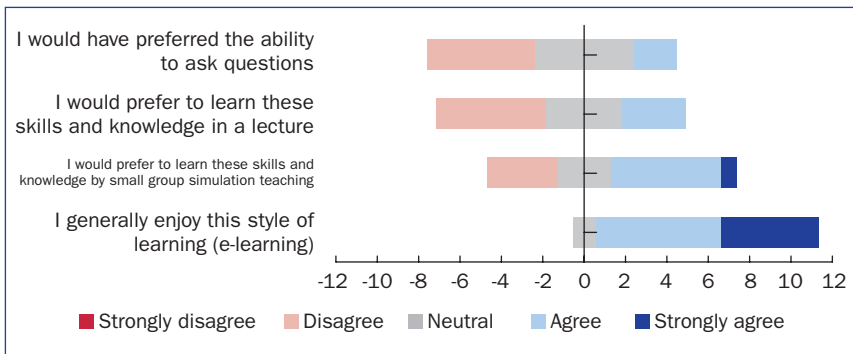
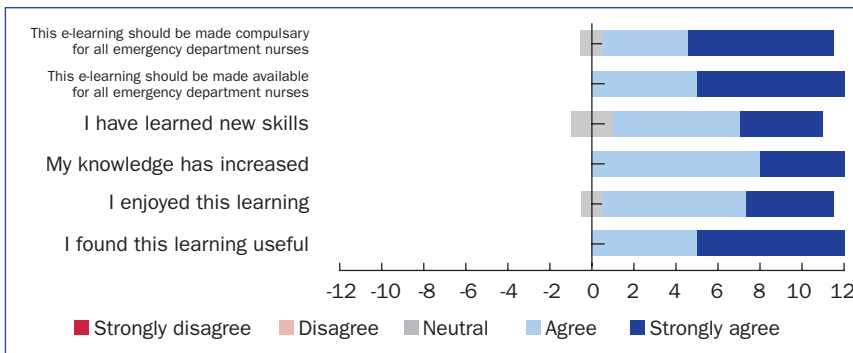Figure 3. Participant responses to questions regarding general preferences

Figure 4. Participant self-reported outcomes

Table 2. Free-text responses	
Is there anything you would have liked to see included that wasn't?	■ Video of drawing up the drugs ■ I would like to be able to print off handouts to keep as a hard copy ■ The preparation of drugs, including a quiz
What was the most useful part of the e-learning?	■ Everything ■ Simulation ■ The demonstrations ■ Navigating all boxes for an overview ■ All of it ■ All aspects. The application of cricoid pressure was very useful as unsure of how much pressure ■ The videos ■ The quizzes to test knowledge
What were the strengths of the e-learning?	■ Very relevant and easy to understand ■ Re-enforced training ■ The demonstrations were very good ■ Relevant content ■ Videos demonstrating ■ All aspects. Videos and quizzes really effective when learning. Easy to read. Good amount of learning, not too much! ■ Drugs, equipment use and videos ■ Quizzes
What were the weaknesses of the e-learning?	■ I thought some of the questions were misleading and would have liked a bit more information before answering the questions ■ Quite long. Also restarted every time you went away, couldn't save what you had done which wasted time
Are there any other comments you would like to make?	■ Maybe could include some info re neck breathers and equipment. Also point out some info regarding emergency trachy [tracheotomy] when unable to maintain the airway ■ Very informative well done

a core skill of all nurses and is not specific to the role of airway assistant, so was not included.

In each chapter the core material is preceded by a presentation of the learning outcomes and a clinical introduction. Quizzes and interactive elements are included. The learning ends with a summary and a link to a certificate of completion. The e-learning resource can be accessed on an open-access basis at www.iccueducation.org.uk.

Evaluation of the e-learning resource

Fifteen nurses gave written consent to take part in the evaluation of the e-learning. After completing the learning, participants completed an online survey (using Smart Survey). The evaluation considered the first two levels of Kirkpatrick's hierarchy (Kirkpatrick, 1994) i.e. acceptability and enjoyment, and a self-evaluation of the degree of learning. The extent to which the learning changed practice within the emergency department and the effect of the learning on patient safety were not considered in this pilot evaluation; these would be the true indicators of the clinical impact of the resource.

Twelve participants completed the evaluation survey, a response rate of 80%. Seven of the participants had less than 1 year's experience of working as an emergency department nurse, and six had never assisted at an RSI. One of the participants had attended a relevant lecture within the last year, and another had attended a tutorial where the role of the airway assistant was discussed. However, neither of these two participants were confident in the role of airway assistant before undertaking the learning.

The results of the feedback survey are presented as *Figures 1-4*. Participants gave favourable responses regarding the content and instructional design of the e-learning. All participants reported that all emergency department nurses should have access to the e-learning package; 11 of the 12 agreed that the learning should be made compulsory for all emergency department nurses.

Eleven of the participants reported an increase in their perceived confidence, with the same number also reporting that they would be confident in the role of airway assistant after undertaking the learning.

Participants were also asked free-text questions to gain their views on the strengths and weaknesses of the e-learning package and areas for improvement. The responses are shown in *Table 2*.

Discussion

A limitation of this work was that it was undertaken in a single site, with all participants sharing an organisational culture and a scope of practice defined by the local environment.

The evaluation of the e-learning was limited to self-assessment rather than external assessment of learning i.e. the self-perceived increase in competence was not tested by a skills assessment. The use of a control group would have allowed comparison with other teaching methods; however, this study was not designed to show superiority.

The results of the pilot evaluation are positive and support the implementation for this type of learning. For wider availability, a web-hosted resource such as this can be shared on a free and open-access basis via a link to the resource on the websites of

any other organisations who would wish to use it. An important consideration for such organisations is that as well as providing access to the resource, learners may require allocated time to complete the learning.

Conclusions

This project produced a list of six competencies required of the airway assistant within the emergency department, and produced an e-learning resource that has been subject to a favourable pilot evaluation. The authors believe the learning resource has the potential to improve patient safety, as well as to contribute to nursing professional development in a poorly addressed yet relatively common and high-risk area of practice. Nurses may use the resource as their first introduction to the role of airway assistant, or as 'refresher training' if the role is undertaken rarely.

As to further application of the method, consideration could be given to the role of airway assistant in other environments, where the required competencies may be different. Examples would include the pre-hospital environment, the paediatric emergency department and critical care units. **BJN**

Declaration of interest: none

Benger J, Hopkinson S (2010) Rapid sequence induction of anaesthesia in UK emergency departments: a national census. *Emerg Med J* **28**(3): 217–20. https://dx.doi.org/10.1136/emj.2009.085423

Birks RJS, Alladi VR, Angell J et al for Association of Anaesthetists of Great Britain and Ireland (2010) *The Anaesthesia Team 3*. http://tinyurl.com/zu6zml4 (accessed 23 January 2017)

Cook DA, Dupras DM (2004) A practical guide to developing effective web-based learning. *J Gen Intern Med* **19**(6): 698–707. https://dx.doi.org/10.1111/j.1525-1497.2004.30029.x

Cook T, Woodall N, Frerk C, eds (2011) *Major Complications of Airway Management in the United Kingdom*. 4th National Audit Project of The Royal College of Anaesthetists and The Difficult Airway Society (NAP4) report and findings. http://tinyurl.com/zbe9q8y (accessed 23 January 2017)

Hoyt KS, Coyne EA, Ramirez EA, Peard AS, Gisness C, Gacki-Smith J (2010) Nurse Practitioner Delphi Study: competencies for practice in emergency care. *J Emerg Nurs* **36**(5): 439–50. https://dx.doi.org/10.1016/j.jen.2010.05.001

James MR, Milsom PL (1998) Problems encountered when administering general anaesthetics in accident and emergency departments. *Arch Emerg Med* **5**(3): 151–5

Kirkpatrick DL (1994) *Evaluating Training Programs: The Four Levels*.

Berrett-Koehler, San Francisco

Knowles MS, Holton EF, Swanson RA (1998) *The Adult Learner: The Definitive Classic in Adult Education and Human Resource Development*. Routledge, London

NHS Education for Scotland (2011) *Core Competencies for Anaesthetic Assistants*. http://tinyurl.com/zsec5jn (accessed 23 January 2017)

O'Connell J, Gardner G (2012) Development of clinical competencies for emergency nurse practitioners: a pilot study. *Australas Emerg Nurs J* **15**(4): 195–201. https://dx.doi.org/10.1016/j.aenj.2012.10.004

Pinate R, O'Neil S, Crouch R, eds, for Royal College of Emergency Medicine and Healthcare Education England (2015) *Emergency Care Advanced Clinical Practitioner Curriculum and Assessment*. Version 1.0. https://tinyurl.com/jdsxscj (accessed 31 January 2017)

Scottish Medical and Scientific Advisory Committee (2003) *Anaesthetic Assistance: A Strategy For Training, Recruitment and Retention and the Promulgation of Safe Practice*. http://tinyurl.com/h5u95lw (accessed 23 January 2017)

Sisson SD, Hill-Briggs F, Levine D (2010) How to improve medical education website design. *BMC Med Educ* **10**:30. https://dx.doi.org/10.1186/1472-6920-10-30

Stevenson A, Fidler C, Craig M, Gray A (2005). Emergency department organisation of critical care transfers in the UK. *Emerg Med J* **22**(11): 795–8. https://dx.doi.org/10.1136/emj.2004.017822

Stevenson AG, Graham CA, Hall R, Korsah P, McGuffie AC (2007) Tracheal intubation in the emergency department: the Scottish district hospital perspective. *Emerg Med J* **24**(6): 394–7. https://dx.doi.org/10.1136/emj.2006.041988

Whiteley S, Macartney I, Mark J, Barratt H, Binks R for Intensive Care Society (2011) *Guidelines for the Transport of the Critically Ill Adult*. 3rd edn. http://tinyurl.com/hghxnqk (accessed 23 January 2017)

CPD reflective questions

- Are all the airway assistants in your place of work adequately trained and competent?

- Could the approach described here be replicated in other areas of practice, and with other professional groups?

- Do you think self-perceived competence should always be tested and, if so, why?

Have an idea for BJN?

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