Rapid sequence intubation in the emergency department: 5 year trends
J Simpson, P T Munro, C A Graham

Aim: Airway management is a core aspect of emergency medicine. The technique of rapid sequence intubation (RSI) creates continuing debate between anaesthetists and emergency physicians in the UK, although similar complication rates for emergency department (ED) RSI have been shown for both specialties. This study examined prospectively collected data on every ED RSI performed in a university hospital in Glasgow over 5 years.

Methods: Data were prospectively recorded for every attempted RSI in the ED on a dedicated pro forma identical to that used in previous studies. Data were collected between January 1999 and December 2003. Immediate complications were specifically sought in the questionnaire, as was the immediate destination on leaving the ED. The \( \chi^2 \) test was used for categorical data.

Results: On average, 51 ED RSI were performed annually (range 42–60). Emergency physician RSI for trauma increased from 32% (7/22) in 1999 to 75% (21/28) in 2003 (\( \chi^2 = 9.32, \text{df} = 1, p = 0.002 \)) and for non-trauma from 62% (18/29) in 1999 to 79% (23/29) in 2003 (\( \chi^2 = 2.08, \text{df} = 1, p = 0.15 \)). Complication rates for emergency physician RSI decreased from 43% (3/7) to 14% (3/21) for trauma (\( \chi^2 = 2.55, \text{df} = 1, p = 0.11 \)) and from 28% (5/18) to 4% (1/23) for non-trauma (\( \chi^2 = 4.44, \text{df} = 1, p = 0.035 \)). This compares with mean complication rates for anaesthetists for trauma of 17% and for non-trauma of 22%. Incidence of hypotension decreased in all groups; however, oxygen desaturation is now the most common complication. The rate of ED RSI prior to computed tomography (CT) scans increased in both the trauma (79% v 42%, \( \chi^2 = 7.42, \text{df} = 1, p = 0.0065 \)) and non-trauma (48% v 17%, \( \chi^2 = 5.85, \text{df} = 1, p = 0.016 \)) groups.

Conclusion: Emergency physician performed ED RSI is increasingly common but is not associated with overall higher numbers of RSIs being performed in the ED. Effective pre-oxygenation should be emphasised during training.

METHODS

The study was undertaken in an ED seeing 45,000 new patients annually. Data were prospectively recorded for every attempted RSI in the ED on a dedicated pro forma identical to that used in previous studies. Data were collected between January 1999 and December 2003. The questionnaire was specific to identify immediate complications resulting from the procedure, and the patient’s immediate destination on leaving the ED. RSI in the ED was strictly defined as given previously. Regular checks were made to ensure no intubation attempt had been overlooked; during the daily handover meeting, all intubations were identified and the duty consultant ensured that data forms had been completed for each intubation. Data were entered onto a Microsoft Excel spreadsheet for analysis.

RESULTS

Annually, a mean of 51 ED RSIs were performed (range 42–60). Emergency physician RSI for trauma increased from 32% (7/22) in 1999 to 75% (21/28) in 2003 (\( \chi^2 = 9.32, \text{df} = 1, p = 0.002 \)) and for non-trauma from 62% (18/29) in 1999 to 79% (23/29) in 2003 (\( \chi^2 = 2.08, \text{df} = 1, p = 0.15 \)) (fig 1). Complication rates (defined as number of patients with one or more complications, not individual complications) for emergency physician RSI decreased from 43% (3/7) to 14% (3/21) for trauma (\( \chi^2 = 2.55, \text{df} = 1, p = 0.11 \)) and from 28% (5/18) to 4% (1/23) for non-trauma (\( \chi^2 = 4.44, \text{df} = 1, p = 0.035 \)). This compares with overall complication rates for anaesthetists for trauma RSI of 22% (9/41), with no obvious trends in the patterns of complications noted. Complications varied between trauma (oesophageal intubation) and non-trauma (cardiac arrest and vomiting).

The incidence of hypotension decreased in all groups; however, the incidence of oxygen desaturation is high and is
now the commonest complication. The majority of desaturations occurred in patients intubated by emergency physicians.

The rate of ED RSI prior to computed tomography (CT) scans increased in both the trauma (79% v 42%; $\chi^2 = 7.42$, df = 1, $p = 0.0065$) and non-trauma (48% v 17%; $\chi^2 = 5.85$, df = 1, $p = 0.016$) groups. There was no observed increase in the proportion of direct admissions from the ED to the intensive care unit.

**DISCUSSION**

Over time, the observed complication rate for emergency physician performed RSI in the ED decreased.

The finding of oxygen desaturation as the commonest complication for emergency physicians suggests that greater emphasis should be put on formal pre-oxygenation as an essential part of RSI. It may also reflect the decreased oxygen reserve in critically ill patients who need immediate intubation by emergency medicine staff. However, a short period of preoxygenation (ventilation with high flow oxygen via a bag valve mask device or Mapleson C circuit while drugs are drawn up and preparations are made for intubation) may improve oxygenation and decrease the incidence of this complication.

Our results suggest that higher proportions of patients are being intubated prior to CT scan. Skills in in-hospital transfer for emergency physicians (for example, to the CT room) are likely to be required if this trend is repeated in other centres.

It is reassuring to note that the absolute number of patients requiring RSI has not increased despite the increased involvement of emergency physicians. The continuing involvement of senior emergency medicine, anaesthesia, and intensive care specialists is likely to be the main factor behind this, as it suggests that fewer ED patients are inappropriately subjected to RSI. The higher complication rate for anaesthesia staff is likely to reflect the fact that most difficult airways are triaged to anaesthetists and intensive care specialists rather than emergency physicians.

The study is limited by the honesty of the person completing the form. It is possible that a few cases may have been missed but this is unlikely to have significantly affected the results.

The applicability of this study is limited to centres in the UK with emergency physicians who are committed to providing an advanced airway service in close collaboration and with the support of anaesthetic and intensive care medicine colleagues. We acknowledge that not every ED in the UK will fulfil these criteria and this may limit the applicability of our results.

In conclusion, complication rates for emergency physician performed RSI have improved over time. The lack of increase in ED RSI numbers suggests that patient selection criteria by emergency physicians are appropriate.

**ACKNOWLEDGEMENTS**

We would like to thank all the emergency medicine, anaesthesia, and intensive care medicine staff and the emergency department nurses at the Southern General Hospital for contributing data to this study. We also acknowledge the key role of the Scottish Trauma Audit.
Group in creating and providing the form used for data collection for this and other studies.

Authors’ affiliations
J Simpson, P T Munro, C A Graham, Emergency Department, Southern General Hospital, Glasgow G51 4TF, UK

Competing interests: C Graham is a member of the committee developing the UK Emergency Airway Course.

Correspondence to: Dr C Graham, Associate Professor, Accident and Emergency Medicine Academic Unit, Chinese University of Hong Kong, Trauma and Emergency Centre, Prince of Wales Hospital, Shatin, New Territories, Hong Kong SAR; cagraham@cuhk.edu.hk

Accepted for publication 4 February 2005

REFERENCES

Clinical Evidence—Call for contributors

Clinical Evidence is a regularly updated evidence-based journal available worldwide both as a paper version and on the internet. Clinical Evidence needs to recruit a number of new contributors. Contributors are healthcare professionals or epidemiologists with experience in evidence-based medicine and the ability to write in a concise and structured way.

Areas for which we are currently seeking contributors:
- Pregnancy and childbirth
- Endocrine disorders
- Palliative care
- Tropical diseases

We are also looking for contributors for existing topics. For full details on what these topics are please visit www.clinicalevidence.com/ceweb/contribute/index.jsp. However, we are always looking for others, so do not let this list discourage you.

Being a contributor involves:
- Selecting from a validated, screened search (performed by in-house Information Specialists) epidemiologically sound studies for inclusion.
- Documenting your decisions about which studies to include on an inclusion and exclusion form, which we keep on file.
- Writing the text to a highly structured template (about 1500-3000 words), using evidence from the final studies chosen, within 8-10 weeks of receiving the literature search.
- Working with Clinical Evidence editors to ensure that the final text meets epidemiological and style standards.
- Updating the text every 12 months using any new, sound evidence that becomes available.

If you would like to become a contributor for Clinical Evidence or require more information about what this involves please send your contact details and a copy of your CV, clearly stating the clinical area you are interested in, to CECommissioning@bmjgroup.com.

Call for peer reviewers

Clinical Evidence also needs to recruit a number of new peer reviewers specifically with an interest in the clinical areas stated above, and also others related to general practice. Peer reviewers are healthcare professionals or epidemiologists with experience in evidence-based medicine. As a peer reviewer you would be asked for your views on the clinical relevance, validity, and accessibility of specific topics within the journal, and their usefulness to the intended audience (international generalists and healthcare professionals, possibly with limited statistical knowledge). Topics are usually 1500-3000 words in length and we would ask you to review between 2-5 topics per year. The peer review process takes place throughout the year, and our turnaround time for each review is ideally 10-14 days.

If you are interested in becoming a peer reviewer for Clinical Evidence, please complete the peer review questionnaire at www.clinicalevidence.com/ceweb/contribute/peerreviewer.jsp.