Prehospital Rapid Sequence Intubation in a Blunt Trauma Patient: A Case for High-Fidelity Simulation in Prehospital Medicine

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Abstract

Introduction: Rapid sequence intubation (RSI) is a procedure that has moved from the operating room to the emergency department and now to the prehospital setting. It is a procedure that has significant risk but is used infrequently, and therefore, providers have a tendency to lose proficiency. These facts make simulation training and evaluation of utmost importance. As our experience and skill as a specialty continue to improve, high-fidelity simulation scenarios can easily incorporate these techniques to improve patient outcomes. Methods: This simulation case consists of four files that can be utilized by faculty implementing this evaluation/learning activity. This case can be presented with a single faculty member providing case information and role-playing various aspects of the case. It may be enhanced with additional actors or standardized patients. Results: This scenario has been presented to 45 paramedics over 9 different days to evaluate their ability to maintain competence in RSI. Our experience to date has been that experienced paramedics are able to successfully negotiate this case without significant difficulty. As we have stressed the importance of the use of continuous waveform capnography and preprocedure resuscitation, the paramedics have been more successful in the management of these types of patients. Discussion: This scenario provides an opportunity for paramedic evaluation and training in RSI. This high-fidelity simulation case format can be used for other high-risk, low-occurrence scenarios in prehospital care.

Keywords
Simulation, Emergency Medicine, Rapid Sequence Intubation, EMS, Prehospital Medicine, RSI

Educational Objectives

By the end of this simulation, the learner will be able to:

1. Demonstrate the appropriate initial approach to a trauma patient with potential airway compromise.
2. Identify indications and contraindication for rapid sequence intubation.
3. Demonstrate proper, complete preparation for intubation including patient positioning, equipment, preoxygenation, resuscitation, etc.
4. Demonstrate appropriate medication selection for rapid sequence intubation including preinduction medications, induction medications, and paralytic medications.
5. Identify tension pneumothorax postintubation.
6. Perform needle decompression.

Introduction

Patients with blunt traumatic injury are commonly encountered by prehospital providers. Being the first to care for these patients can be stressful. Given that many patients with traumatic injuries are critically ill and require time-sensitive assessment, treatment, and transportation, educational resources are needed to help train providers to make appropriate initial clinical decisions.
Rapid sequence intubation (RSI) is a procedure that has moved from the operating room to the emergency department and now to the prehospital setting. It is a procedure that has significant risk but is used infrequently, and therefore, providers have a tendency to lose proficiency. These facts make simulation training and evaluation of utmost importance. As our experience and skill as a specialty continue to improve, high-fidelity simulation scenarios can easily incorporate these techniques to improve patient outcomes.

This resource provides the instructions and materials for a high-fidelity simulation case or oral board exam appropriate for paramedic students, emergency medical technicians/paramedics, and critical care transport providers including paramedics and nurses. Blunt trauma patients with significant injuries such as the scenario presented here provide an opportunity for providers to assess and manage potentially unstable airways. RSI is a prehospital clinical skill used by many emergency medical services (EMS) agencies and requires careful consideration of multiple factors to safely manage airway emergencies.

**Methods**

This simulation case consists of four files that can be utilized by faculty implementing this evaluation/learning activity. Appendix A includes all of the information needed to plan and implement this case. Laerdal SimMan, CAE Healthcare METIman, or other appropriate high-fidelity patient simulator can be used. Alternatively, with a few modifications, this case could also be completed using low-fidelity patient mannequins or even used in an oral board presentation format.

This case can be presented with a single faculty member providing case information and role-playing various aspects of the case. It may be enhanced with additional actors or standardized patients as detailed in Appendix A.

A PowerPoint presentation suitable for use after participants have completed the case (Appendix B) is available, along with a participant evaluation tool (Appendix C). Appendix C provides a guide for the evaluator to move through the case and record the provider’s actions in real time. We consistently use a score of 75% to pass the scenario. Penalties are assessed when participants fail to perform certain tasks (highlighted in red). Please note that there is an important line toward the bottom of the tool that allows the instructor/evaluator to fail the participants despite the total score in the rare event that they cause the patient harm during the simulation.

**Results**

This scenario has been presented to 45 paramedics over 9 different days to evaluate their ability to maintain competence in RSI. Our experience to date has been that experienced paramedics are able to successfully negotiate this case without significant difficulty. As we have stressed the importance of the use of continuous waveform capnography and preprocedure resuscitation, the paramedics have been more successful in the management of these types of patients.

Some participants have failed to properly recognize the need for a definitive airway early in the case. Due to the emergent nature of the airway compromise, this case cannot be successfully completed without identifying and successfully managing the airway with RSI. Similarly, participants who did not initiate adequate preprocedure resuscitation had difficulty completing the case successfully, as immediate airway maneuvers, oxygenation, and fluid resuscitation are at the core of preparing any patient for RSI.

Two specific areas are highlighted as important for prehospital EMS providers in completing a successful RSI: use of continuous waveform capnography and assessment for complications such as tension pneumothorax. It is now standard practice to use capnography as a required element in the confirmation of endotracheal tube placement in the prehospital setting. Providers must be vigilant for changes in patient condition that may indicate the development of a tension pneumothorax.
Discussion

This scenario provides an opportunity for paramedic evaluation and training in RSI. As we reflected on the use of this module, it was apparent that this is a beneficial opportunity for one-on-one time between participants and their medical director. The training staff also benefits from the repeated emphasis of good assessment and treatment of a complex patient scenario. Over time, the scenario and evaluation of the participant have gone through several versions.

Initially, the scenario was of a multisystem trauma patient presenting with signs of hemorrhagic shock. The scenario has been simplified by removing the patient's initial hypotensive blood pressure reading. The patient's complexity distracted from the primary objective of evaluating the participant's ability to manage an emergent trauma airway using RSI. Far too many patients died due to the resuscitation difficulties. We plan to reintroduce more complexity to scenarios in the future as training and proficiency allow.

Though our primary objective was to assess participant understanding of RSI and addressing of complications related to this, it became apparent that participants' skill in intubating mannequins is not to the level expected. Participants who are able to intubate mannequins also have high success rates with their patients.

This high-fidelity simulation case format can be used for other high-risk, low-occurrence scenarios in prehospital care. Our approach to all scenario-based learning and evaluation is moving toward this format. Medical scenarios such as septic shock associated with respiratory failure due to pneumonia are currently in development.

A limitation of this module is that it is not possible to fully engage all of the many factors that come into play in the rare case that requires prehospital RSI. The variability of airway anatomy and facial injuries are just two of the structural limitations a simulation cannot embody. A common limitation in many simulations is the difficulty in showing the subtle changes that develop indicating complications, such as tension pneumothorax in this case.

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References


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