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Welcome to the Fall issue of the Canadian Journal of Respiratory Therapy (CJRT). With this issue, we continue to push forward with the Journal and the promotion of respiratory therapy research in Canada.

This issue marks a transition point for the CJRT. Beginning with the Winter issue, the CJRT will be published through the Pulsus Group, leading us in new directions and allowing us a venue to continue to grow the journal and strengthen the publication of peer-reviewed research. Some changes are already underway, including a new online submissions system for managing new manuscripts and the peer-review process. This system allows us to continue to produce high-quality peer-reviews, while enhancing authors’ and editors’ ability to track the progress of these articles.

The coming months will see the CJRT growing in new directions, with several new developments and revitalizations underway. We will continue to adopt a focus that advances the delivery of respiratory therapy in Canada and the science that underlies it. Our new approach to online open-access publication will strengthen this, as well as allow for international submissions and readership, which we believe will strengthen the journal and its impact. Our intention is to continue to provide Canadian respiratory therapists with high-quality peer-reviewed research, but also to broaden our approach to include international authors and readers who have similar interests and a need for sound research to guide their work.

Within this transformation, we need the continued support and input of Canadian respiratory therapists. It is vital that the journal be a reflection of Canadian needs and practices, and serves to enhance the provision of high-quality respiratory therapy and patient care. I want to thank our editors and peer-reviewers for their continued hard work and support of the journal. Your dedication and valuable insight is what allows us to push the journal forward and provide meaningful feedback to our authors and strengthen the quality of the journal. As we venture forward, we will be continuing to recruit peer-reviewers and members of an expanded editorial board to guide the future of the journal.

With this issue, we also welcome the addition of a new member of the editorial team to the CJRT: Carly McCuaig. Carly comes to us with extensive experience and a great deal of expertise in medical publishing, and will be working to help strengthen the CJRT and our overall vision and approach to the publication of high-quality research. We want to extend our sincere thanks to Rita Hansen, who has dedicated several years to the maintenance of the journal. Without Rita, we would not have been able to grow as much as we have, and a great deal of gratitude is owed to her.

Thank you for your continued support of the CJRT, and I look forward to the coming months and a renewed focus for the journal.

MESSAGE FROM THE EDITOR-IN-CHIEF

Jason Nickerson, RRT, FCSRT, PhD(c)
Bruyère Research Institute, Ottawa, ON

...
Bienvenue au numéro d’automne du *Journal canadien de thérapie respiratoire* (JCTR). Par ce numéro, nous poursuivons notre mission et la promotion de la recherche en thérapie respiratoire au Canada.

Ce numéro marque la fin d’une époque pour le *JCTR*. Dès l’hiver prochain, le *JCTR* sera publié par l’entremise du Pulsus Group, nous donnant une nouvelle orientation et nous permettant de croître et de favoriser la publication de recherches révisées par les pairs. Certains changements sont déjà mis en place, dont un nouveau système de soumission en ligne pour gérer les manuscrits et le processus de révision par les pairs. Ainsi, nous pouvons continuer de produire des révisions de grande qualité tout en permettant aux auteurs et aux éditeurs de suivre les progrès de leurs articles.

Au cours des prochains mois, nous verrons le *JCTR* prendre de nouvelles avenues, par un renouveau et une revitalisation déjà amorcées. Nous continuerons à adopter un point de vue qui fera avancer la prestation de la thérapie respiratoire au Canada et la science sur laquelle elle repose. Notre nouvelle approche de publications en ligne accessibles concrétisera ce point de vue et nous offrira des textes et des lectrices internationaux, ce qui devrait renforcer le journal et ses répercussions. Nous voulons continuer à offrir aux thérapeutes respiratoires canadiens une grande qualité de recherches révisées par les pairs, mais nous voulons aussi élargir notre approche pour rejoindre les lectrices étrangères qui pourraient intéresser aux recherches sûres pour guider leur travail.


*MESSAGE DU RÉDACTEUR EN CHEF*

**Jason Nickerson, RRT, FCSRT, PhD(c)**

Institut de recherche Bruyère, Ottawa (Ontario)
REVIEW ARTICLE

Airway Management, A Primer: Part 2
Peter G. Brindley MD, Stuart F. Reynolds MD, Michael Murphy MD

Reprinted with permission from the Canadian Journal of General Internal Medicine, Volume 7, Issue 1, Spring 2012

As explained in part 1 of this series (see CJRT 49.2), managing an airway is widely understood to mean ensuring an open breathing pathway (airway patency), protecting the lungs from aspiration (airway protection), and ensuring oxygen and carbon dioxide transfer (oxygenation and ventilation). We have described the rudiments of airway positioning, airway adjuncts, bag-mask ventilation (BMV), and airway assessment. Part 2 will focus on the basics of intubation technique and pharmacology. Taken together, we hope these articles will offer a range of practical insights.

FAILING TO PREPARE MEANS PREPARING TO FAIL

The mnemonic Y BAG PEOPLE can provide structure to chaos, and provide an aide-memoire during preparation for intubation. The letters stand for Yankauer suction; BMV; Access vein; Get your team ready; Position the patient; Endotracheal tubes (and check cuffs); Pharmacy (prepare drugs); Laryngoscope (obtain a variety of blades and confirm the light is working); and Evaluate for a difficult airway (see part I). When verbalized, “Why bag people?” also reminds us not to provide positive-pressure ventilation if patients are achieving gas exchange with spontaneous efforts. For example, it is common during crises to see a spontaneously breathing patient receiving aggressive BMV. This can inflate the stomach, thereby causing emesis. It can also decrease venous return and thereby cause hypotension. However, if the patient is not meeting his or her gas-exchange needs, then 100% oxygen and BMV are required (see part 1 for specific details).

LARYNGOSCOPY

The patient’s head should be approximately level with the clinician’s xiphisternum. The handle of the laryngoscope is held in the left hand and positioned close to the blade (Figure 1). The clinician’s right hand is placed under the patient’s occiput to provide additional lower neck-flexion and head-extension. The blade is then inserted to the right of the tongue (Figure 2). This should occur slowly and deliberately into the vallecula, deliberately depressing the hyoepiglottic ligament, which flips the epiglottis forward (Figure 3). A “look-as-you-go” approach helps to avoid advancing the blade too far. The blade tip is then centred (i.e., moved leftward) and an additional lift is applied along the laryngoscope’s longitudinal axis (Figure 4). The handle should be lifted – not levered – at an angle of no more than 30° to the floor.

FIGURE 1. The handle of the laryngoscope is held in the left hand and positioned close to the blade.
FIGURE 2. The blade is then inserted to the right of the tongue.

FIGURE 3. Blade insertion should occur slowly and deliberately into the vallecula, deliberately depressing the hyoepiglottic ligament, which flips the epiglottis forward.

FIGURE 4. The blade tip is then centered and an additional lift is applied along the laryngoscope’s longitudinal axis.

The usual laryngoscope blade for adults is the size 3 curved blade (Macintosh). The tip of the curved blade is intended for placement in the vallecula (anterior to the epiglottis). If the curved blade is too short, it will not contact the hyoepiglottic ligament and the epiglottis will not move to reveal the glottis. In these cases, a longer blade should be used, namely a size 4. However, a blade that is too long can occasionally trap the epiglottis, thereby worsening rather than improving the glottic view. Straight blades such as the Miller, Phillips, or Wisconsin are designed to displace the tongue to the left and then to directly elevate the epiglottis by picking it up. Although more often used in pediatric patients, these blades can also be helpful in the adult patient with an anterior larynx, small mandible, large tongue, long neck, or prominent incisors.

An endotracheal tube (ETT) that is too large can damage laryngeal structures (e.g., pressure necrosis of the arytenoids) and delay extubation. A tube that is too small can increase the work of breathing. As such, a size 7, 7.5, or 8 tube is well suited to small-, medium-, and large-sized adults. Following the insertion of a lubricated stylet, the tube is typically bent into a hockey-stick shape and then passed from an assistant to the clinician’s free right hand. This avoids interrupting direct visualization. In order to confirm correct tracheal placement, the tube should be visualized as it advances through the larynx (and the clinician should cease further advancement when the balloon is just past the cords). Other confirmatory signs include sustained end-tidal carbon dioxide detection; chest auscultation; the absence of gastric breath sounds; and normalization of oxygen saturation. The tube is held continuously to prevent being dislodged until it is secured, the laryngoscope is gently removed, and the ETT cuff is inflated with air until there is no leak at peak airway pressure. The focus now shifts to mitigating post-intubation hypotension produced by the switch to positive-pressure breathing (which decreases venous return) and the hemodynamic effects of anaesthesia of any medications we may have administered.

AIRWAY PHARMACOLOGY

In the critically ill, the physiological effects of drugs can be unpredictable. No single agent can achieve analgesia, hypnosis, and muscle relaxation. A combination of drugs is often used, but this can bring about hypotension. This can be mitigated through concomitant administration of intravenous (IV) fluid boluses, ephedrine (usual dose 5–20 mg IV), or phenylephrine (usual dose 50–100 mcg IV). However, one of the best ways to avoid hypotension is by administering small doses, followed by reassessment. More drugs can be given, but once given, cannot be taken away. It is also better to know a few agents well rather than many agents poorly. The following is a very rudimentary review (please see supplementary reading list for more information).

Opioids possess analgesic and sedative properties. Fentanyl has a higher potency than morphine, a rapid-onset, and a short duration of action. In usual doses (50–100 µg IV), it blunts the hypertensive response to airway stimulation. Other synthetic opioids, such as remifentanil and sufentanil, are better at blunting both hypertension and tachycardia but are not usually found outside of the OR. Because opioids block the sympathetic outflow, they too can cause hypotension (especially in combination with other agents). Less commonly, opioids have also been associated with chest wall rigidity and masseter spasm, complicating oxygenation and intubation. The short-acting benzodiazepine midazolam...
(usual dose 2.5–5.0 mg IV) causes amnesia and anxiolysis. This can facilitate intubation, especially if carefully combined with an opioid, local anesthetic, or low-dose propofol.

Propofol (usual dose 25–50 mg IV) is a lipid-soluble drug with a rapid onset and offset. It has no analgesic activity, and is therefore typically given with fentanyl. Despite wide appeal, at induction doses, it induces apnea and some muscular relaxation. This is why its use demands close monitoring and concomitant airway protection. Its use in the critically ill is further limited by its negative inotropic and vasodilatory properties, which can cause marked hypotension in patients with hypovolemia or poor myocardial function. Propofol is best reserved for hemodynamically stable patients requiring intubation for altered mental status; those with isolated head injury, status epilepticus, or asthma; and cases of isolated respiratory failure.

Lidocaine, a local anesthetic, can reduce airway reactivity, mitigate intercranial hypertension, and decrease cardiac dysrhythmias during intubation. To be most effective, lidocaine (usual dose 1.0–1.5 mg/kg IV) should be administered 3 minutes prior to intubation. Of note, it can lower seizure threshold. Ketamine (usual dose 50 mg IV) causes a dissociative anesthesia and can also lower seizure threshold. However, it is an appealing agent due to potent analgesia and amnesia combined with relative preservation of the respiratory drive and airway tone. Due to its central sympathomimetic effects, it can augment blood pressure, heart rate, and bronchodilation. As such, its use is favoured in hypotensive patients. However, it can also increase myocardial oxygen demands; therefore, caution is advised in patients with cardiac ischemia. Paradoxically, ketamine can also cause hypotension due to direct myocardial suppression. It is frequently given with a benzodiazepine so as to counter the dysphoria that occurs upon awakening.

Etomidate (0.3 mg/kg) is used widely in emergency and anaesthesia practice for the induction of anaesthesia in patients with incipient or actual shock, particularly as a component of rapid sequence intubation. It provides a remarkable degree of cardiovascular stability that is provided by no other currently available agent, including ketamine. The conundrum as to whether etomidate is safe in patients with sepsis mitigates against its use in these patients.

Neuromuscular blocking agents (NMBA) are often used to bring about muscle paralysis and ease intubation. However, they have to be used with care! The most important contraindication is a lack of certainty that gas exchange can be maintained if the patient cannot be intubated. Succinylcholine (usual dose 1–1.5 mg/kg), a depolarizing NMBA, has a rapid onset (30–60 seconds) and short duration of action (5–15 minutes). Contraindications to succinylcholine include a personal or familial history of malignant hyperthermia, underlying neuromuscular diseases, central nervous system injury, myopathies, narrow-angle glaucoma, penetrating eye injuries, or a suspected deficiency of plasma pseudocholinesterase. The drug should also be used with caution in patients with pre-existing hyperkalemia, burns, and chronic renal insufficiency. Rocuronium (usual dose 30–50 mg IV), a non-depolarizing NMBA, still has a relatively rapid onset (1–2 minutes) but a much longer duration (45–70 minutes). If the patient cannot be successfully intubated, there is a risk of dangerous hypoxemia because the patient is now reliant on expert BMV during prolonged paralysis. In short, these agents are not recommended for inexperienced practitioners of airway management. It is important to note that paralyzed patients must have ongoing sedation.

CONCLUSION
As with all topics in acute care medicine, there is no substitute for “hands-on” experience and an appreciation of the need for ongoing maintenance of competence.

DISCLOSURE
Dr. Michael Murphy is a shareholder in the company that operates the Difficult Airway Management Courses, Airway Management Education Center.

ABOUT THE AUTHORS
Peter Brindley and Stuart Reynolds are members of the Division of Critical Care Medicine, and Michael Murphy is a member of the Department of Anaesthesiology and Pain Medicine, all at the University of Alberta, in Edmonton, Alberta. Correspondence can be directed to peterbrindley@albertahealthservices.ca.

RECOMMENDED SOURCES FOR ADDITIONAL READING
From all sides, we hear that the healthcare system is becoming more complex. The prevalence of chronic diseases is rising, technology is advancing at an unprecedented rate, healthcare organizations are becoming larger, and patient care is becoming more interprofessional. Add to this the usual array of organizational challenges such as negative work cultures, personnel shortages, and large-scale changes, and you have an environment that actively works against the retention and recruitment of talented professionals.

This complex healthcare environment requires that those entering the workplace have more than just clinical knowledge and skills. They must also have (or rapidly acquire) a broad range of emotional and sociocultural competencies to be able to function in safe and proficient manner. There is a growing body of evidence that professionals who entering critical care areas, including respiratory therapists (RTs), often experience significant workplace and moral distress that can result in a number of negative results such as unsafe patient care, medical errors, and professionals leaving the practice area (1).

In light of this challenge, healthcare organizations are in desperate need of leaders who can actively generate positive and supportive work cultures, while compelling new and developing staff to higher levels of clinical, emotional, and sociocultural competence. It seems highly improbable that schools will be able to adequately prepare students for transition into such a multifaceted and complex work environment. Consequently, healthcare leaders must find or create tools to help facilitate this transition into the workplace while, at the same time, ensuring the highest standards of quality and patient safety.

Formal mentoring programs are one tool that successful leaders and organizations are using to improve performance, retain talent, and shift culture. Though the initial research on workplace mentoring focused primarily on informal mentoring relationships, progressive organizations have quickly tried to duplicate the positive results through formal programs for both new hires and developing leaders (2). In fact, 71% of Fortune 500 companies now have formal mentoring programs in place as an employee development tool (3). Healthcare organizations are not far behind; there have been numerous studies on mentoring in healthcare, especially as it relates to the nursing profession.

WHAT IS MENTORING?

Before getting into the benefits and best practices of workplace mentoring programs, we must first define mentoring. Although there is currently no common definition of mentoring in the literature, it is possible to identify several attributes of a mentoring relationship that provide a common frame of reference for our understanding:

- Mentoring reflects a unique relationship between individuals
- Mentoring is a reciprocal relationship
- Mentoring is a process
- Mentoring is a learning partnership (2).

These attributes are important for leaders to keep in mind when trying to create formal programs that encourage mentoring relationships. The attribute of mentoring as a relationship between individuals should be kept at the forefront. Although formal programs can encourage mentoring relationships through formal programs, ultimately the relationship between the individuals must be genuine if there is to be beneficial outcomes. Furthermore, the reciprocal aspect of the relationship must also be recognized. Both the mentee and mentor should feel that the benefits of being in a mentoring relationship outweigh the costs.

BENEFITS OF FORMAL MENTORING PROGRAMS

There are a number of benefits associated with mentoring. This article will highlight a few of the benefits that have been established in literature and, where possible, supplement those findings with our experience in Fraser Health (one of British Columbia's six provincial health authorities). Over the last three years, respiratory therapy departments across the region have participated in developing a formal workplace mentoring program for the profession. Development work has included establishing one-to-one mentoring relationships between new hires and more experienced therapists, participation in mentor training, the development of competency assessment tools, and standardization of education programs.

There are numerous, well documented benefits of mentoring programs for mentees. In healthcare, one of the main potential benefits is improving clinical competence. As patient care becomes more complex, there is mounting pressure for new hires to rapidly integrate their knowledge and skills and apply them to stressful, real-world situations (4). Mentoring programs have proven to be an effective tool in helping new graduates foster clinical judgment and gain experience while, at the same time, preserving patient safety and mentee confidence. Having a more experienced RT as a mentor allows the mentee to seek guidance and receive feedback in a supportive learning environment. Since implementing a formal mentoring program in Fraser Health, new graduates have reported an increase in both their confidence levels and in the amount of feedback received during the first two months.
RT mentees in our organization have also reported that their favorite aspect of the mentoring program is the relationship with their mentor. Prior to implementing a mentoring program, negative role modeling by experienced staff, and new graduates turning to other new graduates for guidance and support was commonplace. Implementing a mentoring program has helped establish a more supportive culture where new graduates are protected and guided by experienced staff. Literature also indicates that mentoring programs have the potential to assist mentees in gaining the emotional and sociocultural competencies needed to be successful in their job. Those who have had mentors tend to be more aware of the sociopolitical environment and the importance of navigating it with care (5).

The benefits of mentoring relationships and programs are not restricted to the mentee; there are also substantial benefits to the mentor. Benefits for mentors include: the acquisition of new knowledge and skills, improved career satisfaction, career revitalization, and improved career laddering opportunities. Having a mentee gives the mentor an opportunity to enhance their personal mentoring and leadership skills, while at the same time giving them a rewarding role in the organization (5). In addition, the formal responsibility of mentoring new staff is often an impetus to obtain new knowledge and skills. In Fraser Health there has been an incredible demand (5). In addition, the formal responsibility of mentoring new staff is often an impetus to obtain new knowledge and skills. In Fraser Health there has been an incredible demand (5). The benefits of mentoring relationships and programs are

The literature also cites the need for effective mentor-mentee selection and matching, as outcomes are directly related to the quality of the mentor-mentee relationship. Selection tends to be less of a challenge. If the formal mentorship program is for new graduates, the selection of mentees is made at the hiring stage. Mentors are often hand-selected based on training, skill, and experience. Matching mentors and mentees, on the other hand, is challenging in most formal mentoring programs because the mentors and mentees have little say in the matching process. Most organizations tend to use a random selection process or hand-pair mentors and mentees based on personal impressions or goals. This is done for ease of matching, though it is likely that allowing mentor-mentee input into the matching process would improve the quality of the program (7). It is interesting to note that pairings based on demographics have not been demonstrated to be effective. Perceived commonality and mutual attraction are the best predictors of a successful mentoring relationship (6).

Much more could be said about best practices in formal mentoring programs, but perhaps the most important piece of all is leadership. Like most new initiatives, mentoring programs will never get off the ground, let alone succeed, without leaders who see the significance of the program and show a high level of support. This support could come in many forms, from allowing RTs time away from the bedside to attend training, to rewarding mentors that demonstrate desired qualities to sustained program evaluation. One thing we know for certain is employees will be more committed to an initiative if they believe their leaders value and practice it.

**BEST PRACTICES IN FORMAL MENTORING PROGRAMS**

Perhaps the most commonly mentioned best practice related to mentoring programs is the need to train participants. Program effectiveness and participation are tied to the quality and quantity of training. Topics and skills that are generally recommended when training participants include adult learning theories, competency assessment, coaching and feedback skills, conflict resolution, and mentor-mentee responsibilities (6). In Fraser Health, a mentorship workshop was already established for nursing, we simply modified the content so that it was better suited to our profession-specific needs, which included creating profession-specific scenarios and integrating our profession-specific learning plan/competency tool. In our experience, the workshops have been well received, especially the sections on sharing wisdom and giving feedback. As the mentorship program has evolved we have also come to realize the importance of training the mentee. Mentees are expected to set their own learning goals and plans, which is hard to do without proper training and clear expectations.

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BOOK REVIEW

The Ins and Outs of Breathing: How We Learnt about the Body’s Most Vital Function

Submitted by Gail Dechman BScPT, PhD, School of Physiotherapy, Dalhousie University, Halifax, NS Canada

This book is written by Dr. Norman L. Jones (MD, FRCP(C)), Professor Emeritus, Division of Respirology, Department of Medicine at McMaster University. He is best known for his work on many aspects of exercise and his book, Clinical Exercise Testing. A true respiratory renaissance man, Dr. Jones has the ideal background to undertake this project. Rather than writing a standard textbook, his purpose is to present ‘a historical approach to various topics (in respirology) to build a picture of our present-day understanding of breathing in all its aspects.’ Indeed, this book would be a frustrating and uninformative read for anyone who wanted to use it as a course resource. Instead, Dr. Jones presents fascinating descriptions of the work of early physicians such as Hippocrates and Galen and explains the evolution and importance of pivotal work by people like Boyle, Fenn, von Neergaard, and Haldane in building the foundations of our current understanding of pulmonary function. He also tackles disparate topics such as atmospheric science and yoga breathing, explaining their integration with the other organ systems and ultimately with the environment around us.

There are 22 chapters in this 259 page book. Each is typically less than 10 pages long, so the reader can approach the book like a group of short stories. The content covers expected topics such as lung structure and function, and control of breathing. However, playfully intriguing chapter titles like “The Air GAIA Breaths” may attract readers to discover interesting science previously unknown to them.

Gaia was the goddess of earth in Greek mythology and the Gaia Hypothesis proposes that the biosphere and the physical components of the earth (atmosphere, cryosphere, hydrosphere and lithosphere) are integrated to form a homeostatic system that maintains climatic and biogeochemical conditions on Earth. You will have to read the book to discover how Dr. Jones relates these ideas to breathing! Dr. Jones also includes fascinating fragments of personal history about many of the scientists whose work he is discussing; for example, how Alexander Fleming’s boss, Sir Edward Almroth Wright earned the nickname “Sir Almost Right” and failed to attend the celebration of Dr. Fleming’s knighthood. Additionally, there are many stories about Canadians who have contributed to the respiration story for those who are interested in a bit of local gossip.

The book is not dry, but Dr. Jones writes with a precision that is not common today. Therefore, the reader must pay attention to understand fully the story he is telling. Compared to today’s textbooks, the font is small and there are few pictures or figures, but that shouldn’t take away from the pleasure readers will get from the book. Indeed, for those willing to take the time, this is an engaging read. Perhaps my only disappointment is that Dr. Jones has not included any information about how recent advances in molecular biology and immunology have influenced our understanding of breathing and its interconnectedness with other body functions. Regardless, the book is informative and an interesting way to expand one’s understanding of breathing and its role in our lives.
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\(^1\) The Joint Commission Sentinel Event Alert Issue 49, August 8, 2012
\(^2\) Teunzer AH et al. Anesthesiology. 2010;112(2):282-287

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