

Emergency airway management in Brazil: lessons from our past will help guide us towards our future*

Manejo da via aérea na emergência no Brasil: lições do nosso passado ajudarão a nos guiar para o futuro

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The rapid growth of emergency medicine in Brazil represents a critical opportunity to advance the training of the next generation of emergency physicians, who will provide superior care to their patients for years to come. This editorial is a product of work done to support the launch of the first textbook specifically addressing the advancement of emergency airway management, completed by a skilled cadre of Brazilian physician authors.

We asked a panel of 12 academic physicians leaders who are involved in the research and dissemination of knowledge related to emergency airway management. Most are also contributors to many influential emergency medicine research publications related to airway management. Each of our 12 colleagues were asked to provide unscripted answers to the following two questions:

- What have been the most important milestones and accomplishments during the evolution of emergency airway management?
- What advice do you have as our Brazilian colleagues continue to advance the practice of emergency airway management?

You will find a compilation their responses and recommendations below. We hope that the opportunity for us to share these ideas today will catalyze many opportunities for future collaboration between Brazilian and American emergency physician colleagues with a special interest in emergency airway management.

DEVELOPMENT OF A ROBUST EMERGENCY AIRWAY MANAGEMENT RESEARCH PLATFORM

This first accomplishment, which has been a critical piece to supporting all the others listed below, represents a journey and not just a milestone. For the past three decades emergency physicians have worked diligently to answer important research questions unique to the emergency department environment and our patients. The ability to build a robust body of literature has been essential to define the unique path of airway management in our specialty. This has also been critical in building credibility and gaining the respect and support of our colleagues in anesthesiology, trauma surgery, and critical care.



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Emergency physicians have led critical research efforts that provide a better understanding of all phases of the emergency airway management process, including: airway assessment,^{1,2} pre-oxygenation techniques,³⁻⁶ patient positioning for intubation,⁷ selection of sedative and paralytic agents,⁸⁻¹¹ intubation techniques, including video laryngoscopy,¹² and post-intubation sedation and analgesia.^{13,14}

In the realms of airway adjuncts and airway rescue techniques, studies done in the emergency department have provided clarity on the best approach and settings for the use of: the gum-elastic bougie,^{15,16} extraglottic airway devices,¹⁷ surgical airway techniques,¹⁸ and endoscopic intubation.¹⁹

Emergency physicians have also led airway management research focusing on special populations, including: pediatric patients,²⁰ trauma patients,²¹ obese patients,²² and more recently, patients with COVID-19.²³

Lastly, emergency medicine has added focus to the rigorous evaluation of patient safety during airway management²⁴ by highlighting the importance of first-pass intubation,^{25,26} and by identifying predictors of post-intubation hypotension,^{27,28} and peri-intubation cardiac arrest.^{29,30}

One of the most important assets that emergency physician scientists have used to generate this high-quality research are well-designed airway registries. These capture rigorous data prospectively with the objective of providing continuous quality improvement, as well as the raw material for ground-breaking original research. A good example of a high-quality single-institution registry is highlighted by the prolific work by Dr. John Sakles and colleagues at the University of Arizona. Three examples of well-established multi-institution airway registries include the National Emergency Airway Registry (NEAR), the brainchild of Dr. Ron Walls from Harvard Medical School, the National Emergency Airway Registry for Children (NEAR4KIDS), and the Japanese Emergency Airway Network (JEAN).³¹⁻³³

As academic emergency physician leaders in Brazil continue to build their own strong airway

management research platforms, the creation of local and national airway registries would create a value asset for future research success.

WIDESPREAD ADOPTION OF RAPID SEQUENCE INTUBATION

The use of rapid sequence intubation (RSI) was first introduced in U.S. and Canadian emergency departments in the late 1980s and early 1990s.^{34,35} At the beginning of this journey opposition was strong and many medical professionals believed that it was inconceivable that neuromuscular blockade could be safely used outside of the operating room by non-anesthesiologists. The “essential ingredients” to overcome this long-held belief were a tireless pursuit of excellence, strong science, and a commitment to challenge the conventional wisdom. Another prominent component of this journey, and one that provides us with many valuable lessons, has been the need to avoid battles with other medical specialties, and instead to work together in a highly collaborative fashion.³⁶ With the collaborative spirit in mind, in 1996, the American College of Emergency Physicians published the first Policy Statement supporting the use of RSI in U.S. emergency departments.³⁷

Almost three decades later, RSI is the cornerstone of emergency airway management, an achievement that represents one of the most important milestones in Emergency Medicine. Along this path, emergency physicians have invested in the necessary equipment, implemented progressive evidence-based protocols, developed strong training programs, and mandated rigorous oversight systems to ensure high-quality patient outcomes.³⁸

While RSI is now commonly practiced by well-trained emergency physicians across Brazil, there is still opportunity for growth. As has been the case in the many countries, specialty leaders must join forces with residency programs, and those interested in developing continuing medical education to expand this fundamental approach to all four corners of the country.

DEPLOYMENT OF VIDEO LARYNGOSCOPY

The rapidly growing incorporation of video laryngoscopy into clinical practice represents another critical milestone in the field of emergency department airway management. Multiple studies have demonstrated that when compared with traditional direct (“line-of-sight”) laryngoscopy, video laryngoscopy provides: superior views of the airway during intubation, a higher rate of first-pass intubation in both adults and children, improved overall intubation success rates in adults, children, those with difficult airway characteristics, trauma patients, obese patients, and those with acute respiratory failure (e.g.: COVID-19), as well as a lower rate of intubation-related adverse events in these populations.³⁹⁻⁴⁴

Building an emergency department video laryngoscopy program requires three basic steps: investment in the necessary equipment, mastery of the technique, and development of relevant clinical protocols:

- Investment in the necessary equipment: complete, non-disposable video laryngoscope platforms with equipment for both adults and children cost between US \$15,000 and US \$20,000. While this cost may be seen as a barrier, this represents a critical investment for your emergency medicine team and your patients. Strategies to reduce this expense include partnering with other specialties in your hospital (e.g.: anesthesiology, critical care) to purchase equipment as a collective, purchasing the equipment in phases, or using less expensive disposable components.
- Achieving technical mastery: when compared with traditional direct laryngoscopy, video laryngoscopy is a different psychomotor skill. Most emergency physicians learn quickly how to identify the glottis, while passing the tube across the vocal cords typically requires more training and practice.⁴⁵ Airway mannequin training provides an inexpensive, reproducible approach to achieving mastery.
- Protocol development: while use of a video laryngoscope is reasonable intuitive, there is wisdom

in proactively developing protocols for optimal blade selection, e.g.: use of a standard video-assisted Macintosh blade for most intubations versus the hyper-angulated blade for patients requiring cervical immobilization, those with limited mouth opening, and those who are obese.

A COMMITMENT TO LEARN AIRWAY RESCUE TECHNIQUES

Developing skill and comfort with a select group of airway rescue techniques is vital. Since new airway devices will reach the market quickly, it is vital for the emergency physician stay up to date with the most recent technology. With this in mind, rather than attempting to learn all new products, it is more practical to master a focused number of devices that will help the team manage the clinical scenarios and/or disease state that you will likely see in your clinical practice.

Here is an example set of equipment for your Emergency Airway Cart, along with basic suggested indication for each:

- Video laryngoscope platform: for both most “standard” and difficult adult and pediatric RSI cases, and those using awake oral intubation with sedation alone.
- Gum elastic bougie: to assist with the management of both “standard” and difficult airways in adults and children.
- Extra-glottic devices: for patients in cardiac arrest and/or those who are “crashing” and requires immediate ventilation.
- Open surgical cricothyroidotomy kit: when immediate airway control is needed and oral and nasal intubation is impossible or contraindicated, typically because of distorted anatomy.
- Disposable endoscope: for difficult airways that require direct vision, e.g.: angioedema, smoke inhalation, disrupted airway anatomy. When your team wishes to deploy endoscopic technology in the emergency department for the first time, there is often an opportunity to acquire used endoscopes from the operating or endoscopy suites when these are replaced with newer devices.

Your teams must commit to practicing these devices regularly. This can be achieved using specially designed airway mannequins, high-fidelity simulators, dissected specimens, or human cadavers.

A SOPHISTICATED UNDERSTANDING OF THE PHYSIOLOGICALLY OF THE DIFFICULT AIRWAY

In parallel with the great strides that RSI, video laryngoscopy, and other advanced airway technique have provided for the management of the anatomically difficult airway there has also been important progress in our understanding of the physiologically difficult airway. This concept centers on the understanding that critically ill emergency department patients are frequently challenged by disease states that may cause abrupt, predictable physiological deterioration before, during, or after intubation, manifest as hypoxia, hypotension and cardiac arrest.^{27-29,46,47}

Three countermeasures have helped emergency physicians better anticipate and prevent this challenge: the identification of predictable markers of peri-intubation physiologic decompensation, the development of sophisticated pre-oxygenation techniques, and new approaches to managing peri-intubation hemodynamic optimization. The thoughtful use of intubation checklists has been shown to help operationalize these countermeasures and decrease adverse physiologic events during emergency airway management.^{48,49}

SPECIAL ATTENTION TO PEDIATRIC AIRWAY MANAGEMENT

When compared with adults there are significant differences in our understanding of and approach to emergency airway management in children, including: pediatric emergency airway management epidemiology, anatomic characteristics of the pediatric airway, pediatric physiology, strategies for successful airway management, airway management equipment, selection and dosing of induction agents, paralytics, and post-intubation sedatives, and airway management-associated adverse events.⁵⁰

Emergency departments that have the responsibility of caring for critically ill and injured children must commit the necessary time, resources and expertise to developing pediatric airway management teams and protocols.¹ Because pediatric endotracheal intubation is a relatively uncommon event, even in busy, inner-city emergency departments, cognitive aids like the Broselow-Luten tape™ can assist the team with the rapid and accurate, weight-based selection of equipment and drug dosing.^{51,52}

BUILDING A STRONG EMERGENCY MEDICINE AIRWAY CULTURE

The road to success in creating a strong emergency medicine airway culture is grounded on a sense of enormous responsibility to our patients, and intense pride in the impact of our specialty. This comes after a long history of hard work and dedication by many in our field.

To carry our unique culture forward, determination will be required, with a constant focus on:

- Strong emergency medicine leadership as part of the larger airway management community.
- A commitment to “own” airway management in our emergency department space.
- Continued high-impact contributions to the scientific literature.
- Sophisticated airway management training during residency.
- Sustainment of strong ongoing continuing medical education programs.
- Nurturing of a collaborative spirit with colleagues who share a passion to advance emergency airway management.

We look forward to success and partnership in the future!

CONTRIBUTORS

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