

# UK Paramedic Rapid Sequence Intubation ...is it viable?

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## Abstract

This report details the indications and drug requirements of Rapid Sequence Intubation (RSI), then proceeds to discuss the literature and evidence surrounding RSI with a view to answering the question: Can UK Paramedics perform RSI? And more importantly, should they?

The literature reviewed is taken from a variety of sources, including searches of internet material, journal articles and relevant text books, and the information critically reviewed.

The report details and critiques the information gleaned and discovers that there is little in the way of research relating to Paramedic RSI, and therefore uses other appropriate studies, for example MacKay [1]. It is soon realised that even the studies that are published are not as concise as they first appear to be, some leaving large breaches in the research, and other failing to answer the questions posed.

The report concludes that at present, the data that has been collected is not in favour of Paramedic administered RSI, in fact it is overwhelmingly suggested that pre-hospital RSI is actually detrimental to patient outcomes. Therefore, it is concluded that whilst UK Paramedics would be capable of administering RSI, with the evidence bias, it would not be appropriate.

## Introduction

The review is intended to define Rapid Sequence Intubation (RSI), indications for RSI, what drugs are required and to discuss if RSI is viable for UK Paramedics. The format chosen is a critical review of the evidence available. Each article selected for review will be discussed in turn, with the conclusion feeding from all articles aiming to forming a sound, evidence based opinion.

This does not seek to change current policy or practice with respect to RSI.

The subject of RSI has been discussed by many Paramedics during the author's career and has recently been considered for aircrew Paramedics who work primarily on the County Air Ambulance, but to date has remained outside the scope of Paramedic practice. The extent to which the topic is debated by staff is of particular interest to the author.

Currently Paramedics in the UK are permitted to perform endotracheal intubation (ETI) without the administration of drugs, thus the patient is required to be unconscious or have an absent gag reflex [2], but if the patient is conscious with a gag reflex and problematic airway, there is little a Paramedic can do to assist in airway maintenance except revert to more basic methods which should already have been tried, and which have presumably failed.

As an individual and a state registered Paramedic, the author has often thought that they would be capable of performing RSI, and has certainly had cases where RSI would (and in some cases has) been of great benefit to the patient.

However, in today's environment, evidence based research is required in order to change, improve and add new practices to current management regimes.

This premise is based upon:  
*'I will follow that system of regimen which, according to my ability and judgement, I consider for the benefit of my patients, and abstain from whatever is deleterious and mischievous'* [3]

Within this review, I am going to consider the questions: 'Can UK Paramedics administer RSI' and perhaps more importantly 'If we can.....should we?'

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## What is Rapid Sequence Intubation?

Rapid Sequence Intubation (RSI) is '*...giving medications to sedate (induce) and temporarily paralyse a patient and then performing oro-tracheal intubation.*' [4]

This means that patients whose gag reflex is intact but may have poor airway management can be managed more effectively. This is achieved by sedating and paralysing the patient, which removes the gag reflex in order to pass an endotracheal tube through the vocal cords into the trachea [5]. This tube is then sealed against the walls of the trachea with an air filled balloon, the tube can then be used for effective ventilation and if necessary a drug route [6].

## Indications for use

According to the South Carolina Department of Health and Environmental Control [7], RSI can be used for any patient requiring sedation, paralysis and intubation, including: patients involved in trauma with a Glasgow Coma Score (GCS) of below nine, facial injury plus a problematic airway, unconscious patients following a head injury or stroke, patients with burns especially to the airway, respiratory exhaustion and overdoses resulting in loss of airway control.

In the pre-hospital research context RSI has been administered primarily to Traumatically Brain Injured (TBI) patients.

## The drugs used for RSI

The medications involved are utilised for a number of purposes; induction, premedication, neuromuscular block and maintenance [8]. Induction medication provides a sedative effect allowing a neuromuscular blocking agent to be administered which provides temporary paralysis and removes the gag reflex in order to allow the endotracheal tube to be inserted [8].

There are a variety of drugs that

can be used for each of the above mentioned purposes, Midazolam and Etomidate being the induction drugs of choice in the studies reviewed [9].

Premedication has not been observed in the studies chosen for this assignment, as it is suggested that the patients are in immediate need and therefore premedication would be inappropriate [8].

Succinylcholine (Suxamethonium Chloride), Pancurium and Rocuronium have been named as neuromuscular blocking agents within the studies critiqued [1, 9].

Maintenance medication is rarely used in the prehospital setting due to the relatively short period of time that is required to transport the patient to a suitable receiving centre [8].

Some of the medication, for example Succinylcholine, needs to be kept at specific temperatures, which may present storage issues on ambulances and response cars, but could be overcome by having a small cool box attached to the ancillary battery as well as the fluid warmer which is standard on most ambulances within the United Kingdom.

## Literature Review

When reviewing the evidence and literature associated with RSI, it became quite evident that there was little from the UK. One report [10] compiled for the Welsh Office of Research and Development in Health and Social care appeared to be a critical review of literature that was available at that time. This report has not been used, as it was thought more appropriate to draw upon original research.

Ochs *et al* [9] completed a 'successful' prospective study of Paramedic administered RSI within San Diego, California, US. The subsequent paper 'Paramedic Performed Rapid Sequence Intubation of Patients with

Severe Head Injuries' is a retrospective paper, based upon the main study that remains so far unpublished [11]. The objective of the study was to assess the capability of Paramedics on the administration of RSI [9] in patients with severe head injuries. Within the confines of the study, it does achieve this, although in the wider context, it leaves some fundamental questions unanswered.

There were 114 patients recruited to the study over a one year period, this sample size compared to the quoted population of 2.79 million people within San Diego, seems very small.

Although the study quotes, '*More than 2 million people are transported annually in the United States by emergency medical services after traumatic brain injury (TBI)...*' [9] there is a given quantity of 7649 patients with major injuries, who were transported within San Diego during the trial period, but of these 7649, only 249 had reduced GCS (below 8), and of these, 123 had RSI administered, which represents 49%.

It could be suggested that had the cohort been larger, it would also be more representative in terms of outcomes [12] and as the study uses a quantitative method of analysis, perhaps more useful information could have been gained if a qualitative approach had been used with this small study group size [13].

There is no information given as to the fate of the remaining 51% of patients or as to why they were not brought into the trial. Had they been recruited, it is possible that the results could have been very different.

It is stated that one Emergency Medical Service (EMS) provider from twelve opted not to participate in the trial, this is not taken into account within the results, but the potential results from this one EMS

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service could change the outcomes of this trial quite dramatically. This lack of participation could account for the 51% of patients that were not recruited as mentioned above.

From the eleven agencies that took part in the trial, 484 Paramedics were educated in RSI. There is no indication of what percentage of total Paramedics this corresponds to. Had all Paramedics been educated and subsequently allowed to practise RSI, it may have had significant impact upon the results. For example, if only 50% of Paramedics were trained, the remaining 50% could have influenced the results positively or negatively depending upon the patient's condition and mechanism of injury, the Paramedic's skill level and success rates of RSI.

The method of selecting the Paramedics is not discussed, therefore the reader has to consider the potential of selection bias [12]. If Paramedics were asked to volunteer, it is possible that the people volunteering had exceptionally good or even exceptionally poor skill levels, however if the Paramedics were all selected by the researchers, it is entirely possible they would have selected 'good' Paramedics. The researchers would have benefited from stating the percentage of Paramedics trained and explaining their recruitment process to prevent misrepresentation and allow for the replication of the research.

The Paramedics' education took the form of a seven hour session, which involved watching a video of standard Glasgow Coma Scale (GCS) implementation, training in the administration of RSI drugs, RSI practice, scenario based practice, training in the use of the Combitube™ (as a rescue device in case of RSI failure), bag valve mask (BVM) practice and a test [9].

It could be argued that with the amount of information given in a

seven hour period it would be difficult to prove competence, although there is no indication of how many Paramedics were present at each training event. The standard required or indeed achieved by the Paramedics undergoing the training is not mentioned, and whilst a test was applied at the end of the session, it is not clear how the test was administered, for example verbal, written, multiple choice, practical, or if in fact there was a grade that the Paramedics were required to attain before being granted permission to administer RSI in the trial setting.

Competence in non-medicated intubation could have been assumed as the staff undergoing the training were already practising as Paramedics and therefore should have already been assessed as competent. The additional knowledge and skills learnt during the teaching session should be formally assessed, to ensure the relevant knowledge has been assimilated and the adapted practice can be performed successfully and appropriately [14].

Within the actual trial, patients selected were apparently over the age of eighteen, which suggests that some patients younger than eighteen may in fact have been recruited. There is no mention of age within the results section, therefore leaving the issue of age of patients open to speculation. If, erroneously, younger people were involved in the study, the drug doses which were intended for adults could prove to be inappropriate. The effects could be more dramatic, it is also possible that the physiology of the patient in terms of intubation landmarks could be different, leading to either more difficult or straight forward intubations, thus affecting the results.

A definition of major trauma had to be applied to each patient, this was defined '*as per county guidelines*' [9], this creates subjectivity, in that

one county's definition may be different to another, therefore allowing different categories of patient into the trial. There was no indication in the paper of any of the definitions, therefore no comparison could be made.

Head injury was to be either suspected (due to nature of traumatic event) or observed, again allowing speculation by the Paramedic involved. Potentially the clinician might suspect head injury due to the mechanism of injury, but there may in fact not have been any head injury, with other conditions leading to the clinical observations seen. If such patients had been recruited, they could influence the results of the trial either positively or negatively as their injuries could be more or less severe than the ones expected.

The patients were required to have a GCS of below eight, which, dependent upon the effectiveness of the education event, may or may not have been applied correctly, therefore leading to the possibility that some patients who had a GCS higher than 8 were included, this could provide a more positive outcome.

Patients who were intubated without drugs were excluded from the trial, as were patients who could not be cannulated and therefore could not be given the RSI drugs. The non-medicated but intubated patients would not have a major impact upon the study, as they would not be administered RSI in any case, but the uncannulated patients could alter the results, it is likely that these patients were peripherally shut down due to their major trauma, and as such may in fact have had more serious injuries than the recruited patients.

Whilst RSI is impossible to administer without intravenous access [8], had this cohort somehow been considered, the potential seriousness of their injuries could have had dramatic effect upon the final results.

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The medications (Midazolam, Succinylcholine, Rocuronium and Morphine) were given dependent on the patients' apparent frame size. For example, small patients were intended to be between 35-63kg. It may be speculated that there were occasions where disparity existed between the quantity of drug required and that given. The study does state however, that no problems were noted that would indicate either over or under dosing of any patient. Therefore some degree of credibility can be applied here.

There is evidence presented of the gender but not of the ethnic background of the patients selected, although anatomically there is likely to be no more variations between people of different ethnic backgrounds as there is between people of the same ethnic background.

There is no discussion surrounding the ethical issue of best practice. Whilst medical best practice cannot effectively be decided without clinical research, ethics suggests that no harm should be done to the patient [12], therefore consideration needs to be made as to whether the patients who subsequently dies or had poorer outcomes as a result of the trial were actually harmed.

The report does conclude that one of its biggest flaws is the lack of outcome data, i.e. long-term outcomes of the patients.

The implications of this report are unclear, it answers the question of whether Paramedics can do RSI, but the lack of patient outcomes cannot assist with answering the question of whether Paramedics should do RSI.

The second report the author has chosen to consider is '*Paramedic intubation of patients with severe head injury: a review of current Australian practice and recommendations for change*' [15]. This is a retrospective qualitative report reviewing current practice, with the

aim of changing practices if required. Stephen Bernard is an Honorary Associate Professor at Monash University, he is holding a Bachelors Degree in medicine and surgery, and currently working in a medical advisory and research capacity with the Metropolitan Ambulance Service in Victoria, Australia, these facts suggesting him to be a credible and reliable source of information.

Bernard [15] refers to the Brain Trauma Foundation guidelines regarding the management of TBI, which appear to have been updated since 2006, and currently suggest that maintaining oxygen saturation above 90% is sufficient [16]. There is no mention in the 2007 guidelines securing the patient's airway.

Bernard [15] makes mention of the current practices within Australia, which vary quite considerably across the eight states. There appears to be two states which are able to administer RSI, these being Australian Capital Territory (ACT) and Victoria. Although Victoria was originally the subject of a trial that commenced in 1999, there is no mention of when or if the trial had ceased.

The Bernard report [15] discusses several different airway maintenance methods, for example intubation with sedation, some of which, whilst bearing some resemblance to RSI do not have any direct correlation. Bernard [15] states that RSI has not been rolled out across Australia due to the lack of evidence suggesting patient benefit and the potential problems created by having a paralysed patient whose airway is in jeopardy.

Interestingly there are no references quoted for the airway problems, therefore it is difficult to discover where this concern has originated and therefore if it is realistic. Ochs *et al* [9] trained their Paramedics in the use of the Combitube™ as a rescue device, which could obviously cause

an additional financial outlay, but the majority (six from eight) territories are able to use cricothyroidotomy, therefore, already have a readily available rescue device.

Another concern voiced by Bernard [15] is that of oesophageal intubations not being recognised. All of the eight territories have End Tidal Carbon Dioxide (ETCO<sub>2</sub>) available in some format, which is designed to indicate correct and incorrect tube placements, consequently making the assumption that the Paramedics are familiar with and can utilise the equipment, oesophageal intubations should be picked up quickly. If the Paramedics were using the correct intubation technique they could have avoided oesophageal intubation completely, by intubating under direct observation i.e. actually watching the tube pass through the vocal cords [8].

Studying the table in Bernard [15] brings up another question, how can the Paramedics administer RSI, when they cannot perform endotracheal intubation (ETI)? ACT and Victoria are both indicated as not being able to perform ETI (without drugs) on patients with TBI, but can administer RSI. This seems a little unusual and bizarre, as ETI is anecdotally a relatively common practice for Paramedics and can in some cases of TBI be an uncomplicated procedure.

The Bernard [15] report draws upon Wang *et al* [17] and Bochicchio *et al* [18] both of which suggest that TBI patients have a worse outcome when intubated in the field without drugs, compared to patients intubated using RSI within the hospital environment. This is countered by a retrospective study by Winchell *et al* [19] who found that patients intubated pre-hospitally without drugs had a lower mortality than those not intubated, although this same study also states that there was no change to the rate of 'discharge to home' which appears contradictory.

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Bernard [15] concludes from the studies he references that: *'...attempts at laryngoscopy without appropriate drugs in patients with severe TBI who have intact airway reflexes is inappropriate...'* [15]

This conclusion is supported by Todd [20] who suggests that a patient who has an intact or partially intact gag reflex should not be intubated without sedative and paralytic drugs, but how Bernard [15] has drawn this conclusion from the preceding paragraphs is difficult to say. It appears there is a discrepancy, in that the previous paragraphs appear to state that intubation is associated with higher mortality rates, but the statement made by Bernard [15] refers to laryngoscopy rather than intubation.

It is accepted that laryngoscopy is usually performed as a precursor to intubation, but can also be used for other purposes for example to inspect for airway obstruction [20]. It is also recognised that laryngoscopy in TBI patients can possibly cause an increase in intracranial pressure (ICP) and thus deterioration in medical condition [21].

Bernard [15] recognises the potential for the problematic maintenance of competence in RSI skills. It is suggested that a road based Paramedic would use RSI on average twice a year, therefore may not be able to maintain the skills to enable fluency and accuracy. This could be countered by the guidelines for UK Paramedics, JRCALC [22], in which it is stated that it is expected that needle thoracentesis is performed in a case of tension pneumothorax. This skill is anecdotally rarely used, but still expected to be, and more importantly is, performed when required. Yearly updates would of course, assist in reducing skill degradation.

Bernard [15] draws from Wang *et al* [17] to suggest that in a Pennsylvania study, there was a dramatic

improvement in the outcomes of RSI patients who had been air lifted and treated by aero medical staff. Upon reviewing the article by Wang *et al* [17], I have been unable to draw the same conclusions, in fact Wang *et al* [17] state:

*'...out of hospital time information was too incomplete in this data set to facilitate meaningful analysis.'* [17]

This obviously lays quite a different opinion out for consideration.

In the conclusion, Bernard [15] recommends the use of RSI for aeromedical Paramedics, justified by their greater experience and therefore skill level, and basic airway maintenance with oxygen administration for land based Paramedics. This unfortunately does not negate the possibility of patients whose airway cannot be maintained manually, and who is hypoxic.

This second report also has mixed views in the conclusion, therefore does not provide clear cut implications to this review or the issue of Paramedic RSI viability.

The third report chosen is one written by MacKay *et al* [1]. Whilst dealing with the ability of physicians against that of anaesthetists and not dealing with Paramedic's capabilities, has written an interesting quantitative, retrospective report. Dr Catherine MacKay works as a consultant physician and Professor Coates is a professor of emergency medicine therefore this report can be assumed to have credibility.

The physicians underwent a month's training in order for them to fly with Helicopter Emergency Medical Service (HEMS) and to administer RSI. There is no information provided about the amount of training specifically for RSI, other than to say standard operating procedures were provided to each individual physician. These procedures provided the indications for RSI, presumably amongst other information.

There is no information regarding the capability and experience of the physicians prior to their month's supervision, therefore it is difficult to decide if the supervision phase is suitable or whether the training could be undertaken in a more effective manner.

MacKay *et al* [1] reported the use of surgical airway (or needle cricothyroidotomy in paediatrics) as a rescue device, rather than the Combitube™ that Ochs *et al* [9] chose, this at first reading appears a little excessive, but in reality is probably the most appropriate course of action, as space within the helicopter in which to complete procedures, is very limited.

The study used data from 1997-8, which at the time was current. It is not possible to compare the figures from 1997-8, but compared to the 1306 missions completed in 2006 [23], the study cohort only represents 27% of patients transported. The results of the study state that RSI was carried out on 350 patients, but then discusses the results in terms of intubation with no reference to RSI. It is difficult to decide if the study is actually comparing RSI figures or non-medicated ETI figures.

Interestingly the physicians intubated patients with higher GCS when compared to the anaesthetists. This could suggest that the physicians were more willing to perform RSI (especially if it is new to them), more aware of the potential complications arising from not performing RSI or more aware of the patient in terms of comfort.

It is fascinating that the physicians intubated more people with a GCS above 12 (the recommended limit) than the anaesthetists – 36% compared to 22%.

This could support the argument that the physicians were more aware of the patients' potential complications and/or comfort.

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There are two patients that had failed intubations and did not receive a surgical airway, these patients are reported as self ventilating. This is difficult to understand as they had been administered the RSI drugs and would have needed some support for a short while until the effect of the drugs diminished sufficiently for the patient's respiratory effort to return. There is no information as to what clinical support was given to these patients prior to them self ventilating.

There was a 3:1 ratio of men to women in the RSI cohort, which could be explained by the nature of the cases attended, but there was no ethnicity data collected. Neither of these areas would be expected to impact greatly on the outcome of the patients, as male/female and different ethnic groups tend to have very similar physiology and anatomy. The study claims that data regarding age of the patient was collected, and yet was not presented, it is therefore possible that the data could influence the results; the patients may have been primarily from the 18-20 age group, therefore ruling out difficulties that the more mature patient might exhibit, for example ankylosing spondylitis. There is however a cohort of 80 paediatric patients mentioned within the 359 total, these patients did not impact negatively upon the results.

There was less than a 0.02% failure rate in intubations, but the physicians had double the failures when compared to anaesthetists, this is not surprising when it is considered that one of the main aspects of an anaesthetists role is to intubate patients, therefore pro rata they could have considerably more experience.

MacKay *et al* [1] acknowledged that the data used to base the study on '*...varied between run sheets...*', therefore it is difficult to accept the findings of the report on face value. It is possible that the data was corrupted deliberately by staff not

wanting to appear less competent than staff members, or accidentally by a different staff member completing the sheet on behalf of the administrator of RSI. The authors also admit that some other data could have been corrupted by artefact or even adverse weather conditions, therefore leading to inaccurate information being processed.

As with the Ochs *et al* [9] study, the numbers were small (359 patients), therefore a more qualitative approach could have been used to achieve more meaningful data [13].

The study claims to answer the question: '*Prehospital rapid sequence induction by emergency physicians: Is it safe?*' [1], but in reality they fail to answer the question. They prove the nine physicians involved are capable of RSI in the trauma setting, but there is no information regarding patient outcomes, therefore MacKay *et al* [1] fail to answer if it is '*safe*', with reference to the Cambridge Dictionaries Online [24] definition.

It is accepted that there were few difficulties in performance of RSI, therefore in a limited capacity the procedure could be classed as safe, but as stated overall safety in patient outcomes was not considered.

The impact of this study on Paramedic RSI is negligible when taken on face value, but potentially could be used to argue that if physicians can successfully administer RSI, then why not Paramedics.

Dunford *et al* [25] prospectively consider the San Diego Paramedic RSI trial from a different perspective in a quantitative substudy. This report considers the patients that were monitored using ETCO<sub>2</sub> and pulse rate and SPO<sub>2</sub> devices.

The trial was again over a two year period, this report states that the trial was stopped after two years due to the patient's outcomes worsening after RSI.

This report gives a little more detail regarding the education that the participating Paramedics underwent for example, home study materials – although there is no information regarding what this consisted of, a written pre-test, but what this was based upon and when it was applied, is not clear.

We could presume the home study information would be tested in this manner, but no indication was given of the pass mark, if indeed there was one, or of the type of test (for example written or verbal), and of what happened if a candidate were to fail or not achieve the expected standard.

Dunford *et al* [25] and Ochs *et al* [9] contradict each other when discussing GCS. Ochs *et al* (2003) state the Paramedics were taught '*...standardized GCS scoring...*' but Dunford *et al* [25] state that the Paramedics were taught '*...derivation of the GCS...*', quite clearly derivation of the scoring system will not indicate to the students how to apply to it appropriately. It is unclear which of these statements is correct. The author of this paper would like to suggest the former is more likely to be correct.

Pharmacology appeared to be '*reviewed*' within the seven hour day, which suggests that this formed part of the home study and therefore potentially the test. If this was the case, then there seems to be nothing to be gained from reviewing something the Paramedics were expected to have learnt at home, and tested on prior to starting the course.

Dunford *et al* [25] discuss the application of advanced and basic airway techniques. It has to be assumed that the Combitube™ rescue device was taught and practiced within this same time frame, as training in its use is discussed in Ochs *et al* [9], but training in this device is not mentioned within this report.

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The Paramedics were provided with mannequin stations and clinical scenarios, which when interspersed with the GCS video, SPO<sub>2</sub>, ETCO<sub>2</sub> and basic and advanced airway skills and possibly the pre-test, does not allow a huge amount of time for each topic to be covered in detail. As from the previous discussion of this trial in the preceding paper, there are still questions outstanding especially with regards to the standards expected and standards achieved. Although there is a comment to say that all Paramedics who underwent the training were deemed competent and the authors acknowledge that different training methods may have elicited different results.

The study suggests that the Paramedics were allowed three thirty second attempts at intubation once the patient had been medicated, Bledsoe *et al* [8] recommends 20-30 seconds as a range of time in which to attempt one intubation during RSI, there is a good chance that if these Paramedics were advised 30 seconds, they would exceed that in at least some cases. This would therefore allow the patient to become hypoxic more easily.

The Paramedics were debriefed after each RSI attempt, by the county's EMS medical director, but again the structure of the debrief is not discussed in any way, although the content was used in the results as were the patient documents completed for each patient.

This study draws upon the data from 54 patients, from the original 426 that were enrolled over the two years, which represents 0.13% of the total. Obviously it is impossible to draw any real conclusions from the finding of this trial as the numbers are so small and are therefore not truly representative. As with the Ochs *et al* [9] study, a more qualitative approach could perhaps have provided more ecologically valid data [13].

It is shown that the majority (57%) of patients in this small cohort had a decrease in SPO<sub>2</sub> level for an average of 160 seconds (2 minutes 40 seconds) and had an average drop of 22%. 31% of patients exhibited a drop in pulse rate of more than 20 beats per minute, and 19% showed profound bradycardia. There is no stated relationship discussed between the bradycardic patients and the hypoxic patients, although it may be safe to assume some patients had both conditions, one leading from the other.

It is acknowledged that the trial was suspended after it became apparent the procedure was detrimental to the patients, something that could only occur in a prospective study, as in a retrospective study the events have already occurred for example in MacKay *et al*'s [1] study. The fact that patient outcomes had been considered suggests that the trial had managed to extrapolate this information, but as yet the authors have failed to publish it in any of the reports to date.

This report, in conjunction with the Ochs *et al* [9] report, suggest that Paramedic RSI will not improve the patients outcome, and therefore it may be argued to be a pointless exercise.

Spaite *et al* [26] reply to Dunford *et al* [25] within the same issue of the journal. Whilst this article is not an original piece of research in itself, it does draw upon information from original research including Dunford *et al* [25], Davis *et al* [11] and Winchell *et al* [19] all of which have been considered and critiqued within the confines of this review.

Spaite *et al* [26] cite information that supports the use of advanced life support in improving patient outcomes, and suggest that some of the increase may be due to intubation, although they have not been able to identify how much of the increase is due to intubation, and how much is due to the other

interventions made during advanced life support, for example drug administration.

The authors make reference to the lack of problems reported during RSI trials and, they indicate that just because there is a lack of information, this does not mean there are no or few problems.

This is an issue that Dunford *et al* [25] did acknowledge in their report. Spaite *et al* [26] also suggest that the vast majority of pre-hospital practice is not evidence based, and therefore is performed because it *can* be – not because it *should* be.

### Conclusion

The reports studied primarily use a quantitative method of analysis, which given the small sample sizes may have more effectively employed a qualitative analysis, allowing for the collection of more appropriate data [13].

Rapid Sequence Intubation (RSI) is a process that requires the administration of sedative and paralytic drugs to a patient to allow the passage of an endotracheal tube to be passed into the patient's trachea, this allows efficient and reliable ventilation of the patient. RSI has many applications in the wider context, but in the prehospital field, appears to be used primarily for traumatically brain injured patients.

The author has considered many journal articles and papers for review, but has chosen just five to critique. There are no original research papers to found relating to UK Paramedics and RSI, but this did not deter the research. For the most part, research that has been carried out within the United States could be extrapolated to the United Kingdom with few problems as the populous and cultures are very similar, but this does not negate the need for more rigorous research to be completed here within the UK. The papers critiqued for the most

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part answer the questions they have posed, albeit in a rather limited capacity. They are written using academic style and for the most part are correct in their comments and assumptions.

It appears that the vast majority of research that has been conducted regarding RSI has been retrospective and quantitative, rather than prospective and qualitative.

Qualitative and prospective study could give data that is more flexible and interpretative [12].

It would be beneficial for the information that has to be collected in a quantitative manner, to be collected by an independent person or electronic device that is not open to corruption, alteration or missing data. The qualitative data could be collected again by an independent person. The use of an independent person would relieve the Paramedic of this extra workload and burden; ensuring information was collected accurately and impartially.

Future studies need to be completed in Paramedic RSI before it can be allowed to become standard practice. A large cohort of patients would need to be drafted in to ensure that the results could be extrapolated to the populous as a whole. The Aeromedical services would be the obvious place for a trial to be run, although, with limited number of cases dealt with it might require all of the UK aero medical services and land based services to be involved in order to obtain a large enough sample size to allow the extrapolation of ecologically valid results.

In response to the question posed at the beginning of this review: 'if we can.....should we?', the author believes the answer to this to be quite straightforward. At present, Paramedics in the UK would have the capability to administer RSI, but based upon the evidence described within, it is quite clear that without

further prospective research, UK Paramedics should not be administering RSI.

There is insufficient data to suggest that RSI is beneficial to the patient and an excess of data suggesting that it is actually detrimental particularly as the overriding philosophy of medicine is, do no harm.

## Recommendations

Further research is required using a randomised or quasi-randomised clinical trial(s) with a qualitative design. Obviously consideration of the ethics involved is paramount, especially with trials that potentially could cause a worse patient outcome [27].

The research is required to be well considered and planned to ensure as few problems arise as possible.

Care needs to be taken into the writing of the hypotheses or research question(s) to ensure complete and accurate data can be collected, and data collection methodologies need to be commensurate with the planned hypotheses and the analysis types.

The method of selecting staff needs careful planning in terms of reasons and objectivity, any foreseeable problems in procedure need to have contingencies that are feasible, education of the staff to be involved needs to be delivered effectively to include assessment criteria, suitability and standards required.

It should also be considered how to deal with a staff member who not only fails to achieve the required standard, but who demonstrates they are not to the standard that is required in their current job role. Debriefing facilities are required for the staff once they have taken part in the trials, and finally cost implications need to be considered. Once the planning has been ratified, the study can then get underway.

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