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ABSTRACTS

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MESSAGE FROM THE EDITOR-IN-CHIEF

Looking ahead: The state and future of the Canadian Journal of Respiratory Therapy

Justin Sorge RRT FCSRT MPH

Over my career, I have been fortunate to witness the evolution and growth of this publication. A crucial resource for cardiopulmonary practitioners, the Journal provides robust evidence and information to support you in delivery of evidence-based care. The increasing quality of submissions is a testament to the growing capacity of respiratory therapists as leaders in healthcare research and evidence-based medicine. With this growth, we have seen wider reaching contributions both regionally and professionally.

Exposure to cardiopulmonary research authored by colleagues from disciplines beyond respiratory therapy and borders beyond Canada carries with it the benefit of exposing our readership to unique clinical perspectives, expertise, and methodologies. These benefits work in synergy when research teams are composed of multiple healthcare professionals. Analogous to the improved health outcomes associated with multidisciplinary patient care, interprofessional collaborative research (ICR) aims to address complex research questions by leveraging the unique scientific perspectives of disciplines. In an era of increasingly complex health issues, ICR offers access of research teams to resources to address these issues that may not be available to siloed disciplines working in isolation [1]. Indeed, emerging ICR research teams, together with interprofessional education and clinical practice, create an integrated “nexus” aimed at enhancing population health, decreasing healthcare costs, and improving satisfaction with healthcare received [2].

An additional aspect of the evolution of the Journal that will benefit both its readership and authorship is our current migration to a rolling publication model. Rolling publication is article-based publishing as opposed to issue-based publishing. When an article is in its final form, rather than waiting for the article to be in a print issue before it is published, the article is published in its final form online. Authors benefit with a reduction in time to publication. Authors can be confident that their novel results will be published as quickly as possible. As such, authors can be confident that they will be the first to share their discoveries; this is an increasing pressure in academia. As an extension of this, the readership will be able to access, scrutinize, and implement the latest information. It is our hope that this will translate to improved and efficient care, leading to better health outcomes.

Our readers can expect to receive new information in a timely manner. Be sure to check the homepage (cjrt.ca) often for the latest articles. Every three months, the issue will be collated and placed in the archives; this is the new rolling publication model. Rolling publication is article-based publishing as opposed to issue-based publishing. When an article is in its final form, rather than waiting for the article to be in a print issue before it is published, the article is published in its final form online. Authors benefit with a reduction in time to publication. Authors can be confident that their novel results will be published as quickly as possible. As such, authors can be confident that they will be the first to share their discoveries; this is an increasing pressure in academia. As an extension of this, the readership will be able to access, scrutinize, and implement the latest information. It is our hope that this will translate to improved and efficient care, leading to better health outcomes.

Our readers can expect to receive new information in a timely manner. Be sure to check the homepage (cjrt.ca) often for the latest articles. Every three months, the issue will be collated and placed in the archives on the Canadian Journal of Respiratory Therapy website.

Finally, we are excited to promote our forthcoming Primary Care special issue. We are accepting submissions until 1 May 2018. I encourage everyone interested in submitting for this special issue, or any other submission, to visit our homepage to find author resources and guides provided by the Editorial Board.

I am truly excited and humbled to assume the role of Editor-in-Chief of the Canadian Journal of Respiratory Therapy and continue to contribute to our wonderful profession. I would like to acknowledge the foundational and continuing support of the Editorial Board—past, present, and future—whose invaluable and tireless efforts have advanced the Journal and its robust content throughout the years. Additionally, my warm gratitude goes to Dr. Andrew West, whose ongoing leadership, guidance, and advocacy of the Journal and the profession has set an ambitious standard to achieve.

As the Editor-in-Chief, I value transparency in our processes. I look forward to responsive open communication and discourse with our readership and authors. I encourage both authors and readers to contact me at editorinchief@csrt.com with any questions or concerns or for any general discussion surrounding the Journal. Let the discussions continue!

Justin Sorge RRT, FCSRT, MPH, Editor-in-Chief

REFERENCES


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A pilot study to assess short-term physiologic outcomes of transitioning infants with severe bronchopulmonary dysplasia from ICU to two subacute ventilators

Robert M. DiBlasi, RRT-NPS, FAARC1,2, Dave N. Crotwell, RRT-NPS, FAARC2, Jonathan Poli1, Justin Hotz, RRT-NPS3, Jonathan D. Cogen MD4, Edward Carter, MD5

INTRODUCTION
Chronic lung disease of prematurity/bronchopulmonary dysplasia (BPD) is a serious complication in premature infants, which can lead to tracheostomy tube placement and prolonged ventilation beyond the neonatal intensive care unit (NICU) setting. The prevalence of long-term mechanical ventilation with BPD outside of the NICU is not well defined, but some sources indicate that the need has steadily increased over the last two decades [1–4]. Cristea et al. [5] reported nearly a four-fold increase in the number of subjects requiring mechanical ventilation with BPD outside of the NICU from 1984 to 2010. A likely cause of prolonged intensive care unit (ICU) stay following tracheostomy in ventilator dependent infants may be related to the difficulty in transitioning from ICU ventilators to subacute/homecare ventilators. Potential reasons for failure to convert from an ICU ventilator to a subacute one may include the inability to trigger the ventilator, less rapid response times, increased dead space in subacute ventilator tubing, and bias flow differences between ICU and subacute ventilators. Sensitive breath-detection during mechanical ventilation has been associated with shorter response times and fewer ineffective triggering efforts [6]. Infants that experience dysynchrony due to poor trigger response with subacute ventilators may require sedation, higher ventilator settings, or the need to be placed back onto the ICU ventilator until they are large enough to successfully trigger mechanical breaths and have a slower respiratory rate.

In the past 10 years, recent advances in subacute ventilator technology have resulted in a proliferation of new microprocessor-controlled subacute/homecare ventilators. These ventilators are small, lightweight, and portable. They use batteries that are capable of lasting several hours, and most incorporate an internal air compressor or turbine-based flow generator. While many of these devices are approved for pediatric subjects weighing 5 kg or more, it is unclear whether they are capable of responding to the specific needs of smaller infants or those that have weak or ineffective inspiratory efforts or significant lung disease. Ventilators that provide more effective respiratory support and comfort during spontaneous breathing may facilitate the conversion from an ICU ventilator to a subacute one.

The Trilogy 202 (Phillips Respironics, Murraysville, PA) and the LTV 1200 (Carefusion, Yorba Linda, CA) are widely used home ventilators. We evaluated how these ventilators performed in a clinical setting in...
Subjects ≥0.30 or continuous positive airway pressure or mechanical ventilation sensitive flow triggering between the patient Y and airway opening. Initially with either the AVEA (Carefusion, Yorba Linda, CA) or the lar blocking agents, and (or) a recent history of apnea, central hypoventilation syndrome, indices of work of breathing, and the lowest work of breathing (WOB).

METHODS

Subjects

The Seattle Children’s Hospital Institutional Review Board (IRB) reviewed/approved the study on 15 May 2013 and deemed this work to be a quality improvement initiative. Routine esophageal pressure (PES) monitoring and transitioning from ICU ventilators to subacute ventilators are both considered standard clinical practice for any patient requiring chronic ventilation at Seattle Children’s Hospital ICUs. As such, we were not required by the IRB to obtain informed consent.

Clinically stable infants with severe BPD with cuffed tracheostomy tubes in place for ongoing mechanical ventilation residing in the NICU and ready to transition to a subacute ventilator were eligible for the study. They also needed to be cleared by the clinical team for trials before transitioning to the subacute ventilator. Severe BPD was defined as: FIO2 ≥0.30 or continuous positive airway pressure or mechanical ventilation required at 36 postmenstrual week for infants born at <32 weeks [7]. Exclusion criteria were: the ongoing need for moderate-deep sedation that resulted in no spontaneous breathing efforts, receiving neuromuscular blocking agents, and (or) a recent history of apnea, central hypoventilation syndrome, or neuromuscular disease. All infants were supported initially with either the AVEA (Carefusion, Yorba Linda, CA) or the Dräger VN 500 (Dräger Medical, Lubeck, Germany) ICU ventilator. These ventilators incorporate proximal hot-wire anemometers to allow sensitive flow triggering between the patient Y and airway opening.

Subacute ventilators

The LTV 1200 is a microprocessor-controlled, turbine-based flow ventilator that uses a pediatric dual-limb circuit and a pneumatically controlled positive end expired pressure (PEEP)/exhalation valve. A differential pressure pneumotachometer integrated into a modified Y connector of the subject circuit allows triggering and enables flow, volume, and pressure measurements proximal to the subject’s airway. The minimum flow trigger setting on the LTV 1200 is 1 L/min and the preset bias flow is 10 L/min. The LTV 1200 has leak compensation that will gradually adjust the sensitivity up to maximum subject leak of 6 L/min.

The Trilogy 202, like the LTV 1200, is a turbine-based flow ventilator. It incorporates a pediatric single-limb (passive) circuit with an integrated fixed orifice exhalation valve. Subject triggering and flow and pressure measurements are sensed at the ventilator with an internal mass flow anemometer. Similar to the LTV 1200, the Trilogy 202 minimum flow trigger is 1 L/min, and the bias flow varies based on subject leak, where: Bias Flow = 7 × PEEPM. For example, a subject receiving 6 cmH2O of PEEP who has no tracheostomy leak may have a bias flow of approximately 10.6 L/min, but this value could be higher with greater PEEP or when a leak is present or both. However, during exhalation, the Trilogy 202 turbine will reduce flow to keep PEEP constant.

The Trilogy 202 ventilator also has the option to use a dual-limb (active) circuit with a differential pressure pneumotachometer that has an approximate dead space ~7 mL. When the Active Flow circuit is chosen, the machine measures flow from a proximal flow element. This flow is used to estimate volume, to trigger, and in some cases cycle breath delivery. Prior to the clinical trial, we evaluated several subacute ventilators using a spontaneously breathing lung model configured with lung model mechanics similar to those observed in infants with BPD (unpublished data). We found that with the Trilogy 202, ventilator performance did not differ between the active dual limb circuit (with proximal flow sensor) and passive single-limb circuit configurations. Thus, we chose to forego the active circuit and only use the passive circuit with the Trilogy 202 for our study.

Heated and humidified gases were provided with a Fisher and Paykel MR 840 humidifier (Auckland, NZ), and each of the ventilator circuits were connected to the tracheostomy tubes using a Pediatric Omni-Flex Connector (Carefusion, Yorba Linda, CA).

Monitoring devices

Infants were monitored with esophageal balloon catheters, airway pressure (Paw) transducers, flow pneumotachometer, oxygen saturation (SpO2) monitor (Rad 7, Massimo Corporation, Irvine, CA), and end tidal carbon dioxide (PETCO2) monitors (Microstream; Oxidion, Needham, MA) while receiving mechanical ventilation. A single lumen air-filled, balloon-tipped 6 French Pco2 catheter (Cardinal Healthcare, Dublin, OH) was positioned in the lower esophagus and the balloon was inflated with 0.2 mL of air. Placement of the Pco2 catheter enables direct measurement of Pco2 which is an estimate of pleural pressure. We confirmed appropriate placement of the catheter using the occlusion technique [8]. Pre-existing nasogastric feeding tubes were not removed for this study. The Paw and Pco2 were obtained using calibrated micro-machined piezo resistive silicon pressure transducers (XRA515GCN, Honeywell, Morristown, NJ) range 0-1054.5 cmH2O. The differential pressure pneumotachometer (4500A, Hans Rudolph, Kansas City, MO) was placed in series between the subject and the tracheostomy tube to measure flow. Outputs from the Paw and pneumotachometer were sampled at 1024 Hz, using a 16-bit analog/digital (A/D) converter (DT9804-E4C-I-BNC, Data Translation, Marlboro, MA) and were processed using a fourth-order Butterworth low-pass filter with a cut-off frequency of 20 Hz.

Study protocol and primary measures

Each infant served as their own control and were supported initially with an ICU ventilator and then consecutively with each of the different subacute ventilators on the same day as part of a crossover design. Before transitioning to the subacute ventilators the mandatory ICU ventilator rates were adjusted (over 10 min) so that all subjects were breathing spontaneously in order to evaluate subject-ventilator interaction and triggering. The order for which each of the subacute ventilators was first initiated was varied on each of the different days of testing. They were placed on identical settings as the ICU ventilator for 20 min with each of the two subacute ventilators and then returned to the ICU ventilator for a 20 min “wash-out” period between testing with each subacute ventilator. In each case the pressure control SIMV with pressure support mode was used. Once infants were placed on a subacute ventilator, the slope (rise) of the inspiratory flow was adjusted independently so that peak inspiratory pressure (PIP) measured on the subacute ventilators was similar to those measured at the airway with the ICU ventilator. In addition, we adjusted flow trigger settings to maintain the lowest value that did not result in auto-cycling of the ventilator (as confirmed by real time PES waveform analysis).

It was determined a priori that any infant who did not tolerate a subacute ventilator based on SpO2 <85% on the same FIO2 used with the ICU ventilator, and (or) significantly increased work of breathing, and (or) Pco2 increase >20% from the value when on the ICU ventilator would be placed back on the ICU ventilator and not continue with the study.

Heart rate, respiratory rate, SpO2, and Pco2, were recorded (n = 10 per subject at each condition) and measurements of Pco2 were acquired for three consecutive 15 s intervals (45 s) following 20 min of support with the ICU ventilator and each of the subacute ventilators. Infants who were able to complete the study were first placed onto the ICU ventilator and later transitioned to the subacute ventilator that consistently resulted in the best empirical evidence for subject comfort, gas exchange, and the lowest work of breathing (WOB).

Esophageal pressure changes (ΔPaw) were used to approximate changes between baseline and maximal deflections in Paw measure respiratory rate during spontaneous breathing efforts. The ΔPaw was also used in the calculations for pressure rate product (PRP). PRP is the product of ΔPaw and respiratory rate (RR) and is used as an index of inspiratory WOB, where:
DiBlasi et al.

This method of calculation has been described elsewhere in detail [9, 10]. Briefly, PRP provides a more objective measure of effort of breathing than clinical respiratory scores, and it has been shown in children to be more effective in characterizing increasing inspiratory load when compared with phase angle, especially when significant airway resistance is present [10–12]. PRP may be a more useful measure of the amount of energy required to breathe spontaneously during mechanical ventilation than traditional work of breathing measurements because it incorporates respiratory frequency. Also, PRP reflects the magnitude of the entire esophageal pressure swing independent of whether a breath was triggered, whereas standard WOB measurements only assess the integral of airway minus esophageal pressure and volume.

Subject-ventilator asynchrony and increased WOB may result from delays in the time from when the subject initiates a breath (deflection of airway minus esophageal pressure and volume) triggered, whereas standard WOB measurements only assess the integral of the esophageal pressure swing independent of whether a breath was triggered. Two infants developed excessive WOB, inability to breathe spontaneously during mechanical ventilation via cuffed tracheo-bronchomalacia, and necrotizing enterocolitis. The rise time settings could have an impact on response time but they were typically 1 with the LTV-1200 across a range of simulated spontaneous breathing models with simulated airway leaks. The rise time settings could have an impact on response time but they were typically 1 with the Trilogy 2 and 1–2 with the LTV-1200 to promote rapid filling without overshooting/undershooting the PIPs between the two ventilators. We propose that the observed difference in ventilator response times can be attributed to differences in the triggering algorithms, flow sensor performance, and responsiveness of the gas delivery systems between the two ventilators. Although we did not measure the different circuit volumes, bias flows, inspiratory times ranged from 0.35 to 0.5 seconds.

### TABLE 1
Patient characteristics and ventilator settings

<table>
<thead>
<tr>
<th>Gestational age (wks)</th>
<th>Chronologic age (mos)</th>
<th>Weight (kg)</th>
<th>Sex</th>
<th>Diagnoses</th>
<th>Ventilator settings*</th>
</tr>
</thead>
<tbody>
<tr>
<td>24-0/7</td>
<td>6</td>
<td>5.2</td>
<td>M</td>
<td>BPD, pulmonary atresia, tracheomalacia, bronchial stenosis</td>
<td>SIMV PIP/PEEP/PS/Rate/FIO₂</td>
</tr>
<tr>
<td>26-1/7</td>
<td>5</td>
<td>5.7</td>
<td>M</td>
<td>BPD, tracheomalacia, pulmonary hypertension</td>
<td>32/10/20/30/0.35</td>
</tr>
<tr>
<td>27-2/7</td>
<td>5.5</td>
<td>3.9</td>
<td>F</td>
<td>BPD, tracheomalacia, necrotizing enterocolitis</td>
<td>27/9/12/30/0.45</td>
</tr>
<tr>
<td>30-1/7</td>
<td>3</td>
<td>5.4</td>
<td>M</td>
<td>BPD, complete tracheal rings, bronchial stenosis</td>
<td>28/10/18/25/0.25</td>
</tr>
<tr>
<td>24-3/7</td>
<td>5.5</td>
<td>4.9</td>
<td>M</td>
<td>BPD, tracheomalacia, NEC</td>
<td>28/12/16/20/0.35</td>
</tr>
</tbody>
</table>

*All ventilators were in the pressure control SIMV/PS/PEEP/FIO₂ mode. Inspiratory times ranged from 0.35 to 0.5 seconds.

**Note:** SIMV: ventilator set rate in breaths/minute; PIP: peak inspiratory pressure in cm H₂O; PS: pressure support over PEEP in cm H₂O; PEEP: positive end-expired pressure in cm H₂O; FIO₂, fraction of inspired oxygen; BPD: bronchopulmonary dysplasia.

### TABLE 2
Respiratory parameters on the ICU and subacute ventilators

<table>
<thead>
<tr>
<th>Parameter*</th>
<th>AVEA or VN500*</th>
<th>LTV 1200*</th>
<th>Trilogy 202*</th>
<th>p*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart rate (beats/min)</td>
<td>158 (9)</td>
<td>156 (20)</td>
<td>156 (26)</td>
<td>0.51</td>
</tr>
<tr>
<td>SpO₂ (%)</td>
<td>99 (9)</td>
<td>95 (11)</td>
<td>94 (9)</td>
<td>0.97</td>
</tr>
<tr>
<td>ETCO₂ (mm Hg)</td>
<td>44 (2)</td>
<td>49 (11)</td>
<td>45 (9)</td>
<td>0.02</td>
</tr>
<tr>
<td>Respiratory rate (breaths/min)</td>
<td>49 (34)</td>
<td>65 (21)</td>
<td>49 (41)</td>
<td>0.002</td>
</tr>
<tr>
<td>∆ P-esophageal</td>
<td>4 (6)</td>
<td>10 (13)</td>
<td>3 (6)</td>
<td>0.007</td>
</tr>
</tbody>
</table>

*p values are expressed as median (interquartile range).

**p** values pertain to differences in values between the two subacute ventilators; Wilcoxon signed rank test used.

### DISCUSSION
The major finding from this study is that the Trilogy 202 ventilator provided short-term ventilator support that was superior to the LTV-1200 with respect to subject–ventilator response time, triggering, and work of breathing in 6 infants with severe BPD requiring long-term mechanical ventilation via tracheostomy tubes. This study was not designed to compare physiologic outcomes between ICU ventilators and subacute ventilators. We used two different ICU ventilators, so we were not able to make any statistical inferences about performance between the subacute ventilators and ICU ventilators. However, it is important to note that all of the physiologic measurements were similar between the Trilogy and ICU ventilators.

Our findings concur with those obtained by Blakeman et al. [13] who observed shorter ventilator response times with the Trilogy 202 than with the LTV-1200 across a range of simulated spontaneous breathing models with simulated airway leaks. The rise time settings could have an impact on response time but they were typically 1 with the Trilogy and 1–2 with the LTV-1200 to promote rapid filling without overshooting/undershooting the PIPs between the two ventilators. We propose that the observed difference in ventilator response times can be attributed to differences in the triggering algorithms, flow sensor performance, and responsiveness of the gas delivery systems between the two ventilators. Although we did not measure the different circuit volumes, bias flows,

Six infants completed the study (Table 1). The mean (SD) weight of the six infants was 4.98 (0.56) kg. There were no differences between the LTV 1200 and Trilogy 202 in HR and SpO₂ (Table 2). When on the Trilogy 202 infants had lower P_{ETCO₂}, ∆P_{esophageal}, respiratory rate (Table 2), PRP (Figure 1), and response times (Figure 2) and greater percent subject triggered breaths (Figure 3) than with the LTV 1200 (p < 0.05). All six infants transitioned successfully from the ICU ventilator to the Trilogy 202 on a long-term basis.

The major finding from this study is that the Trilogy 202 ventilator provided short-term ventilator support that was superior to the LTV-1200 with respect to subject–ventilator response time, triggering, and work of breathing in 6 infants with severe BPD requiring long-term mechanical ventilation via tracheostomy tubes. This study was not designed to compare physiologic outcomes between ICU ventilators and subacute ventilators. We used two different ICU ventilators, so we were not able to make any statistical inferences about performance between the subacute ventilators and ICU ventilators. However, it is important to note that all of the physiologic measurements were similar between the Trilogy and ICU ventilators.

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or compliance and resistance between the different circuits used with Trilogy and LTV 1200 ventilators, the proportionally lower circuit volume of the Trilogy single circuit, coupled with higher bias flows, may help to explain the lower observed response times and PRP values.

We were not able to quantify tracheostomy tube leaks, but several of the subjects enrolled in this study had small audible airway leaks, despite using cuffed tubes. The Trilogy 202 uses an adaptive triggering algorithm that modifies triggering and cycling characteristics in the presence of dynamic air leaks, whereas the LTV 1200 employs triggering compensation based on preset parameters and will only adjust for leaks up to 6 L/min and only if there is a stable detectable leak during exhalation. The effort required to trigger breaths in the face of small tracheostomy tube leaks may have also contributed to lower PRPs and response times in this study.

Another possible reason for the difference in PRP, ventilator response times, and triggering may be related to where the triggering mechanisms are actually located within the ventilator circuit. The Trilogy 202 allows subject triggering with a mass flow sensor inside the ventilator through a passive, single-limb circuit, whereas the LTV 1200 senses subject effort using an integrated differential pressure pneumotachometer situated proximal to the subject airway with a dual-limb subject circuit. In chronically ventilated subjects there may be a disadvantage with a proximal flow sensor because the sensor accuracy may be more easily affected by humidity, temperature, secretions, and fluid condensate compared to a sensor that is housed within the ventilator. Also, flow sensors situated at the airway may increase mechanical deadspace and resistance, which may increase the energy required by a subject to breath on the LTV 1200. Of note, with the Trilogy 202, despite its better performance, we found the median ventilator response time was still >600 msec, which is higher than that reported by both Blokpoel et al. [14] and Blakeman et al. [13]. Both of those investigators used airway pressure and flow characteristics to determine onset of respiration in a mechanical lung model. The longer ventilator response time observed in our study was likely due to the use of esophageal manometry to define the onset of subject effort and also differences in airway obstruction in our subject population compared with the pediatric lung model used in those in-vitro studies.

Also, unlike previous methods that identified ventilator response times as the time it takes a subject to initiate a breath to the time it takes for the onset of a mechanical breath to be sensed at the airway, we felt that peak inspiratory flow would be more descriptive from a performance standpoint because it takes into account the time between subject effort, breath onset, and time to reach the maximal flow delivered to the subject. Further subacute ventilator improvements are needed to reduce ventilator response times and triggering as these are a primary contributor to ventilator asynchrony [15], and ventilator asynchrony is associated with negative outcomes, to include prolonged intubation [16, 17], increased sedative use [18–20], and higher mortality [21].
Our subjects with BPD likely had air trapping and intrinsic PEEP [22] that had to be overcome with generating sufficient pleural pressure before a change in circuit pressure and flow could allow ventilator triggering to occur [23]. We showed statistically significant differences in the number of spontaneously triggered breaths between the two subacute ventilators. One of the subjects was only able to trigger the LTV 1200 ventilator 56% of the time but was able to trigger the Trilogy 100% of the time. It is unclear whether the subject had a significant trache tube leak or whether they had greater difficulty initiating breaths with the LTV 1200 due to a more severe form of BPD (high intrinsic PEEP) or because the subject was extremely small (3.9 kg) compared with the other subjects included in this study. Nonetheless, the infant was clinically stable with SpO2 >98% and didn’t appear to have any significant distress. Two infants were excluded from the original eight eligible patients in the study (insufficient data to be shown) and returned to the ICU ventilator because they were unable to trigger breaths from the LTV 1200 ventilator. As such, this study was designed only to include clinically stable infants that could trigger the respective ventilators for the majority of the time.

The calculation of subject-triggered breaths provides information about the relative proportion of subject-triggered mechanical breaths delivered by the ventilator but it doesn’t take into account the energy expenditure required by the subject to trigger those breaths. The PRP reflects these initial efforts as well as all maximal efforts required by the subject throughout the entire inspiratory effort. As such, we postulate that the significant reductions in PRP observed in subjects supported by the Trilogy 202 may be due, in part, to the lower pleural pressures required to effectively trigger this ventilator.

In our study we noted improvement ineffect of breathing, FRP, and triggering with the Trilogy 202 ventilator compared with the LTV 1200. As mentioned previously, we speculate that these differences are related to the force necessary to trigger a breath and receive appropriate flow from within the ventilator system. The PRP has been used for respiratory disease severity stratification in children with upper airway obstruction [24] and also in rhesus monkeys with simulated upper airway obstruction [12]; it is a clinically relevant measure of inspiratory load. Excessive inspiratory loads during ventilation may be a contributor to diaphragm dysfunction [25] and may have clinical relevance in regards to pulmonary rehabilitation. As mentioned previously, we did not observe clinically important differences in SpO2, HR, and ETCO2 between the Trilogy and LTV despite differences in work of breathing as assessed by the PRP.

Our findings are similar to Ross et al. [12] who observed stepwise rises in FRP as increasing high inspiratory resistors were added to both intubated and spontaneously breathing rhesus monkeys; there were no significant changes in clinical parameters (SpO2, HR, ETCO2) until the highest resistors were added and the monkeys were unable to match the inspiratory load.

There are several limitations to our short-term physiologic study. We only evaluated six infants with a single disease (BPD) process and from a single institution. Transitioning large numbers of infants to subacute ventilators is a rare occurrence at our institution. As such, acquiring data in a large number of subjects would take decades with ventilator technology changes making those efforts a moot point. Other investigators have also found differences in patient-ventilator synchrony in using a relatively small numbers of neonatal subjects [26]. Our findings are limited to subjects with BPD, so it is unclear whether there would be different outcomes in subjects with other forms of chronic respiratory illness supported by the same ventilators. It is important to note that all subjects in this study had at least one form of significant upper airway obstructive lesion (e.g., tracheomalacia) and another had Necrotizing enterocolitis that was treated surgically. It is unclear how these factors may have contributed to these findings or whether infants experiencing BPD would have different short-term outcomes in the absence of these complications. Also, this was a study of short duration (20 min at each condition); therefore, it is difficult to extrapolate these results to longer time periods. We only used two subacute ventilators, all in a single mode of ventilation (PC SIMV with PS). Lastly, we evaluated performance in patients that were <5 kg and these subacute ventilators are approved for use in patients >5 kg. As such, these findings should be approached with caution, as larger infants may be able to be supported similarly using either of the subacute ventilators mentioned in this study and conversely, smaller spontaneously breathing infants may not be able to be supported with these ventilators.

CONCLUSION

In this small group of infants with ventilator-dependent BPD we found that the Trilogy 202 ventilator performed better than the LTV 1200 with respect to response time, respiratory rate, triggering, and WOB (PRP). We postulate that this was because of, in part, the Trilogy 202’s adaptive triggering algorithm and responsive gas delivery system, and location of the flow sensor. These pilot data may be useful for informing future clinical study design and understanding differences in the level of support provided by different subacute ventilators in infants with BPD. Future studies will be needed to determine whether these new ventilator technologies play a role in reducing length of ICU stay.

CONFLICT OF INTEREST

Robert DiBlasi has served as a consultant, received research funding, and has been on the speaker’s bureau for Draeger Medical and Mallinckrodt Medical. He also currently has a grant from Aegeron Pharma (#15915). The other authors have no conflicts of interest to disclose. We received no funding support for this study.

REFERENCES


INTRODUCTION

Psychomotor skills are essential in many healthcare professions. In the past, these skills have been taught, reinforced, and evaluated to the new generation of health care workers through in-class labs and simulations with a face-to-face instructor. With emerging technology, e-learning and other forms of computer-assisted learning have become a critical part of education in general and have been implemented for healthcare professions [1–3]. There is very limited research exploring the effectiveness of e-learning on the acquisition of psychomotor skills in health sciences, a key component in the field [4, 5]. Major limitations of face-to-face learning include limited classroom space and an insufficiently qualified instructors in settings where there are high demands for healthcare education [6]. For students in clinical learning settings, additional barriers include a lack of procedural knowledge among institution staff and preceptors, costs of training equipment, and low patient need for certain procedures resulting in insufficient learning opportunities for students [7]. We postulated that e-learning would be a useful tool in overcoming these obstacles. Thus, it is worth further exploring the effectiveness of online education on student learning when used in addition to traditional classroom-based settings. Online material could enhance face-to-face learning by acting as a supplementary tool for students’ learning. It also has the benefit of allowing students to pause or repeat aspects of procedural learning should they not understand them initially. Furthermore, a major limitation of learning procedural skills in the classroom setting alone is the inability to practice these skills outside of the classroom. Students may learn a procedure such as venipuncture in the classroom, but without the opportunity to regularly practice and refresh their knowledge these skills may be lost before students are able to use them in clinical placements or the workplace. While students can review the procedures they have learned in the classroom, reading alone will not allow students to retain certain technical aspects of procedural skills. Videos demonstrating these procedures, such as the videos in our e-learning module, may reinforce these more technical aspects of the procedure.

The task of performing venipuncture, an essential psychomotor skill in many healthcare professions, requires academic competence, confidence, and proper dexterity for successful performance. Our goal was to determine whether an e-module on performing venipuncture (developed in-house) would be beneficial for students’ performance. In particular, we sought to determine if e-learning in conjunction with in-class training would (i) increase students’ confidence, (ii) improve students’ academic competence, and (iii) improve students’ psychomotor skills. A study by Worm et al. [8] showed that the use of video and simple animations in online learning improved students’ performance compared with the use of only text, images, audio, and simple interactivities for content presentation. Our e-module fits the description of the former type of learning, and when used in conjunction with in-class learning, we would therefore expect students to benefit from the e-module. Thus we hypothesise that students will perform better in all three areas of evaluation when e-learning is used in addition to in-class training.

Key Words: e-learning, venipuncture, psychomotor skill
Study participants
All study participants provided written informed consent to partake in this pilot study. The study protocol was approved by the community college Research Ethics Board (#16-05-02-1). Study participants were students recruited from Health Science Programs at a community college in Southwestern Ontario. Study representatives approached students during the fall semester with a short presentation explaining the study. Study representatives emphasized that the study was an optional component of students’ education, that participation or lack thereof would have no effect on students’ evaluation, and that the e-module would be made available to everyone upon completion of the study, whether they participated or not. Furthermore, while instructors from several of the programs were involved in the studies, they did not approach students within their own classes. With the exception of skills gained from participating in the e-learning module, there was no added benefit for students participating in the study. In total, 224 students were approached: 64 from paramedicine, 87 from practical nursing, 62 from respiratory therapy, and 11 from magnetic resonance imaging. All students from paramedicine, practical nursing, and respiratory therapy had recently started their second year of study while the postgraduate magnetic resonance imaging students were in their first year of study.

E-learning module
Paper-based text material developed by London Health Sciences Centre was converted into a self-paced, visually rich, interactive module designed with Richard Mayer’s Multimedia Principles in mind [9]. For example, care was taken to delete extraneous material (Coherence principle), cue students to key ideas (Signaling principle), and break content down into manageable chunks (Segmenting Principle). The e-learning module consisted of six main sections: Venipuncture Site, Equipment, Preparation, Procedure, Complications, and Continuing Care. Forward and back buttons were included for linear progression through the content, as well as a navigation menu outlining the main and sub-sections of the material to allow for more specific content retrieval. Checkmarks next to menu sections served as a visual marker of progress through the module and allowed students to identify which sections were previously completed.

Various interactive activities throughout the module were designed to reinforce learning through retrieval practice. Retrieval practice has been shown to be one of the most powerful methods of learning [10]. Videos throughout the module provided a visual demonstration of psychomotor skills. Cooper et al. [4] reinforced the growing body of research showing the effectiveness of online instructional videos in demonstrating psychomotor skills. Each section began with a reflection task designed to prime students’ curiosity for deeper cognitive processing. Curiosity has been shown to reliably encourage student engagement [11].

Data collection
Recruited students were randomly divided into two groups, a control group and a study group, using an online random number generator [12]. The control group was educated using traditional in-class training, in contrast, the study group was educated using an online random number generator. Recruited students were randomly divided into two groups, a control group and a study group, using an online random number generator. Students from the separate health science programs were grouped together within the control and study groups for analyses. Figure 1 displays a detailed breakdown of the two study arms with a summary of the number of students in each group and components completed.

METHODS

Study participants
Consisting of readings, lectures, and lab demonstrations. In contrast, the control group was educated using traditional in-class training, while the study group, using an online random number generator. Recruited students were randomly divided into two groups, a control group and a study group, using an online random number generator. Students from the separate health science programs were grouped together within the control and study groups for analyses. Figure 1 displays a detailed breakdown of the two study arms with a summary of the number of students in each group and components completed.

Data collection
Recruited students were randomly divided into two groups, a control group and a study group, using an online random number generator [12]. The control group was educated using traditional in-class training, consisting of readings, lectures, and lab demonstrations. In contrast, the study group had access to our e-learning module through the learning management system used for teacher–student communication and sharing of course material, in addition to traditional in-class training. Students in the study group had access to the module throughout the entire semester, whereas students in the control group received access to the module after study evaluation was completed but prior to their final exams. This ensured that students from the study group did not have additional benefits in their academic education.

Participants were assessed on three separate competencies all completed during the fall semester of 2016 to coincide with scheduled in-class learning of venipuncture skills in all programs. Students’ self-confidence was recorded before and after the final exams. Both control and study groups’ confidence levels were evaluated using a Likert scale (administered through the college’s online learning management system) that is similar to the scale developed by Hicks et al. [13]. A sample questionnaire is shown in Appendix A. Academic competence was also evaluated post-intervention using a short assessment, which was administered through the college’s online learning management system and which consisted of 13 multiple-choice questions on performing venipuncture (see Appendix B). Finally, to evaluate psychomotor skills, students were video recorded while performing venipuncture on mannequin arms (Life/form Adult Venipuncture and Injection Training Arm LFG0698L) at an anatomical site (antecubital fossa or hand) most convenient to them [14]. Students’ identities were hidden in the videos by focusing the camera only on the students’ hands and the surface on which venipuncture was being performed. The students’ faces, names, and audio were not included in the recording. Several instructors then graded students by viewing the video recordings. To avoid bias and potential recognition of student identity, instructors only graded students who were not enrolled in their courses. To measure psychomotor competence, a rubric (see Appendix C) similar to the one previously tested and utilized by the respiratory therapy program was employed.

RESULTS

A total of 114 candidates provided written informed consent to participate in the study leading to a 51% response rate. Overall 84 students completed at least one component of the study. Of these, 50 participants were from the control group: 18 paramedicine, 14 practical nursing, 16 respiratory therapy, and 2 magnetic resonance imaging students. Furthermore, there were a total of 34 participants in the study group: 8 paramedicine, 13 practical nursing, 12 respiratory therapy, and 1 magnetic resonance imaging students. Due to the low response rate, students from the separate health science programs were grouped together within the control and study groups for analyses. Figure 1 displays a detailed breakdown of the two study arms with a summary of the number of students in each group and components completed.

As shown in Table 1, there were no significant differences observed between the control and study groups for pre- or postconfidence level scores. Additionally, as shown in Table 2, significantly higher postconfidence level scores were observed for both the study (p = 0.0011) and the control (p = 0.0025) groups than preconfidence level scores. Interestingly, as shown in Table 1, students in the study group scored significantly higher (p = 0.017) on their multiple-choice test, which was designed to assess students’ academic competence. Finally, as shown in Table 1, there were no significant differences observed between the study and control group scores when testing psychomotor skills.

DISCUSSION

Our goal in this study was to determine whether an e-learning module, when provided in addition to traditional in-class training, would improve health sciences students’ confidence, academic competence, and psychomotor skills. We hypothesized that students will perform better in all three components of the study when e-learning is used in addition to in-class training. Our results suggest that there was no significant difference in confidence levels for students in the control and study groups pre- or postintervention. We observed an increase in confidence for both groups by the end of the intervention. This was expected, as both groups received in-class instruction. Additionally, students in the study group scored higher on their academic evaluation than the students in the control group, which suggests that e-learning or other forms of computer-assisted learning have the potential to improve academic competence when used in conjunction with traditional techniques.

Unexpectedly, we found that students who had access to the e-module did not improve their psychomotor skills more than students who only received in-class training. This finding may suggest that
psychomotor skills are difficult to transfer through e-learning; however, this needs further validation, and e-learning should not be dismissed as a possible means of transferring psychomotor skills. Work is currently being done to understand optimal methodology and e-learning module setups. A meta-analysis conducted by Gugenfurtner et al. [15] identified user control of the level of difficulty as well as student assessment after training (rather than during training) to be effective strategies for improving students’ self-efficacy and transfer of learning. Future online modules for intravenous training may be more effective if they were in the form of interactive digital simulations as opposed to or in addition to videos demonstrating the skill. User control of difficulty level should be incorporated into the design of future intravenous training modules. As technology continues to progress, novel and more interactive e-modules could be developed which could prove to be more successful in cultivating psychomotor skills. Current work suggests that e-learning modules need to be used in conjunction with face-to-face learning with a focus on enhancing both teaching and learning [16].

Several limitations of our study should be addressed. Because of the low response rate of students, our sample size was relatively small. Furthermore, of the students who did participate, not all completed each of the three assessments (academic, psychomotor, and confidence). This issue limited the types of analyses that could be performed. A larger sample size would have allowed us to look at differences within health sciences programs, as there are differences in the level of in-class instruction that students receive in each program and these differences should be accounted for. To increase the student response rate for future studies, a more controlled intervention should be planned. While the e-module, the confidence assessment, and the academic evaluation were easily accessible for students, there was no true incentive for students to complete all components, and there was no way to actually confirm that students in the study group had truly completed the module, rather than simply accessing the module’s link without reviewing.
the content. Thus a study could be designed where the module usage is monitored and better controlled.

Not all students chose the same anatomical site for performing venipuncture. While this is a limitation, we do not believe that this was a major contributor to our results. The e-module mainly focuses on venipuncture at the antecubital fossa and students were instructed to find any appropriate site during their psychomotor skill testing. Thus, most students found it appropriate to perform venipuncture in the hand, which is a skill taught during in-class instruction in some of the health science programs. While we believe that there is sufficient overlap in the skills required to perform venipuncture at these two anatomical sites, future studies should be site-specific to reduce the chance of variation in measurements.

Future studies should effectively incorporate an e-learning module into students’ training. This would increase the likelihood of module and assessment completion, increase sample sizes, and possibly yield a more well-controlled study. Time commitment and attention span required may both play a role in the completion of all components of the study. Thus the length of the e-learning module should also be taken into consideration [17]. Future studies should also focus on a single objective to decrease the time commitment of students, which may further increase the response rate. Finally, future work could explore the impact of this e-learning module on students who are already in the clinical component of their education, as it would be more relevant to them at that time of training and could boost the response rate.

CONCLUSION

Our results suggest that there is potential for an e-learning module to increase the academic competence of students when used in conjunction with traditional learning; however, further research is needed to determine its efficacy on psychomotor skills. With emerging technology and new advances in the field, more well-controlled experimentation is needed to determine the importance of e-modules and other computer-assisted learning tools in aiding in the development of psychomotor skills in the health sciences learning environment.

REFERENCES

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APPENDIX

Appendix A. IV Insertion Self-Confidence Scale

<table>
<thead>
<tr>
<th>Insertion skill</th>
<th>Not at all confident</th>
<th>Somewhat not confident</th>
<th>Somewhat confident</th>
<th>Moderately confident</th>
<th>Very confident</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Ensure the patient has provided informed consent</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>2. Explain the steps to be taken to the patient</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>3. Choose an appropriate vein</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>4. Choose the appropriate equipment and PPE</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Insertion</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Effectively apply the tourniquet</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>6. Safely prepare the site, following institutional policy</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>7. Anchor the vein and insert catheter at the appropriate angle</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>8. Verify entry of catheter into the vein</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>9. Attach the IV fluid line to the catheter</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>10. Safely secure the insertion site and stabilize the tubing</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Follow-up</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. Document your initiation of IV</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>12. Evaluate the effectiveness of your initiation of IV insertion and troubleshoot any problems?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>13. Quickly and accurately access an IV insertion on a mannequin</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>14. Teach someone to perform this skill?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

Source: Adapted from Hicks et al. [13].
Appendix B. IV Test Questions

1. Which of the following IV cannula gauge sizes is appropriate for a patient 80 years of age who needs IV access for pain management?
   a. 24 gauge
   b. 22 gauge
   c. 18 gauge
   d. 16 gauge

2. Which of the following is the best choice when selecting the size of IV cannula?
   a. The largest one you feel you can successfully insert in the patient
   b. The smallest one you can find
   c. The smallest gauge to accommodate the purpose
   d. The largest gauge your facility has

3. When a patient who needs an IV has cold extremities and few veins are visible or small, which of the following are acceptable techniques to help improve the likelihood of a successful IV insertion?
   a. Turn up the heat in the room and return in about an hour when the patient is warmer
   b. Apply warm packs to the extremity for 5-10 minutes
   c. Blow warm air on the extremity with a blow dryer for 3-5 minutes
   d. Allow the tourniquet to remain in place for a few minutes while you prepare your equipment

4. If a patient is expected to need multiple IV’s or an extended hospitalization, it is best to choose which of the following sites for the first IV?
   a. Antecubital fossa
   b. Non-dominant hand
   c. Dominant forearm
d. It doesn’t matter where the first IV is placed

5. When assessing vessels for venipuncture, why should a vessel NOT be used if it is pulsing?
   a. A pulse indicates the vessel it is an artery
   b. A pulse indicates the patient is hypertensive
   c. A pulse indicates the patient is hypotensive
   d. A pulse indicates the patient has a fistula

6. While in the process of inserting an IV, which of the following may result in a complication?
   a. Entering the skin at a 15-45 degree angle
   b. Reusing the device as long as it is in the same site as the original attempt
   c. Entering the skin directly over the vein
   d. Entering the skin slightly adjacent to the vein and directing the needle into the side of the vein wall

7. After applying the tourniquet, if the vein feels hard or rope-like, you should:
   a. Use it, it’s the best choice for an IV
   b. Stretch it to prevent rolling
   c. Select another site
   d. Have the patient relax his/her fist

8. How can you verify that you have entered the vein with the IV catheter?
   a. You will be able to see the catheter through the skin
   b. You learn through experience where the vein should be located
   c. You observe a flashback of blood
   d. You palpate with your non-dominant hand for the “pop of the vein when the needle enters it

9. Prior to insertion, holding the skin taut below the chosen vein will help with:
   a. Interrupting the blood flow to the heart
   b. Preventing movement of the vein as the catheter is inserted
   c. Minimizing vein collapse as the catheter is inserted
   d. Preventing contamination of the cleansed site with your non-dominant hand

10. What step would you take if you have attempted IV access and are unsure of proper placement?
    a. Remove the catheter and try again
    b. Attempt to flush the catheter
    c. Pull the catheter back a few millimeters and check for blood return
    d. Go ahead and begin IV infusion

11. When discontinuing the IV which of the following will decrease the formation of a bruise at the site?
    a. Apply direct pressure over the site as soon as the needle exits the skin
    b. Massage the area just above the site to encourage clot formation
    c. Apply a cold compress to enhance venous constriction
    d. Apply pressure above and below the site for 2 minutes after the needle is removed

12. What would be an indication that your IV insertion attempt was not successful? Select all that apply.
    a. The insertion site begins to bruise
    b. The insertion site does not flush easily
    c. The site swells when fluids are flushed through
    d. The patient complains of a cold sensation

13. After 2 unsuccessful attempts at insertion of an IV, the best thing for a health care professional to do would be:
    a. Call the physician to tell them you can’t get the IV
    b. Keep trying until you get the IV
    c. Consult another professional to attempt the IV if available
    d. Hydrate the patient with oral fluids and try again in a few hours

Appendix C. Intravenous placement (peripheral)

<table>
<thead>
<tr>
<th>Attempt</th>
<th>Score (0, 1, or 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wash hands/PPE</td>
<td></td>
</tr>
<tr>
<td>Select an appropriate vessel</td>
<td></td>
</tr>
<tr>
<td>Prepare all equipment</td>
<td></td>
</tr>
<tr>
<td>Effectively apply the tourniquet</td>
<td></td>
</tr>
<tr>
<td>Prepare site for intravenous placement</td>
<td></td>
</tr>
<tr>
<td>Perform cannulation</td>
<td></td>
</tr>
<tr>
<td>Remove tourniquet</td>
<td></td>
</tr>
<tr>
<td>Assess patency of the system</td>
<td></td>
</tr>
<tr>
<td>Secure catheter and tubing to skin</td>
<td></td>
</tr>
<tr>
<td>Attach IV fluid line to catheter</td>
<td></td>
</tr>
<tr>
<td>Safely dispose of sharps</td>
<td></td>
</tr>
<tr>
<td>Clean up area</td>
<td></td>
</tr>
<tr>
<td>Patient safety jeopardized</td>
<td></td>
</tr>
<tr>
<td>Total Score</td>
<td></td>
</tr>
</tbody>
</table>

Score each:
2 Points: Completed satisfactorily
1 Point: Completed with difficulty
0 Points: not acceptable
N/A: Task not applicable to the patient-care situation
We are pleased to present a select number of abstracts from the proceedings of the CSRT Annual Education Conference to be held in Vancouver, British Columbia, on May 24–26. This conference will include topics delivered by international, national, and regional individuals with expertise in various areas of respiratory therapy practice, including quality assurance, patient safety, evidence-based practice, patient and family-centered care, research, and innovation. As evidenced by the following abstracts, the work of our colleagues in 2018 highlights current research and practice innovations led by respiratory therapists. We have made every effort to include all abstracts accepted by the Program Committee before the publication deadline; however, please note that this collection does not represent the entire program (available at https://conference.csrt.com/).

The editorial board looks forward to receiving manuscripts from this conference for consideration for publication in the Canadian Journal of Respiratory Therapy to continue building the body of knowledge specific to our profession. Please note these abstracts have not been peer reviewed.

PLENARY SESSION

01 IMPACT OF TOBACCO, ALCOHOL AND OTHER DRUGS ON CARDIOPULMONARY HEALTH
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BACKGROUND: There is currently a dearth of comparable, valid data on the harms and economic burden of substance use (SU) in Canada. The most comprehensive assessment was developed using data from 2002. Building upon the success of the previous cost study based on 2002 data, the methods and findings of updated direct healthcare harm (morbidity and mortality) and cost estimates will be presented. This study undertaken jointly by the Centre for Addictions Research of BC and the Canadian Centre on Substance Use and Addiction will examine morbidity, mortality and economic costs attributable to SU in Canada during 2006–2016.

METHODS: Over 100 health conditions have been identified to be causally wholly or partially attributable to SU. Morbidity and mortality of partially attributable conditions will be estimated by attributable fraction methodology, which will be discussed. Number of deaths, hospital days and diagnoses in acute care hospitals, psychiatric separations and hospital days in psychiatric hospitals, admissions in inpatient and outpatient centres, and days in treatment related to SU will be discussed. Additionally, the cost of these harms will be estimated. Data sources and analysis methods will be presented.

RESULTS: The presentation of results will focus on cardiopulmonary and other conditions relevant to respiratory therapists. Health conditions presented will include malignant neoplasms, cardiovascular diseases, respiratory diseases, infectious diseases, injuries, and poisonings.

DISCUSSION: In 2002 it was estimated that 19.3% of mortality and 17.8% of hospital days were attributable to SU. Additionally, the economic cost of substance use in Canada was estimated to be almost $40 billion. Our updated findings will provide more recent estimates and trends that will be used to assess the burden of SU and inform policy.

STUDENTS’ FORUM

02 LEARNER TO LEADER: NAVIGATING THE TRANSITION TO PRECEPTOR
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Respiratory Therapists (RT) often find themselves transitioning from student, to practicing Registered Respiratory Therapist (RRT), to preceptor over the span of only a few weeks. RTs are expected to precept and mentor learners at a time when they, themselves are still developing routines, refining skills and establishing their professional identities as independent healthcare professionals. Currently, there are little to no processes in place to prepare the inexperienced RRT to take on the role
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This presentation will be geared towards current respiratory therapy students. As we pass the torch to the young generation, this will introduce them to the role of an RT in the community. As students are trained nationally, for the most part, on how to work in acute settings, students end up wanting to work there when they graduate since that is what they got exposed to; i.e., their new comfort zone. If we start changing this mindset we will be able to be pioneers and take our profession to the next level and serve the perpetually changing Canadian demographic. With the changing landscape of the health care system and the needs of different communities, our role as respiratory therapists will continue to evolve as there is a need in primary care to provide client-centered care.

This presentation will start with a brief description of the transition from hospital model to community model. Then different roles RTs currently play in the community will be described. I will be speaking from personal experience on how I transitioned from being a student to choosing to work as a community RT. Barriers faced, challenges in the new environment, strategies and skillset to develop will be also be discussed. For example, attending the CSRT conference as a student expanded my horizon of what I envisioned as the limitless opportunities of our profession.

03 MENTAL HEALTH IN THE CLASSROOM: A STUDENT PERSPECTIVE
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Maslow’s Hierarchy of Needs states that physiological needs are the basis of human motivation and must be attained before the top-tiered self-actualizing needs are attempted. In a student with a mental health illness however, the items contained within each tier of the pyramid become dramatically skewed when compared to their peers. Importance falls on keeping up with studies, committing to the expectations regarding extracurricular events, all while bearing the boulder of financial responsibility that comes with being a university student. During their academic career, students may be in different points of mental health. Some may have come into university with a full diagnosis, treatment regime, and support system in place before they ever step foot in a classroom, but others may have it develop during their school years largely unchecked, resulting in increasingly destructive behaviours and dangerous impulsivity traits. Students should understand that while they are learning and growing under the guidance of an academic faculty and have a responsibility to the community that they have pledged their careers to; they have a responsibility to themselves first. Surrounding mental health is a stigma based on misunderstanding and lack of knowledge, but students should understand that supports and resources are available to help them succeed in the classroom and reach their academic goals. Student counselling, group therapies, test/exam accommodations, and classroom lecture support services are available to cross the barriers that their mental health poses at school and how to manage their integration with extracurriculars. Addressing difficult areas such as: What if I can’t do this? How am I going to approach difficult clinical experiences? What if I’m having a hard time managing my condition while in school? While schools must still abide by their provincial accessibility laws, students should know that they can develop their own innovative support resources that will help them to participate in their studies and how to go about implementing them into the classroom. Learning this serves as a strong foundation to build confidence, determination, and success once the lessons in classroom come to an end, and the lessons in the career field begin.

04 SRT TO COMMUNITY RT
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This presentation will be geared towards current respiratory therapy students. As we pass the torch to the young generation, this will introduce them to the role of an RT in the community. As students are trained nationally, for the most part, on how to work in acute settings, students end up wanting to work there when they graduate since that is what they got exposed to; i.e., their new comfort zone. If we start changing this mindset we will be able to be pioneers and take our profession to the next level and serve the perpetually changing Canadian demographic. With the changing landscape of the health care system and the needs of different communities, our role as respiratory therapists will continue to evolve as there is a need in primary care to provide client-centered care.

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05 A LETTER TO THE PRACTITIONERS: SINCERELY, THE PATIENT
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One of the most noble and popular reasons healthcare workers enter their professions is to help the sick and dying. The origins of medicine can be attributed to this goal; however, modern medicine can now be described more accurately as disease-specific diagnostics and therapeutics. It is very easy to lose sight of the individual under all of the patient data, regulations, strict guidelines, and most of all the stress of shift work and disrupted circadian rhythms. Although the goal of the healthcare worker is to make the patient better, one must keep in mind that the patient may bear more stress due to their helplessness. It is imperative that we see patients as individuals rather than a list of symptoms on a chart. A crucial part of making the patient feel valid is effective communication. Oftentimes patients feel stressed, anxious, and helpless during their hospital visit and inadequate communication can add to this anxiety. Therefore, good communication is used as an invaluable tool in producing therapeutic effects through comfort. In addition, the manner in which a healthcare worker communicates is as important as what is being communicated. It also plays a vital role in gaining information from the patient as well as providing legal documentation such as informed consent.

Communication cannot be described as one-dimensional as it extends beyond words. Vocal tones, body language, openness, sincerity, and even concealment affect communication and makes up what we call bedside manner. A healthcare professional may run into countless obstacles when practicing effective communication; however, caring for a patient involves treating the entire individual, which includes the patient’s mental well-being. As the patient meets with the practitioner, it’s almost as if they enter into a partnership, a marriage if you will. Like any relationship, it will take trust, reliance and mutual respect for it to work, and patient-practitioner dynamic is no different. However, the differences start to settle in when boundaries must be set because after all, it is both a personal and a professional relationship. The line between caring verses objectivity must be trodden lightly. A common phenomenon that takes place between the patient and practitioner is known as transference and counter-transference. Abiding to set boundaries will aid to minimize these experiences.

Another point to take into consideration is the patient’s perspectives of the healthcare worker. The practitioner may be viewed as superior due to reasons like the use of medical jargon and authority that may put them in a position of superiority. This relationship can be further complicated by a patient’s inability to help their situation leaving them dependent on the healthcare worker and feeling helpless. It’s critical that the practitioner be aware that these feelings may exist and try to limit any feelings of inferiority by establishing a rapport via good communication. Feelings of helplessness can be limited by empowering the patient to be more
involved in their care using techniques like shared decision-making, taking into consideration the patient’s treatment goals.

06 ADMINISTRATION OF SUPPLEMENTAL OXYGEN IN CARDIAC PATIENTS
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BACKGROUND: Oxygen is a widely available therapeutic agent that has become routinely administered to patients admitted with hypoxemia and commonly to cardiac patients. The use of supplemental oxygen is meant to correct hypoxemia and to prevent or decrease cardiopulmonary workload. However, as oxygen concentrations reach nonphysiologically hyperoxic levels, the detrimental effects of oxygen may be overlooked to ensure adequate oxygenation of patients.

OBJECTIVE: This paper aims to determine whether the risks of supplemental oxygen overshadow its benefits in patients presenting with cardiovascular disease.

METHODS: An investigation of current literature was done addressing the effects of hyperoxgenation in cardiac patients with consideration of the effects on mortality.

RESULTS: Multiple studies show that there is an association with supplemental oxygen in patients with cardiovascular disease or are post resuscitation and its effect on mortality.

CONCLUSION: Supplemental oxygen has clear benefits for hypoxic non-cardiac patients; however, there is evidence that there are multiple risks involved in the use of supplemental oxygen in cardiac patients. More clinical trials are needed to quantity the risks and to formulate clear recommendations, but the use of supplemental oxygen continue to be judicious in nature.

07 POST-INTENSIVE CARE SYNDROME: RISK FACTORS AND TREATMENT METHODS
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INTRODUCTION: As more individuals survive their critical illness, there has been a rise in concern for their mental well-being following discharge from the Intensive Care Unit (ICU). Post-Intensive Care Syndrome (PICS) is a mental health disorder that encompasses symptoms of anxiety, depression, and post-traumatic stress disorder. PICS and related mood disturbances have been shown to prevail in up to 55% of patients one-year post-discharge. Because of this, patients also presented with significant signs of cognitive decline and reduced quality of life.

DISCUSSION: The purpose of this presentation is to first develop an understanding of what PICS is before reviewing the sources in the ICU that place patients at the highest risk for development of PICS. Through a series of peer-reviewed articles, the most relevant risk factors proved to be the use of prolonged sedation and prolonged mechanical ventilation. How these personally affect the patient, their ability to form memories as well communicate their needs to staff is reviewed before a patient's perspective on their ICU stay is discussed to create a foundation for methods used to mitigate this rising issue. Both patient testimonies regarding sedation and the care they received from staff are brought to attention as well and the deleterious effects that were caused by the presence of the endotracheal tube. Both methods of nonpharmacologic interventions such as the use of ICU diaries and 24-hour psychologic support are discussed. While ICU diaries are found to be of use in psychological follow-up programs, psychological support during their stay was found to reduce PICS by 50%. Pharmacologic agents including Dexmedetomidine and IV Ketamine are then brought to attention. Dexmedetomidine as a replacement for other Benzodiazepines has proven to be of benefit in high risk patients, allowing them to remain more aware of their surroundings. IV Ketamine at a sub-anesthetic dose provides a treatment method for otherwise treatment refractory depression and post-traumatic stress.

CONCLUSION: Respiratory therapists, among other health care providers, share a key role in a patient’s day-to-day care plan during their ICU admission. With increasing awareness of the strain caused by the ICU and the psychological deficits that occur as a result, it is vital that RTs are aware of the consequences and what contributes to its development. Methods of daily practice that can easily be incorporated, such as speaking to your patient, can easily change a patient's outcome and perspective of their ICU stay. RTs are a key factor in allowing for early extubation, which has proven itself to be one of the most substantial factors to minimizing PICS. Not only will reduced rates of PICS reduce readmission rates and lower hospital spending, it will overall improve patient quality of life once they have been rehabilitated back into the community.

08 PALLIATIVE / END-OF-LIFE CARE: VITAL TO THE RT CURRICULUM
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Respiratory therapists spend the majority of their time throughout a shift in the ICU at a critically ill patient’s bedside, in direct communication with the patient and their family. These patients are often ventilated and may die in hospital. It is not uncommon for RTs to experience the death of a patient during their shifts; however, research shows that the majority of RTs are uncomfortable dealing with patient death, withdrawal of life support, or seeking guidance after the fact. The purpose of this presentation is to demonstrate how effective palliative/end of life care education can be for SRTs preparing for their clinical year. This presentation will aim to discuss the benefits of this type of education for SRTs through student, educator and RT testimonies as well as analysis of previous research studies. Another goal of this presentation is to describe what an ideal course on this topic would consist of, according to educators and SRTs. This presentation will inform educators how valuable a course on this subject can be for their students short-term as they transition to their clinical placement, as well as long-term in their future careers as RTs.

09 CEREBRAL OXYGENATION MONITORING
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Traumatic brain injury (TBI) is the leading cause of morbidity and mortality in people less than 45 years old, worldwide. TBI can be divided into two injury phases: the primary injury phase, occurring at the point of impact, and; the secondary injury phase, occurring for an extended period of time post-initial insult. The secondary injury phase may be treatable, and various methods of cerebral oxygenation monitoring give us insight into what is occurring within the brain during this crucial time. This presentation is meant to provide an overview of current cerebral oxygenation monitoring technologies—how they work, as well as their current strengths and limitations. Jugular bulb oximetry (SjO2) is the current gold standard for cerebral oxygenation monitoring and gives us a measure of global brain oxygenation. However, it falls short in detecting areas of focal ischemia. Brain tissue oxygen tension (PbtO2) can provide more focal measurement, but this is highly dependent on correct probe placement, which itself is invasive. Lastly, cerebral oximetry is a non-invasive, continuous monitoring option but is limited by the shallow depth it is able to penetrate. This leaves large areas of the brain unmonitored. By understanding what these monitoring options can and can’t tell us, we are better able to treat and manage the outcomes of various interventions in our challenging TBI patients.
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10 RESUME WRITING AND INTERVIEW SKILLS
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This presentation will provide the knowledge, tools, and techniques needed to develop a relevant resume for respiratory therapy professionals in a healthcare setting, and to successfully prepare for the interview process. The presentation will provide the learner with resume writing skills that will allow the applicants to stand out to future employers. Differences between a resume and a CV will be explained and resume template examples will be used to highlight resumes that are able to successfully provide the employer with a succinct summary of the applicant’s skills and experiences. Interview style will be discussed with a focus on preparing for a behavioral interview.

Techniques to prepare for an interview will be based on the STAR (situation, task, action, response) technique that allows the applicant to systematically prepare for a question by providing a template to form an answer. Opportunity to practice the techniques will be provided during short, interactive breakout sessions that will allow partners or small groups to formulate an answer using the learned techniques. Volunteers will be asked to share their answers, to which areas of improvement will be reviewed with the group. A summary of take-aways and a question and answer period will be incorporated.

Often, applying for a respiratory therapy position during their clinical year is the first time many students will have encountered a robust application and interview process. This presentation will prepare students for the hiring process and increase their confidence during an interview.

11 INCORPORATING APTITUDE TESTING INTO RT STUDENT SELECTION
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The current process of student selection for respiratory therapy programs across Canada is highly varied. The use of a valid aptitude test to add to the robustness of the student selection information may improve student success in the programs, as well as job retention and satisfaction post-graduation. This talk will examine the current state of selection as well as what is being done with aptitude testing in other fields, while post-graduation. This talk will examine the current state of selection as well as what is being done with aptitude testing in other fields, while presenting a possible model for the RT student selection process going forward.

12 INCORPORATING RESEARCH INTO THE RT CURRICULUM
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There are significant gaps between what we know (best available evidence) and what we do (clinical practice). Evidence-based decision-making (EBDM) is the process respiratory therapists and other healthcare providers use to identify and appraise potential evidence and supports the integration of best research evidence with clinical expertise and patient values. Competence in this process is essential to delivery of optimal care.

Evidence-based decision making is an entry level competency for today’s graduate Respiratory Therapist (RT). It is important that RTs are capable of finding and critically appraising high-quality research studies, and integrating evidence into their practices. Additionally, the entry to practice RT should be equipped with an understanding of the fundamental processes and practices for conducting clinical research, as well as the ability to contribute to interprofessional teams conducting rigorous research into the effectiveness of the respiratory care they provide.

Fundamental research knowledge, skills and attitudes should be an important facet of all respiratory therapy curricula. This session will describe how research can be incorporated into a respiratory therapy curriculum, beginning with a first-year foundations course and culminating with a third year EBDM project. Opportunities also exist for degree programs to further explore and enhance the student research experience with the development of advanced courses and specialty practice.

A novel specialty practice in clinical research was developed for a fourth-year student, which involves theoretical, contextual and clinical learning. A senior student and new neonatal/pediatric respiratory therapist will share his experiences in a clinical research specialty practice.

13 DESIGNING AN INTERPROFESSIONAL CLINICALLY IMMERSIVE SIMULATION
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This presentation will describe a learning opportunity for student respiratory therapists (SRTs) to participate in an advanced interprofessional clinical education and immersive simulation with primary care paramedic (PCP) students. Students will exercise a high level of professionalism through 1) the demonstration of advanced communication by effectively delivering a client handover or transition in care from one provider to another; 2) identifying role clarity with the inter-professional health care team when providing high acuity care to patients; and 3) demonstrating team/system effectiveness in safely transferring a critically ill patient. The clinical immersive simulations are based on acute care patient presentations requiring PCP students to respond to a dispatched call, stabilize the patient at the scene, and then transfer the patient to the nearest emergency department for treatment by the inter-professional team. Once the patient is stabilized, the PCP and SRT students will work as a team to transfer the patient to the nearest tertiary care hospital.

14 STUDENTS AS TEACHERS? DEFINING PROFESSIONAL IDENTITY WITH PEERS
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Interprofessional education (IPE) is increasingly acknowledged as an essential element for patient safety in healthcare and as a standard for healthcare education by accrediting bodies and professional organizations. Research regarding IPE has significantly evolved over the past decade; however there remains a lack of clarity as to when and how IPE should occur within an education program, and whether IPE ultimately impacts professionals’ practice.

A partnership was formed between the SAIT Respiratory Therapy and Mount Royal University Bachelor of Nursing programs to investigate the influence of a collaborative nursing lab on participating students’ knowledge, attitudes, and beliefs about IPE. A Readiness for Inter-professional Learning Scale (RIPLS) questionnaire was administered to both groups of students before and after participating in this lab. RIPLS subscale scores for teamwork and collaboration, and positive professional identity increased significantly for nursing students post lab.
This study also examined the accomplishments of this collaborative lab for both sets of students, in particular the construction of their professional identities. An analytic interpretive approach to discourse analysis was used to analyze data gathered through individual interviews and focus groups. The non-evaluative student-to-student learning that occurred in this lab contributed to an atmosphere less constrained by mechanisms of power inherent in instructor led labs or clinical experiences. Students’ narratives revealed that inter-professional learning, building of relationships, and construction of their professional identity was supported in this nonhierarchical simulated clinical encounter. Understandings generated from this study could support the thoughtful integration of IPE into health professionals’ curricula and support the development of their practice.

15 CLINICAL EDUCATION IN THE COMMUNITY HOSPITAL
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Oakville Trafalgar Memorial Hospital is a community hospital that will become a student placement location as of 2018. As a community hospital there are strengths and limitations to the student experience, but also great room for growth. Steps were taken to assess, adapt, and implement changes to ensure a successful student placement program.

In a community hospital, RTs have many opportunities for hands-on skills, such as intubation and arterial line insertion, but a community hospital is not a specialty service center. There is variance amongst staff in levels of experience as a preceptor, which results in some staff feeling unprepared for what to expect and how to assist the students in achieving their requirements. Less educators are available to oversee students and their completion of competency requirements. These needs differ greatly from those of a tertiary hospital. The needs and concerns of staff are evaluated and addressed. Student needs are discussed in regard to observation, evaluation, and support to achieve all competency requirements. All of these aspects were evaluated and explored, and a program was developed to ensure student and staff success in the transition to being a teaching centre for respiratory therapy students. As the number of Respiratory Therapy programs increase, the demand for placement hospital opportunities will also increase. Our framework for success can guide hospitals that have been uncertain of becoming involved in student placement.

16 MCQ: BREAKING DOWN COMPETENCIES INTO QUESTIONS
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Many health professions in Canada require students in their respective fields to write credentialing exams in order to enter into practice. These examinations are created for the regulatory bodies of the profession to be able to assess entry to practice competencies. The examination design many health professions use for these examinations are multiple choice question (MCQ) format, administered online. The stakes of these examinations are created for the regulatory bodies of the profession to write credentialing exams in order to enter into practice. These exams are written, developed and selected for the exam. It will also provide insight into the taxonomic levels evaluated by the exam, the processes used to review the exam after it has been written, and will address some common questions and misconceptions around the CBRC exam.

17 UNDERSTANDING THE CBRC EXAM
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The Canadian Board for Respiratory Care exam has evolved over the years and is now predominately a case-based exam that is administered online. This presentation will provide an overview of how exam questions are written, developed and selected for the exam. It will also provide insight into the taxonomic levels evaluated by the exam, the processes used to review the exam after it has been written, and will address some common questions and misconceptions around the CBRC exam.

18 GETTING ALL ON BOARD FOR BETTER CARDIORESPIRATORY HEALTH!
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BACKGROUND: Guided by a growing movement in which health promotion, disease prevention, and healthy lifestyles are high on the agenda in Canada, as well as in many other countries around the world, the OPIQ proposed in 2016 a strategic orientation containing the positive and mobilizing message; “A better cardiorespiratory health for all!” Ultimately, this strategic direction, which puts forward our leadership in cardiopulmonary health and care, will serve to position the clinical practice of respiratory therapists downstream as well as upstream of medical diagnosis.

QUESTIONS: How can respiratory therapists prevent cardiorespiratory diseases effectively with sick patients when they were first trained to participate in their diagnosis process and their treatment? In other words, how can they address promotion of health and prevention of diseases efficiently with sick patients while caring for them? And as a regulatory body, how does the OPIQ motivate its 4280 members on board towards this change of practice? How does it lead them in that direction? Last, but not least, how does it help respiratory therapists to place health promotion, disease prevention and healthy lifestyles at the heart of their clinical practice? That is where the challenge is!

DISCUSSION: In addition to defining the new strategic orientation, the presentation will describe the operational plan (2016–2021) for the “In cardiorespiratory health!” program. A variety of communication strategies will be discussed in order to assist leaders in the implementation of such a tailored program for respiratory therapists. Preliminary results related to the appropriation of the program by respiratory therapists will also be shared with the audience.

19 GETTING BEHIND THE WHEEL: RTS DRIVING RESEARCH
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In many academic centres, respiratory therapists (RTs) participate in research. In the ICU setting, most RT research involvement relates to the
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support of physician-led research and includes activities such as following ventilation protocols and completing data collection forms. Much less common are studies led by RTs. For many clinical RTs, the design, implementation, analysis, and publication of a research study may seem like daunting tasks. For RTs whose focus and experience is clinically-oriented, the idea of leading or participating in an RT-led study may highlight challenges related to limitations in time, resources, and research experience. At St. Michael’s Hospital [SMH], a Centre of Excellence in Mechanical Ventilation in Toronto, Ontario, building capacity to support RT-led research is an ongoing priority and RTs seeking the opportunity to develop research projects can access a variety of resources to support the pursuit of their ideas. “A Prospective Observational Study of Exubation Delay in Critically Ill Adults” is an example of an RT-led research project currently underway at SMH. This single centre, prospective observational study is being led by RTs with varied clinical and research experience, who have come together to conduct and answer this clinical research question. The genesis for this project was RT concerns about timely extubation in patients deemed ready for liberation and a desire to better understand the reasons for delays. Together, the group searched the literature and designed a data collection form to capture extubation delays and contributing factors, modifiable and nonmodifiable, in two ICUs—one serving a general medical-surgical population and the other caring for patients with trauma and/or neurological conditions. This study will be presented as an example of an RT-led research project and used to highlight various aspects of research conduct, including: generating the idea and question, forming the team, developing a protocol, seeking funding, obtaining REB approval, implementing the study, engaging staff and collecting data, and analyzing data to describe results.

20 ANTIMICROBIAL NITRIC OXIDE IN CYSTIC FIBROSIS
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Nitric oxide (NO) is a naturally occurring nanomolecule synthesized by mammals. NO plays a major role as a secretory product in the homeostasis of the vasculature and is an integral component of the innate immune system. Using a P. aeruginosa pneumonia rat model, we demonstrated that NO can be administered both safely and effectively. We have also shown that inhaled gaseous nitric oxide (gNO) can be safely administered to healthy human volunteers at an optimal antimicrobial dose of 160 ppm gNO over 30 minutes administered five times a day for 5 consecutive days. This dosing also appeared safe when applied to human alveolar cell-line and was effective at eradicating several gram positive and gram negative bacteria, even when the bacterial loads were as high as those achieved in clinical sputum specimens. Recently, it was shown, in a small cohort of CF patients, that delivery of 160 ppm gNO for 30 minutes, three times a day for 10 days, was safe and had beneficial effects on lung function and sputum bacterial load reduction. A Phase 2, multicenter trial, of gNO in CF is currently recruiting subjects. The antimicrobial use of gNO may provide new opportunities for respiratory therapists.

21 PHLEGM-FREE SINCE ’13: AN RT IN QUALITY
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Using a visually engaging format, the speaker will outline his step-by-step transition from frontline clinical Respiratory Therapist to a full-time role in Quality and Patient Safety. Special emphasis will be placed on explaining the many quality and patient safety opportunities available to respiratory therapists, including the benefits of taking this rewarding path. This presentation is designed to reveal how exciting and abundant these opportunities can be, while dispelling the misconceptions commonly associated with these non-frontline roles.

22 NON-PERFUSED ORGAN (LUNG) DONATION
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With the continuous demand for organ and tissue transplants, there is a need for alternate and innovative methods to increase the number of organ and tissue donors. William Osler Health System (Osler) currently collaborates with Trillium Gift of Life (TGLN) to increase lung organ donors by applying Non-Perfused Organ Donation (NPOD) and offering families an opportunity for donation after unanticipated death. With a crucial window of 180 minutes, a streamlined screening tool and the coordination of a recovery team, NPOD has provided opportunities for lung organ donation after unanticipated cardiac arrest. This presentation explains Osler’s practice for organ and tissue donation, including precise criteria and screening tools used, the vital role of the RT within this structure and how NPOD can contribute to increasing lung organ transplants. Dr. Andrew Healey, Medical Director of Critical Care at WOHS, leads NPOD with the support from the Trillium Gift of Life Network (TGLN).

23 RESPIRATORY THERAPY IN PERU: CULTIVATING EDUCATION
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Respiratory health is a global burden, so why are respiratory therapists limited to providing care to just one community, one province, or one country? The Thompson Rivers University Respiratory Therapy program has created an opportunity to bring respiratory care to both urban and rural regions of Peru. This idea was conceptualized 6 years ago by two RT students who set out to see how they could sustainably bring equipment to a country in need. After formal organization between RT leaders at TRU and a Peruvian Pulmonologist a subsequent, annual “RT mission trip” was formed. Their goal was to provide much needed technical equipment, and the education and bedside respiratory care to facilitate the sustainability of respiratory health of Peruvian citizens. This novel opportunity by TRU has led to the participation of many student RTs and practicing RRTs alike. The program gives opportunity to all types of RRTs: students, instructors, community therapists, critical care therapists, neonatal and pediatric specialties, as well as anesthesia. We will reflect on the challenges, surprises and teamwork involved. Locally developed but globally concerned, TRU is making a difference in Peruvian healthcare. With connections now expanding to other areas of Peru, the dream of sustainability and respiratory care can continue to grow and develop. Respiratory therapists are needed in a big way, in a small country whom are just beginning to discover the depth and aptitude of our discipline.

24 LE THÉRAPEUTE RESPIRATOIRE DANS UN RÔLE DE LEADERSHIP EN SOINS CRITIQUES - EST-CE POSSIBLE?
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Development in healthcare is exponential. Patient-centered care is a standard of practice and RTs have become an essential member of the
interdisciplinary team, but can we do more? Can we lead projects and be front-line players? RTs have to share their unique expertise, their clinical skills, their knowledge and be proud of what they do. As a professional health care provider and a respiratory care leader, RTs should jump in every opportunity or act as a catalyst in hospital development. We will discuss two projects in the speaker’s hospital: one where RTs are the primary care provider for a term baby after an uncomplicated C-section in the operating room, without immediate medical assistance; and another where RTs take the lead in acute asthma at the emergency in the first hour before the medical evaluation and the hours after the first medical evaluation. With some tips, better communication and focus to develop our leadership skills, we cannot expect more than better outcome for patient.

25
ADVANCED PRACTICE RESPIRATORY THERAPIST ROLE DEVELOPMENT
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BACKGROUND: Through an environmental scan it was identified that an Advanced Practice Respiratory Therapist (APRT) role is unique in Canada in providing clinical care services to children with complex cardiorespiratory care needs. Other advanced practice roles in nursing and physiotherapy have demonstrated success in providing advanced comprehensive care, education, research, professional leadership and support of systems. The following principles guided the design and creation of the APRT role: Best practices in client and family centered care; Culturally appropriate care; Partnerships with family leaders; Lived experiences of family in transitions home; Excellence in client and family experience; and Quality improvement and safety.

METHODS: A multi-pronged approach was used. Stakeholders included families, frontline staff, leadership, physicians, community and acute care partners, and regulatory bodies for respiratory therapy. Tools used included semi-structured interviews, surveys and narrative analysis. Role design incorporated:
• Knowledge translation and capacity building in cardiorespiratory care
• Transform how clients access, enter and move through the healthcare system – acute care to Holland Bloorview to community
• Partner to share expertise with community stakeholders
• Identify gaps in services to children and youth and how to create seamless integration
• Stakeholder input to identify key points of high risk in the continuum of care that requires care coordination
• Create competencies and medical directives for access to equitable services
• Enhance scope of practice for respiratory therapists, nurses and other professionals to enhance overall care of the client
• Mentorship with physicians in cardiorespiratory care to build expertise

DISCUSSION: Evidence of sustainability for the APRT role includes:
• Maintains collaborative partnerships with families, clinicians and physicians through feedback & evaluation
• Maintains clinical competency and proficiency related to knowledge, skill and awareness of childhood disabilities
• Utilizes tools for ongoing assessment of role, evaluation and feedback in a phased approach
• Undergoes ongoing professional development, continuing education and research
• Acquired leadership support within organizational structure
• Engage in peer evaluation, reflective practice and case studies
• Maintain partnerships with the College of Respiratory Therapists of Ontario and educational institutions

RESULTS: Outcomes of change include:
• Improves quality, safety and effectiveness of cardiorespiratory care for children through client-family-centered collaboration
• Reduces length of stay and supports timely transitions to the community
• Promotes consistent and standardized care to children in a medical model with part time respirologist services
• Improves quality of life for children in the community and increases family satisfaction
• Reduces the burden of care for families as this role follows the child to the community one month post discharge until first clinic visit
• Integrates APRT within the healthcare system to ensure seamless transitions for clients and families

26
JUST IN TIME TRAINING: LESSONS FROM AN RCT
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Just-in-time training (JITT) involves short educational sessions that can be effectively implemented in the health care setting. These sessions focus on a specific skill and occur within a relatively short time frame prior to the skill being used when engaging in patient care. This innovative educational approach is in alignment with thoughts from cognitive load theory, which suggests that an individual’s working memory limits the amount of information they can process at any time. This is of unique relevance to the field of respiratory therapy practice, as daily work and procedures are often complex and may require a cognitive load that exceeds the working memory of that individual. Additionally, many procedures are often performed infrequently; and JITT can be utilized to “refresh” skills prior to performance in the clinical setting. Given that the daily workload of respiratory therapists across many health care settings involves procedural tasks, advanced skills, and the ability to work as an interprofessional team; there is a promising opportunity to apply JITT as an educational approach for RRTs. At the Hospital for Sick Children, a prospective, randomized controlled intervention study looked at how JITT could be utilized to reduce cognitive load through learner-oriented, simulation based education sessions that focused on specific tasks (CPR and medication administration) and close proximity to actual skill performance in the health care setting. The study evaluated how the use of JITT could improve subsequent skill performance, and potentially have an impact on team-based performance in complex hospital environments. The study involved forty-four teams of interprofessional health care providers who participated in in-situ mock code simulations. Results from the study have shown that teams who received JITT prior to their mock code simulation demonstrated improved CPR compression depth, adherence to medication administration standards when providing epinephrine via IV, and overall team-based performance, when compared to teams who did not receive JITT. Preparation and implementation of the study protocol and subsequent dissemination strategies required buy-in from key stakeholders, including nursing educators, local managers and leadership, as well as from oversight of resident trainees. This was crucial in being able to promote JITT as a worthwhile innovation to pursue in a busy, high acuity clinical setting with many competing priorities.

27
WANT TEAMS LIKE A FERRARI PIT STOP CREW?
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Many RT leaders are overwhelmed by the challenges in the current dynamic healthcare system. The demand for high quality services, limited resources,
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higher patient acuity, neverending best practice guidelines and hospital initiatives implementation are probably familiar to most leaders. This requires clinicians to be adaptable and behave differently, and effective teamwork is essential. However, leaders will often implement “quick fixes” rather than building a high-performing team that is resilient to change. Unfortunately, the layer of band-aid gets thicker and thicker, and yet behavior doesn’t change. How can we build a resilient culture in our complex healthcare environment? “Culture eats strategy for lunch”; having a high-performing team is more efficient than any strategy.

The Ferrari pit stop crew is known for their consistently high levels of performance. The key to success of a high performing team is 1) shared common goals, 2) clear role and responsibilities, 3) effective communication, 4) having the standardize expectations, and 5) ongoing continuous improvement processes embed in their routines. Moreover, leaders also need to have appreciation and able to identify the sources of influence for their team in order to facilitate changing behavior. A leader can use many tools; however, it is very important to choose one that is most meaningful to the team. There are many tools and methodologies one can find in “Google” for each of the 5 key components to a high performing team.

Different tools have different strengths and weakness that might be more suitable for your team and work environment. Some tools that will be reviewed and discuss are: team charter vs appreciative inquiry methodology; SWOT analysis vs competencies mapping; shadowing vs processes mapping exercise; newsletter vs town halls vs huddle board; policies vs standard work; 5 whys vs fish bone analysis. Lastly, the importance of audit tools and setting meaningful metrics will be discussed.

There is no cookie cutter strategies or perfect solution for the complexity environment we all work in. Each team will have their unique culture and process that will drive continuous improvement. Therefore, as a leader, you need to be sensitive to the environment in order to build a high performing team.

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EMPLOYEE ENGAGEMENT
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Literature has identified that a shift in our organizational culture towards enhanced employee engagement could improve relationships with patients and between employees within a hospital setting. Through this, relationship organizations have higher customer satisfaction with patients and between employees within a hospital setting. Literature has identified that a shift in our organizational culture towards enhanced employee engagement could improve relationships with patients and between employees within a hospital setting. Therefore, the second method used was in-person, semi-structured interviews. Themes were reviewed and discuss are: team charter vs appreciative inquiry methodology; SWOT analysis vs competencies mapping; shadowing vs processes mapping exercise; newsletter vs town halls vs huddle board; policies vs standard work; 5 whys vs fish bone analysis. Lastly, the importance of audit tools and setting meaningful metrics will be discussed.

There is no cookie cutter strategies or perfect solution for the complexity environment we all work in. Each team will have their unique culture and process that will drive continuous improvement. Therefore, as a leader, you need to be sensitive to the environment in order to build a high performing team.
will provide an overview of the evidence based ATS guidelines (T. Piraino), followed by the global practices (T. Pham, one of the authors of LUNG SAFE) comparing what we should be doing to what we are really doing globally to manage these patients. The speakers will also provide a brief description of regional differences by continent, with additional data from Canada.

31
ECPR: IMPLEMENTING A SERVICE FOR OUT-OF-HOSPITAL CARDIAC ARREST VICTIMS
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Extracorporeal Cardiopulmonary Resuscitation (ECPR) is a form of Extracorporeal Membrane Oxygenation (ECMO) implanted during cardiac arrest. Emerging data suggest that ECPR may improve survival in certain patients who experience out-of-hospital cardiac arrest (OHCA) and are unresponsive to conventional CPR methods. However, patients who experience OHCA demonstrate significantly worse outcomes when compared to patients who suffer from cardiac arrest in hospital despite having better prognostic indicators. A key factor for this may be the logistical challenges associated with optimizing arrest-to-ECPR time for out-of-hospital patients. Survival data indicate that positive neurological outcomes are strongly correlated with time from the initial out-of-hospital cardiac arrest to ECPR initiation.

To improve access to ECPR and optimize time from OHCA to ECPR initiation, St. Paul's Hospital developed a regional clinical ECPR protocol. The protocol is the first of its kind in Canada and focuses on creating interdisciplinary collaboration between the pre-hospital setting and the emergency department to facilitate early identification and transport of ECPR candidates. The protocol also outlines a coordinated multidisciplinary team response to ensure timely ECPR initiation upon hospital arrival. The presentation will provide an overview of the process of developing an ECPR protocol from a quality improvement lens. It will share the successes and challenges associated with this groundbreaking work as well as the experiences of our patients and health care team members.

32
RECOGNIZING AND CORRECTING PATIENT-VENTILATOR DYSYNCHRONY
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The primary objective of the program/presentation is to provide an interactive learning experience with respect to the use of mechanical ventilator waveforms in patient assessment. This presentation will describe how to interpret waveform scalars for the presence of patient-ventilator dysynchrony, discuss the cause and clinical implications of the dysynchrony, and finally provide recommendations for modifications to set ventilator parameters in an attempt to correct the dysynchrony.

33
AIRWAY MANAGEMENT PAUSE - MAKING SAFE, SAFER
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Airway management can be a high stress and high cognitive load situation. Communication practices around airway management were not defined in a standardized process, as typically demonstrated by silos of communication between the members of a multidisciplinary team, and the team as a whole most often did not exchange information prior to the event start. This contributes to opportunities for communication errors and omissions, which are known to contribute to adverse events.

“Communication failures are the leading cause of inadvertent patient harm.” (Leonard, Graham, & Bonacum, 2004) The Joint Commission for Hospital Accreditation found that in 70% of 2455 sentinel events the primary root cause was communication failure—and in 75% of those, the patient died (Leonard, Graham, & Bonacum, 2004).

Our objective was to introduce a standardized communication tool to support team communication and function, to mitigate some of the errors that can occur during airway management, as well as to reduce cognitive load and stress. The tool is an Airway Management Pause, wherein the members of the team, usually an MD, RN, and 2 RRTs, will stop, once they have completed their preparation for the procedure, to go through a checklist prior to medications being given or the procedure being started. The primary goals are for the team members to be empowered to speak up and contribute to planning, and to share the same mental model before proceeding. The Airway Management Pause mimics examples such as the Surgical Safety Checklist, the FMC OR to ICU handover, and the Procedural Sedation Checklist.

Checklist benefits include: reduced cognitive overload, reduced task fixation with improved situational awareness, reduced stress, defined team member roles, improved team functions and communication, and improved team understanding of potential complications and what they will be expected to do. Checklist use can make crisis management and high-stakes procedures such as RSI smoother and quicker (when well-practiced at using the checklist).

A quality improvement evaluation of our project was undertaken and we hope to demonstrate an improvement in the communication environment during airway management and reduce the number of complications that occur during airway management events and improve team function.

34
RESPIRATORY DISTRESS IN PREGNANT WOMEN, OH NO!
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Respiratory distress in a pregnant women could be a “one of a kind” challenge. As RTs and health care provider, our unique expertise in airway management could be cherry in top when it come to manage this critical situation. Collaborative practice is the direction health care is moving and interprofessional teams have been shown to improve patient care. We have to be a part of it. Although this is not common at the emergency room, RTs should be prepare to face off and demonstrate their autonomy to maintain their skills to provide the best care base on best practice. Their role grows over the time and they are an invaluable member of the interdisciplinary team.

35
REDUCING ATELECTASIS TO MITIGATE INJURY IN THE LUNGS, DIAPHRAGM, AND BRAIN
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BACKGROUND: Positive pressure mechanical ventilation allows severely ill patients to be stabilized and supported, yet it is expensive and complex. One-third of patients are considered “difficult to wean” from the ventilator. Those who require more than seven days of weaning comprise 10% of the ventilated population and are responsible for over 40%
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of total ICU patient days. Managing these patients is expensive, consuming approximately 12% of all hospital budgets. Duration of ventilation is an independent predictor of poor outcome, particularly in patients who are greater than 66 years of age with more than two weeks of positive pressure ventilation. They sustain the worst disability and have a 40% 1-year mortality. Atelectasis, a complete or partial collapse of a lung or lobe of a lung, is common in the ICU. Atelectrauma is caused by altered alveolar mechanics due to changes in alveolar size and shape during mechanical ventilation. This results in cyclic recruitment and derecruitment. Increased atelectasis-related pulmonary shunt exacerbates hypoxia and hypercarbia, requiring more ventilation and oxygen to support the patient. Atelectrauma drives inflammation in the lungs that can trigger systemic inflammation and sepsis. Lung injury also drives apoptosis in the hippocampal area of the brain, perhaps contributing to memory loss in these patients. Diaphragm atrophy results from the lack of use of the diaphragm for ventilation and contributes to weaning failures in the ICU. A common and effective strategy to minimize atelectasis is to facilitate spontaneous assisted breathing to keep the diaphragm contracting as soon as is clinically possible.

METHODS: We are conducting a preclinical nonrandomized study in an animal model for 50 hours in a mock ICU. These methods are an extension of a previous successful study in which my research group demonstrated mitigation of diaphragm atrophy by pacing during mechanical ventilation. There are 2 ventilation conditions (normal positive pressure ventilation and controlled diaphragm contraction in synchrony with ventilation), both delivering a safe tidal volume of 6–8 mL/kg. A second series of pigs will have these conditions repeated however, their which their lungs will be injured through an Oleic acid infusion, an accepted model of Acute Respiratory Distress Syndrome.

SIGNIFICANCE AND IMPACT: We will show that keeping the diaphragm contracting during the course of mechanical ventilation reduces atelectasis and reduces injury to the lungs, diaphragm, and brain. This has the potential to provide a novel method of ventilation in patients with acute respiratory lung disease, and may help to reduce the ventilator-induced lung injury associated with conventional positive-pressure ventilation.

This will inform clinical practice and develop a method of mechanical ventilation that does less harm and results in less long-term sequelae in patients and less resource drain on the health care system.

36 WHAT IS NEW WITH SURFACTANT?
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Surfactant administration for treatment of neonatal Respiratory Distress Syndrome (RDS) has been a revolutionary advancement in the field of neonatal care over the past 25 years. Since the adoption of its routine use it has dramatically reduced mortality and morbidity in the youngest of patients. Respiratory therapists (RTs) are an integral part of the team managing the care of these neonates and are often the clinicians who administer surfactant. A review of the governing principles of surfactant delivery will be discussed. Various types of surfactant also exist and will be highlighted. Traditional techniques including selective intubation, surfactant delivery and mechanical ventilation have become less frequent in favour of Intubation SURfactant Extubation (INSURE), the current gold standard.

However, in recent years, new approaches have emerged and show evidence of improved outcomes. These include decreased risks associated with intubation and mechanical ventilation, in particular reduced rates of Bronchopulmonary Dysplasia (BPD). One proposed method is Minimally Invasive Surfactant Therapy (MIST). This involves the placement of a small catheter in the trachea of a non-sedated patient, and instillation of surfactant to the neonate’s lungs while maintaining spontaneous patient efforts. This is done while the patient is supported on Non-Invasive Ventilation (NIV). Another approach entails the delivery of surfactant through a nebulizer, also using NIV support.

Randomised control trials are currently underway across continents to assess these new approaches. Benefits and limitations of these interventions will be presented and discussed. Other past and possible delivery options for surfactant delivery will also be examined.

A review of current evidence including Cochrane Reviews and meta-analyses, ongoing trials, and future directions will be presented. Ideally, time will allow for audience discussion regarding practice differences and experiences from different locations across the country. It is important for RTs to be aware of emerging trends in this field. RTs must continue to advocate for their patients and ensure the most appropriate interventions are being performed while ensuring the best possible outcomes for their patients.

37 PEDIATRIC INDIVIDUALIZED REGIONAL VENTILATION USING ELECTRICAL IMPEDANCE TOMOGRAPHY
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Ventilation distribution in patients mechanically ventilated is often inhomogeneous. Unfortunately, hardly any established clinical tools possess the ability to assess regional ventilation in patients. Approaches to select “individualized PEEP” are based on its effect on respiratory mechanics, focusing on driving pressure, plateau pressure or transpulmonary pressure. These methods share the limitation of “lumping” heterogeneous processes within the lung into one measurement. Ventilator settings should be adaptive to individual disease stages and regional inhomogeneities of the lung. While PEEP and other ventilator settings are utilized to attenuate the inhomogeneity of tidal ventilation, information on evolving regional lung function is not typically available at the bedside. Thoracic electrical impedance tomography (EIT) is an emerging imaging modality that can track real-time changes to regional lung volumes at the bedside.

In this session, we will present one Canadian pediatric centre’s utilization of thoracic EIT to guide individual mechanical ventilation in pediatric patients. This will be presented using real patient case examples and discussing several EIT parameters that have been developed on ventilation distribution to optimize ventilator settings. EIT is certainly one of the most promising techniques for the development of individual therapeutic strategies in the ventilation of pediatric patients and is changing how we look at ventilating pediatric patients.

38 DIRECTIONAL FLOW EVALUATION OF AN AEROSOL DELIVERY MODEL
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Delivery of aerosols to pediatric patients can be accomplished in many ways. Whether it be the delivery devices themselves or the circuits the aerosols travel in, the goal is to optimize deposition of the drug where it
is needed. Various delivery models have been investigated and are used as evidence for best practice today.

The difficulty in pediatrics resides with the practicality of the studies currently available and considered. Often studies assessing the question of optimal deposition or lung dose make use of controlled in vitro models that have a limited reflection of the patients we care for. Thus, practice is often derived from these in vitro models because of the limited availability of in vivo models. In vitro studies consider variables such as, airway, circuit, delivery device, flow, and particle size whereas they can’t assess breathing patterns and the quantity of expired aerosols.

The objective of this presentation will be to present a site-specific challenge in the delivery of aerosolized medications to intubated pediatric patients. To share a benchmark approach to alternative models in this practice and evaluate the direction of the aerosol within the model. It will share the challenges faced with presenting new evidence/ideas to practice and open a dialogue for others that experience practice challenges in caring with this population.

METHODS: Actual case studies of patients from our NICU will be chosen that serve as examples of difficult airways along a continuum that includes potentially difficult to known difficult to unexpectedly difficult.

RESULTS: Our case studies indicate that several elements were required for the successful management of difficult airways in these cases in our NICU. These elements included specialized equipment, expertise, collaboration, education and "de novo" innovation.

CONCLUSIONS: The difficult airway in the NICU may pose challenges to oxygenation, carbon dioxide clearance, intubation and mechanical ventilation. Our case studies show that in many cases no one provider has the knowledge and expertise to solve all of the potential challenges posed by a difficult airway and that the technical and clinical knowledge of respiratory therapists makes them a key player in managing this patient cohort.

41 JET 58: HFJV AND CONFESSIONS OF A NICU MOM
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Initiating a new ventilation program can be challenging. It involves multiple stakeholders who need to understand the therapy and also agree on strategies, techniques and management. The impact of these interventions of patients and families must be considered as well. In this presentation we will discuss the implementation of the HFJV program at Royal Columbian Hospital and the learnings along the way. This includes the creation of a ventilation standard, appropriate timing of the intervention, and subsequent modifications with complementary strategies to allow skin-to-skin on the HFJV. In addition, we will present the story of a baby girl, Hazel. We will hear her journey of 6 months in the NICU from her mother and the RTs that cared for her. We will share her 58-day "flight" on HFJV with multiple respiratory interventions, including unique "outside of the box" events. Family experience from admission to discharge will be highlighted, including knowledge of the NICU environment, feedback on improvements from family, and post-discharge.

42 VACCINE PERSPECTIVES AND VACCINES RELATION TO ASTHMA
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It has been claimed that vaccines have been the most advanced step in preventative medicine, saving countless lives every year. However, in recent years vaccination efficacy and safety policies have been called into question. This can be attributed to the anti-vaccination movement that has developed over the last two decades. The movement’s primary focus includes Measles Mumps and Rubella (MMR) vaccine and its link to autism. Another belief is that pharmaceutical companies receive shocking profits from mass immunization. It is true the vaccine market was worth approximately $24 billion in 2016 and is projected to grow to be worth $61 billion by the year 2020. This seems deterring, but the more important question to ask is not: are vaccination companies motivated by money? It is: are the products they are producing still safe and effective even if they successful and unimportant? And the answer is an overwhelming yes. Vaccines save countless of lives every year in Canada alone; mortality rates from measles decreased from 535,300 deaths in 2000 to 139,300
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43 OUTCOMES OF USING APPS TO DELIVER COPD SELF-MANAGEMENT
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BACKGROUND: Chronic obstructive pulmonary disease (COPD) is one of the leading cause of mortality and morbidity in Canada. The Public Health Agency of Canada reported in 2011 that 45% of those diagnosed with COPD felt that their overall health was fair or poor. Appropriate self-management may include pulmonary rehabilitation, smoking cessation and pharmacotherapy, and may help preserve lung function, reducing the risk of exacerbations. However, encouraging self-management in people with chronic diseases can be challenging. With the increasingly popular use of electronic and mobile devices, the potential use for motivating self-care with this platform is plausible.

OBJECTIVES: 1. To summarize the potential outcomes of using mobile apps to deliver COPD self-management and 2. to identify potential benefits and limitations of COPD targeted mobile apps.

Method: PubMed databases were utilized to collect studies with the focus of using mobile apps as their method of intervention. Search term combinations included “COPD and apps”, “COPD and mobile technology”. Primary articles that reported patient clinical outcomes or assessed user-experience of mobile apps in COPD management were included.

RESULTS AND DISCUSSION: Currently, there is little literature to demonstrate the effectiveness of using mobile apps for COPD self-management. A Cochrane systematic review reported that mobile apps targeted at supporting COPD self-management have significant effects in improving quality of life and activity levels compared to conventional methods of support. However, longer-term effects of the use of these apps are not conclusive. In the retrieved interventional articles, the target of COPD management in the mobile app intervention varied across trials. Some studies focused on investigating mobile apps providing pulmonary rehabilitation regimes, or physical activity motivation. The outcomes of these interventions show clinical benefits, including improved exercise tolerance, decreased dyspnea, and increased muscle strength. Meanwhile, other studies reported that the use of mobile apps to encourage self-management yielded no statistical significance in their health status. Despite the uncertainties of their clinical benefits, several studies reported positive user experiences with the mobile apps. Mobile apps as a platform to self-management and support from health care providers are feasible and acceptable. Furthermore, the use of mobile apps allows care plans to be individualized to each patient’s goals, self-monitoring and education. Although this modality is favourable, there are limitations that may include financial accessibility and literacy barriers.

CONCLUSION: The use of mobile apps to support COPD self-management is still relatively new, but promising. There is a lack of literature to support the use and prescription of mobile apps in replacement of conventional methods. Due to the uncertainties of using mobile apps to help manage COPD, the Global Initiative of Lung Disease guidelines for COPD do not recommend their use at this time. However, this innovative method of delivery should not be dismissed, but rather be improved on by designing future apps to address current limitations and emphasize on features that have thus far been favourable. Future studies should assess the use of mobile apps and their long-term effects on clinical outcomes, including the risk for exacerbations.

44 ADHERENCE TO POSITIVE AIRWAY PRESSURE THERAPY
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Obstructive sleep apnea (OSA) is the most common sleep-related breathing disorder and the health, social and economic consequences of unmanaged OSA are substantial. The repetitive arousal from sleep associated with this condition has been linked to excessive daytime sleepiness, cognitive dysfunction, compromised work performance, increased risk of motor vehicle and occupational accidents, and decrement in health-related quality of life. OSA is a significant independent risk factor for several clinical consequences, including hypertension, myocardial ischemia and infarction, heart failure and type 2 diabetes mellitus.

The gold-standard therapy for the management of OSA in adults is non-invasive positive pressure therapy administered via continuous positive airway pressure (CPAP). Some patients with OSA, who have underlying significant lung disease or are unable to use CPAP, are treated with bi-level positive airway pressure (BiPAP) therapy. Adherence to positive airway pressure (PAP) therapy may be especially important in OSA patients experiencing concomitant acute and chronic disease.

Advances in Positive Airway Pressure (PAP) technology for managing sleep disordered breathing and hypoventilation syndromes have enabled healthcare providers to verify effectiveness of and adherence to therapy.

In this session, findings from a therapist driven research study that examined the relationship between PAP therapy adherence and health outcomes will be presented. Additionally, a case based approach will be used to review PAP therapy effectiveness and usage data, as well as to examine demographic, physiological, behavioral and technical factors related to adherence.

45 BRIDGING THE ACUTE TO CHRONIC CARE GAP
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In our current health care climate, movement of patients from an acute care setting to a chronic care facility or rehabilitation centre is becoming increasingly challenging due to the limited number of beds and a high demand for these services. The waiting time for transfer can be lengthy, and therefore there are many patients ready to be transitioned, but who remain in an acute care hospital. This is especially true for those patients with specialized needs, such as patients with a tracheostomy or those with a spinal cord injury. Since these patients require particular care and have access to only a limited number of beds, in only a few specific centres, they are often waiting extended periods of time to access a placement. Having these patients remain in acute care hospitals while awaiting transition to another facility (chronic care or rehab), means that acute care providers are faced with unique challenges in terms of their management and clinical progress.

At St. Michaels Hospital (SMH), an urban city teaching trauma hospital found in the heart of downtown Toronto, this situation is a frequent reality. As such, a respiratory therapist-led quality improvement project was developed in an effort to identify and implement strategies to minimize the gaps for these patients (tracheostomy and spinal cord injury) transitioning from acute to chronic care. Through the presentation of two case studies, the following will be discussed: the acute to chronic care gaps that were identified, the process changes that were implemented, the outcomes to date, the challenges faced with these initiatives, and areas for future improvement.
46 BLOWING SMOKE: HOW SHOULD RTS RESPOND TO MARIJUANA?
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While the use of medical marijuana has been legal in Canada since 2001, there have been few studies on the harms and benefits of this substance. The legalization of marijuana (cannabis) in Canada puts respiratory therapists in a position where they need to expand their cessation skills to include this product. Since individuals who use cannabis for medical or recreational reasons are part of the respiratory therapists’ patient population, it is time for the profession to begin to develop strategies around its use. This session will begin with a discussion of the various types of cannabis, the methods of delivery including smoking, vaping, and ingestion, and a harm/benefit analysis of each. Participants will then examine the evidence for the use of medical marijuana, including therapeutic agents (THC & CBD), dosing, frequency etc. The session will conclude with participants collaborating on identifying and developing strategies to minimize the harms of smoking cannabis. The results of the session will be submitted for publication in the Canadian Journal of Respiratory Therapy.

47 MOTIVATIONAL INTERVIEWING: WHAT IS YOUR MOTIVATION?
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The goal of this presentation is to inform educators and practitioners of the type of patient partnerships that are commonly desired by healthcare institutions. Such a change would require a shift in the patient-provider relationship, including expectations of both. As such, this necessitates guidance and support of patients, healthcare providers and leaders alike. The presenter has explored this concept through the development of a novel surgical patient engagement program entitled Ready for My Surgery.

This program is designed to begin supporting surgical patient engagement immediately following the booking of a surgical procedure. Taking advantage of the period of time ahead of surgery, patients are gradually introduced to important concepts. This approach offers a contrast to conventional patient education where large amounts of information are often introduced during a small number of visits to healthcare institutions.

Taking advantage of modern digital technologies, the information provided via the Ready for My Surgery program is personal, accessible, offers different media for information consumption and aims to guide patients toward empowerment. Both patients and healthcare providers can experience and offer feedback on the program by visiting: www.readyformysurgery.com

49 LES OPIACÉS EN ANESTHÉSIE, BIEN OU MAL?
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Dans les dernières années, plusieurs études tendent à démontrer que les opiacés ont à la fois un effet analgésique mais aussi un effet hyperalgésique. Certains travaux expérimentaux pointent du doigt les narco-tiques, à tel point que quelques anesthésiologistes tendent à ne plus les utiliser lors d’une anesthésie générale afin d’éviter de causer une hyperal-gésie chez leurs patients. Après une discussion très intéressante avec un anesthésiologue de mon centre, je me suis interrogé si on pouvait vraiment éliminer les opiacés de l’arsenal pharmacologique en anesthésie? Pour répondre à cette question il faut s’en poser plusieurs autres : Comment fonctionne cette classe de médicament? Est-ce que tous les opiacés sont aussi fautifs? Peut-on utiliser des médicaments non-opiacés pour obtenir un soulagement suffisant pour le patient? Est-il possible de faire une anesthésie générale ou même régionale sans aucun opiacés? J’ai donc décidé de fouiller le sujet plus en profondeur et je viens vous présenter les résultats de ma recherche.

Afin de bien répondre à toutes ces questions, je réviserai la pharmacodynamique des opiacés ainsi que des autres classes de médicament qui peuvent permettent d’élimer ou de diminuer l’utilisation de ces derniers. Ensuite, je m’assurerai de mettre en lumière le phénomène d’hyperalgésie afin de bien comprendre l’origine de ce mouvement contre les narcotiques. Lorsque ces concepts seront maitrisés nous pourrons ensuite analyser si des changements dans la pratique pourraient être bénéfiques pour les patients. De quoi avoir de belles discussions avec vos anesthésiologistes à votre retour dans vos centres respectifs.

De plus, comme la présentation a lieu dans une autre province que celle où j’exerce ma profession et que des inhalothérapeutes/ thérapeutes respiratoire de tout le pays y seront présent, il sera intéressant de comparer les différentes pratiques en lien avec les narcotiques dans chacun de vos milieux.
Abstracts

50 AWAKE CRANIOTOMY: EVOLUTION OF NEUROSURGICAL PROCEDURE AND ANESTHESIA TECHNIQUES
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Introduced by Penfield in the 1930s, awake craniotomy has changed over the years from a surgical and anesthesia perspective. Initially considered safer than undergoing general anesthesia, it was used mainly for epilepsy surgery and occasionally for brain tumour resection. Improvement in neuroanaesthesia and the introduction of intraoperative neuromonitoring expanded the use of craniotomy under general anesthesia for resection of brain tumours. Awake craniotomy was still the only safe approach for resection of tumours located close to the speech centre. In the last five to ten years, there has been a shift to do more brain tumour surgery while the patient is awake, regardless of whether the tumour is located in the "eloquent" area or not. In this presentation we are discussing the advantages of awake craniotomy over the procedures done under general anesthesia. We will look at different anesthesia approaches and limitations of different techniques. The essential role of anesthesia assistants in the implementation of this procedure will be discussed.

51 EMERGENCE DELIRIUM: CAUSATION, CORRELATION AND IMPROVEMENTS NEEDED
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Emergence Delirium is a common complication often seen in the post-anesthetic care unit and is poorly understood as well as poorly managed. Often confused with delirium found in the Intensive Care Unit, Emergence Delirium lacks a clear differentiation clinically and is often not even recognized. Due to its significant impact on postoperative care, patients, and employee well-being, there is a need for more specialized studies to be conducted on its etiology. Not only are there patient-associated impacts, there are also increased hospital-associated costs, longer duration of stay, and more staff being implemented in patient management. Attending healthcare providers need to be made aware of the condition and current research in relation to risk factors, diagnosis, and current treatment options. Associated risk factors that have been seen to increase the incidence of Emergence Delirium are the extreme spectrums of age, the presence of preoperative anxiety, particular anesthetic techniques, specific surgical procedures, and poor postoperative pain management. The high need for further research will also be touched on as the condition has a significant impact on the course of patient care and hospital resources. Emergence Delirium contributes to a delayed recovery process, resulting in longer lengths of stay, more resource utilization, higher hospital costs and more staff needed for patient management. The lack of a specific quantification process and measurement tools make recognition of Emergence Delirium under-recognized and undermanaged. A single, direct cause of Emergence Delirium remains unknown, and further research needs to be conducted in regards to compiling a specific scale and protocol to follow in the postoperative process.

52 TOPICALIZATION TECHNIQUE FOR AN AWAKE FIBEROPTIC BRONCHOSCOPE INTUBATION
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BACKGROUND: Intubating a patient with a difficult airway is a major concern for anesthesiologists and anesthesia assistants. For a class 4 airway, an awake fiberoptic intubation is the most common technique and abolishing the cough and gag reflexes of the upper airway, vocal cords, and carina is required.

OBJECTIVES: To describe one approach used to topicalize a patient's airway in preparation for an awake fiberoptic intubation that produces total abolishment of the cough and gag reflexes.

METHODS: Conscious sedation with dexmedetomidine infusion and oxygen via nasal prongs, 4% lidocaine administered via EZ sprayer and tonsil gauze, 5% xylocaine ointment, 2% viscous lidocaine.

RESULTS: Improved patient compliance, satisfaction, and decreased time to fully topicalize the patient's airway.

DISCUSSION: Past practices, problems with previous practices (inadequate Topicalization, time consuming, decreased patient satisfaction/trauma) and lidocaine toxicity will be discussed.

CONCLUSION: This technique has shown to improve topicalization, improve efficiency, and increase patient satisfaction. This revised technique was brought to my OR following the return of an anesthesiologist after completing a difficult airway Fellowship with Dr. Orlando Hung, a world-renowned anesthesiologist and co-author of "Management of the Difficult and Failed Airway".
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