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ORIGINAL ARTICLE
Assessing the use of the Air Quality Health Index by vulnerable populations in a ‘low-risk’ region: A pilot study

ABSTRACTS
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**Improved transition dyspnea index** (LS mean TDI focal score at week 12, 1.34 vs. 0.11 for placebo, p<0.001)†‡

**References:**

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**FEV1:** forced expiratory volume in 1 second; **LS:** least square; **TDI:** transition dyspnea index.

† B2355: A 12-week, multicentre, randomized, double-blind, placebo-controlled, parallel-group study assessing the safety and efficacy of ONBREZ* BREEZHALER* 75 mcg once daily vs. placebo in patients with COPD (n=318).

‡ From a subset of 239 patients in B2355. FEV1 data shown is ONBREZ* BREEZHALER* vs. placebo, respectively:
- 5 min: 1.56 vs. 1.39
- 30 min: 1.57 vs. 1.38
- 1 hr: 1.56 vs. 1.38
- 2 hrs: 1.56 vs. 1.37
- 4 hrs: 1.53 vs. 1.30
- 6 hrs: 1.49 vs. 1.32
- 12 hrs: 1.43 vs. 1.29
- 16 hrs: 1.39 vs. 1.24
- 22 hrs: 1.44 vs. 1.27
- 24 hrs: 1.46 vs. 1.34.

§ B2354: A 12-week, multicentre, randomized, double-blind, placebo-controlled, parallel-group study assessing the safety and efficacy of ONBREZ* BREEZHALER* 75 mcg once daily vs. placebo in patients with COPD (n=323).

¶ Comparative clinical significance has not been established.
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Respiratory health, tobacco control and smoking cessation / La santé respiratoire, le contrôle du tabagisme et l’abandon du tabac

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COMMENTARY

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ORIGINAL ARTICLE

Assessing the use of the Air Quality Health Index by vulnerable populations in a ‘low-risk’ region: A pilot study

K Spurr, N Pendergast, S MacDonald

An increasing number of recent epidemiological studies have reported associations between short- and long-term exposure to outdoor air pollution and myriad adverse health effects. Given the increasing role of self-management in many contemporary treatment regimens, health care professionals are in an important position to inform at-risk individuals of these links. The Air Quality Health Index is a national program targeted at educating individuals with underlying cardiovascular and/or respiratory diseases about the level of health risk associated with air pollution. Awareness of the index and several other key factors, however, are vital to its effective implementation among health care professionals and patients.

ABSTRACTS

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Therapy will publish a special issue focused on tobacco use and smoking for addressing the pathologies associated with tobacco use. This issue will also discuss the mechanisms for encouraging smoking cessation, but also models of care high in Canada, which should prompt us to consider not only the best smoking-related morbidity and mortality continues to be stubbornly on the sale of tobacco cigarettes (7). Despite all of the options available, the results of a study aimed at assessing and improving patients’ understanding of the air quality health index in Nova Scotia, highlighting the particular role of air quality as an important determinant of respiratory health. The results of this study demonstrate that while much attention has been devoted to many aspects of chronic respiratory disease diagnosis and management, there are still significant areas for greater understanding and research to ensure a comprehensive approach that addresses not only the medical, but also the social determinants of our patients’ health, including the use of available information such as the air quality health index.

Taking this point further, David Sweanor (2) (pages 41-42) argues in a commentary solicited by the Journal that electronic cigarettes offer yet another opportunity for assisting in smoking cessation and tobacco control that should be welcomed by the public health community. This argument is predicated on the notion that although smokers face an addiction to nicotine, it is the delivery system (the combustion of tobacco cigarettes) – rather than the drug (nicotine) – that leads to the vast majority of morbidity and mortality attributed to smoking. It stands, then, that by eliminating the offending device, harms should be reduced.

The particular role of these devices in practice and among public health and respiratory practitioners has been controversial, as Professor Sweanor alludes to. Few randomized controlled trials have been conducted, although the evidence from those that have been completed appears to be promising (3,4). Several authors have, however, highlighted potential and theoretical risks of electronic cigarettes, leading to uncertainty in the minds of many clinicians who work with smokers (5,6).

Pragmatically, electronic cigarettes are likely being used by patients under our care and are almost certainly here to stay. As a profession concerned with the respiratory health of Canadians and people around the world, this is a technology that ought to be at the forefront of discussions within our profession, and is a subject requiring more data and evidence concerning the efficacy of electronic cigarettes in smoking cessation and harm reduction, their long-term safety and their impact on the sale of tobacco cigarettes (7). Despite all of the options available, smoking-related morbidity and mortality continue to be stubbornly high in Canada, which should prompt us to consider not only the best mechanisms for encouraging smoking cessation, but also models of care for addressing the pathologies associated with tobacco use.

For these reasons and more, the Canadian Journal of Respiratory Therapy will publish a special issue focused on tobacco use and smoking cessation in fall 2015.

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The intention of this issue is to examine current evidence and trends related to tobacco use and smoking cessation initiatives. This could include observational studies and descriptive epidemiology of the prevalence of smoking or tobacco-related harms in certain patient populations, evaluations of new drugs, devices and therapies, and models of care for implementing smoking cessation programs across the continuum of care. We are particularly interested in respiratory therapist-led research and initiatives such as the implementation of hospital-based smoking cessation interventions. However, we also welcome submissions from a broad range of health care providers, researchers, social scientists and policy makers who can provide new insights into the dynamics of tobacco use and addiction.

For inclusion in this issue, manuscripts should be submitted no later than May 1, 2015. Hospitals, clinicians and researchers with a potential idea for an article to be included are welcome to contact the editorial office to discuss their proposed article further.

As we begin to close our 50th anniversary of the profession, we look forward to the opportunity to revisit an old problem in a new light. By focusing on tobacco use, we continue to advance the science of respiratory medicine, advocating a broad focus on the medical and social determinants of respiratory health. Adopting a focus on not only clinical interventions, but also on public and population health, is an area of much-needed growth for the profession (8). We look forward to the new evidence and insights generated by this issue and the discussions that ensue.

Jason Nickerson RRT FCSRT PhD
Editor-in-Chief

REFERENCES

Pour ces raisons et d’autres encore, le Journal canadien des thérapeutes respiratoires publera un numéro spécial sur le tabagisme et l’abandon du tabac à l’automne 2015.

Ce numéro sera consacré à l’examen des données probantes des tendances les plus récentes liées à la consommation de tabac et aux initiatives visant l’abandon du tabac. Il pourra inclure des études d’observation et une épidémiologie descriptive sur la prévalence des dommages causés par le tabagisme ou le tabac dans certaines populations de patients, sur l’évaluation de nouveaux médicaments, appareils et thérapies ainsi que sur des modèles de programmes d’abandon du tabac dans le continuum des soins. Nous nous intéressons particulièrement aux recherches et aux initiatives dirigées par des inhalothérapeutes, telles que l’adoption d’interventions liées à l’abandon du tabac en milieu hospitalier. Cependant, nous accepterons également les manuscrits des dispensateurs de soins, des chercheurs, des chercheurs en travail social et des décideurs qui présentent une nouvelle perspective sur la dynamique de la consommation de tabac et de la dépendance au tabac.

Pour pouvoir être publiés dans ce numéro, les manuscrits devront être soumis au plus tard le 1er mai 2015. Les hôpitaux, les cliniciens et les chercheurs qui ont une idée d’article peuvent prendre contact avec le bureau de rédaction pour en discuter.

Nous nous apprêtons à clore les célébrations du 50e anniversaire de la profession et espérons réexaminer un vieux problème sous un nouveau jour. En nous concentrant sur la consommation de tabac, nous continuons de faire progresser la science de l’inhalothérapie tout en prénant une vaste vision des déterminants médicaux et sociaux de la santé respiratoire. Non seulement les interventions cliniques, mais également la santé publique et la santé de la population constituent un domaine de croissance indispensable pour la profession (8). Nous avons hâte de découvrir les nouvelles données probantes et les nouveaux points de vue qui émergeront de ce numéro spécial, ainsi que les discussions qui en découleront.

Jason Nickerson RRT FCSRT Ph. D. Rédacteur en chef

RÉFÉRENCES
Public health and electronic cigarettes

David Sweanor JD

Public health campaigns need pragmatic revolutionaries, people who can spot opportunities and use them to the benefit of individual and population health. Electronic cigarettes (or vapers, which have lately been receiving much attention, appear to offer such an opportunity. These are devices that deliver nicotine via a vapour that can be inhaled much like a cigarette, but without the vast range of carcinogens and other toxins found in cigarette smoke. The market for these products has recently exploded in Canada, as it has in many other countries. Smokers in Canada can easily access such products over the Internet or from bricks-and-mortar ‘vape shops’, and social media and personal conversation is abuzz with advice and testimonials from smokers who have successfully used these products to replace cigarettes.

Although it is readily apparent that vape shops are proliferating at a tremendous rate and are attracting many customers, it is difficult to obtain good data on Canadian sales of vapour products. This is largely because in 2009, Health Canada deemed the products illegal in the absence of medicinal approval (1). Retailers and e-cigarette advocates retort that Health Canada does not correctly interpret the law (2), and we are left with a market that is in a regulatory fog and difficult to monitor. However, in other national markets, the data are more robust. For example, in the United States, the market was estimated by the giant investment bank Wells Fargo in May 2012 as being a ‘niche’ worth $300 million (3). Two years later, the same bank considers the market to be worth $2.5 billion and poised to overtake cigarette sales within a decade (4). In the United Kingdom, academic research monitoring smoking trends and a survey conducted by the public health advocacy group Action on Smoking and Health show that e-cigarettes have become, by far, the most popular way to try to stop smoking; that the uptake of these products is associated with increased cessation (5); that they are now used by >1.3 million consumers (with perhaps 400,000 smokers having totally switched to these devices) and with negligible attraction to those who have not been nicotine users (6). Although it is early in the development of these technologies, the uptake appears to be exceedingly rapid. In addition, these products are improving at a significant pace in terms of consumer acceptability as the technology for such issues as battery power, ‘throat hit’, flavours and nicotine delivery responds to the demands of consumers. A significant number of smokers are apparently finding this technology to be an effective substitute for smoking and, often, an effective way to cease nicotine use altogether.

We appear to be dealing with a classic example of disruptive technology (i.e., new technology that unexpectedly displaces existing technology). Similar to any innovation, there are risks of unintended consequences (such as attraction to nonusers of nicotine or of somehow leading ‘vapers’ back into smoking). There are also some who will have concerns that are ideological or moralistic. These include views such as an abstinence-only approach to any use of a drug regardless of relative risks, antipathy to capitalism or opposition to anything that could conceivably give tobacco companies any alternative to cigarettes. These views are very real in segments of the antitobacco movement, and are similar to opposition that has been faced in numerous other public health campaigns. However, true public health campaigns take a pragmatic view, meet people where they are, value concepts of justice and autonomy, and reject unscientific abstinence-only campaigns.

Regardless of moral or ideological opposition to alternatives to cigarettes, from a public health pragmatist’s point of view, this new technology is here; the market is already significant, is rapidly evolving and it is unlikely to be going away. Not least because in an age of Internet-accessible information and social media for sharing it, even the ability of government regulators to prevent consumer access to innovative products has become highly constrained (7). So what does this mean for policy directions as we look at future opportunities in our efforts to reduce smoking? How can we ensure that the phenomenon of vapour products helps us achieve the best public health outcomes?

Cigarette smoking has long been recognized as Canada’s leading cause of preventable death. The recognition of the immense magnitude of disease, death, disability and economic loss has led to a decades-long effort to reduce smoking, and accolades for many of us who have been part of that fight. To date, the fight against smoking has been regarded as one of the great public health success stories of the past century. The prevalence of smoking has been reduced dramatically over the past 50 years, and exposure to second-hand smoke has been drastically curtailed since the nonsmokers’ rights movement came into its own in the 1980s. However, the success of any effort should be seen in relation to what was possible; if greater things are readily achievable, then settling for middling measures is hardly the sort of thing for which one should be heartily congratulated. We do not congratulate baseball players for hitting a triple but only running to first base.

So, how do our efforts to date on cigarette smoking compare with what could be achievable? We can consider that while the prevalence of smoking has declined steeply, the absolute number of smokers in Canada today is not markedly different than when the antismoking campaign began. Health Canada still reports that there are approximately five million self-reported smokers, and that figure is based on survey data that almost certainly underestimates the actual total, for reasons that include the failure of surveys to capture marginalized populations with high rates of smoking and the tendency of respondents to under-report negatively viewed behaviours. Based on current trends, an additional one million Canadians will die as a direct result of smoking over the next 25 years.

In contrast, other public health campaigns have dramatically reduced the absolute numbers of individuals at risk, often to the point of disease elimination. Think of tuberculosis, polio, smallpox or cholera—diseases that once ravaged Canadians; or of automobile fatalities, in which the campaign for auto safety started at approximately the same time as the campaign against smoking, and for which the maximum number of Canadians reported to be smoking and the maximum number of those dying in traffic accidents peaked at approximately the same time in the late 1970s. However, in contrast with the slow reduction in smoking prevalence and the persistently high death toll associated with smoking, the annual toll of traffic fatalities has not just fallen in terms of a proportion of the population or in relation to the number of vehicles and the distance travelled, but have fallen by two-thirds in absolute numbers (8,9).

One can also consider the rates of stomach cancer, in which the advent of the innovative technology of refrigeration took what had been the leading cause of cancer deaths in the early 1940s and rendered it relatively rare. Compared with the success of some of these other efforts, our success with smoking appears rather less robust.

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The key question, however, is whether tackling smoking-caused harm could happen much more quickly or whether it really is possible to have policies in place that could dramatically accelerate the decline in smoking. In thinking creatively about our policy options, of being pragmatic revolutionaries, a huge remaining opportunity is that the actual disease vector has been left largely unchanged and unchallenged. This is an oddity because it has been known for decades that it is the delivery system (the products of combustion) rather than the drug nicotine that is responsible for the vast majority of all of the deaths caused by smoking, and that it is evidently possible to deliver nicotine without combustion in ways that are acceptable to a great many smokers. Cigarettes are, very simply, an exceedingly and unnecessarily dirty drug delivery device.

Again, considering some other public health efforts gives valuable insights. Technological innovation has played a key role in reducing death, injury and disease in cases such as vaccination programs, water purification, refrigeration, automobile safety, consumer product standards, food preparation, building standards, medical procedures and reproductive health. Furthermore, the interventions used in other areas of public health explicitly acknowledge a key role for risk reduction. In fact, public health campaigns typically have a key ‘but if’ component. We tell people to avoid dangerous activities, but also say ‘but if you are still going to do it, here’s how to reduce your risks’. Such messages are ubiquitous. Drinking to excess is harmful, but if you do it, don’t drive; driving in a snowstorm is dangerous, but if you do, ensure you have snow tires and slow down; and avoid being outdoors when the UV index is high, but if you do go outdoors wear a hat, long sleeves and use sunscreen. Where is the ‘but if’ for those using nicotine? Particularly for people often so dependent on the drug that abstinence is not a short-term option?

Particularly for people often so dependent on the drug that abstinence is not a short-term option?

Particularly for people often so dependent on the drug that abstinence is not a short-term option?

It is into this ‘but if’ vacuum that our field needs to move if we are to be truly pragmatic in fundamentally altering smoking’s disease burden, and electronic cigarettes appear to open the door. We should focus on opportunities rather than merely focus on potential and theoretical risks as technology delivers products that can replace cigarettes. We should also pursue policies that encourage an ever-greater range of choices for those who wish to get off cigarettes and for those wanting to cease any form of nicotine use. The current generation of electronic cigarettes are fundamentally different than what existed even a year ago, and the pace of change as the field innovates to meet the needs of the millions of Canadians still smoking can accelerate as much as we have witnessed in mobile telecommunications and other forms of technology. The big opportunity is not with what we currently have in vapour products, but where we could be in a few years as technology is harnessed to give each nicotine user a viable alternative to smoking. Intelligent policy development can allow us to contain risks of unintended consequences while moving as fast as possible to make today’s cigarettes as obsolete as the automobile technology of 50 years ago.

REFERENCES

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Assessing the use of the Air Quality Health Index by vulnerable populations in a ‘low-risk’ region: A pilot study

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Several studies have shown a relationship between exposure to outdoor air pollution and adverse health effects, and that people with specific chronic diseases appear to be particularly vulnerable. An important opportunity exists for respiratory therapists to inform at-risk clients, especially those with lung disease, about outdoor air pollution and its role in self-management. The Air Quality Health Index (AQHI), a national program led by Health Canada and Environment Canada, is intended to inform individuals about the level of health risk associated with air pollution in Canadian communities, and to provide a tool to manage those risks. The main purpose of the present study was to assess the use of the AQHI by vulnerable populations in a ‘low-risk’ (AQHI ≤3) region. The specific objectives were: to develop and evaluate an AQHI education strategy; to investigate whether awareness of the AQHI impacts self-management in vulnerable populations in low-risk regions; and to identify enabling factors and/or barriers concerning use of the AQHI by both health care professionals and their patients. A pilot study was conducted using a small convenience sample of clients/patients and educators at respiratory clinics across Nova Scotia. A short educational activity on the utility and application of the AQHI was incorporated into their regular disease management plans and surveys were administered pre- and posteducational intervention. Twenty-one clients from three respiratory clinics consented to participate in the study and received the AQHI education program. Using a Wilcoxon signed-rank test with paired data, five of six survey questions had statistically significant changes in response to pre- and posteducation. Some common themes that emerged from qualitative data collected included: limited access to the Internet; lack of its reporting in the media; confusion with other indexes; and relevancy of the AQHI in Nova Scotia, a ‘low-risk’ region. An AQHI educational program improved knowledge and use of the AQHI reported by respiratory clinic patients. Respiratory educators reported the AQHI education program was relatively simple to implement into their chronic disease education plan. A larger-scale study involving participants residing in a moderate- or high-risk region is recommended.

Key Words: AQHI; Health; Outdoor air quality; Risk

Over the past decade, an increasing number of studies (mostly epidemiological) have shown a relationship between short- and long-term exposure to outdoor air pollution and adverse health effects. Individuals with specific chronic diseases appear to be particularly vulnerable. The short-term effects include exacerbation of underlying lung disease, particularly chronic obstructive pulmonary disease (COPD) and asthma (1-6), cardiovascular disease, including arrhythmias, ischemia and heart failure (7,8), and ischemic stroke among the elderly (9). The long-term effects of exposure to air pollution include increased mortality (7,10), incidence of lung cancer (10), pneumonia and the progression of atherosclerosis. An important opportunity exists for health care professionals to inform at-risk clients, especially those with lung or cardiovascular disease, about outdoor air pollution and its role in self-management.

The Air Quality Health Index (AQHI) is a national program led by Health Canada and Environment Canada, in partnership with provincial governments and organizations. The AQHI was derived based on the collective effect of nitrogen dioxide, ground level ozone and particulate matter in ambient air on health (11). It is intended to inform individuals about the level of health risk associated with air pollution in Canadian communities, and to provide a tool to manage those risks (12).

Awareness of the AQHI among health care practitioners is an essential component of its implementation. To that end, the Nova Scotia College of Respiratory Therapists (NSCRT) was identified by Environment Canada and Health Canada as a partner in Nova Scotia (NS) to engage a number of health care practitioners throughout the province to inform patients with chronic respiratory

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TABLE 1
Air Quality Health Index (AQHI) risk levels and health messaging for at-risk and general populations (Environment Canada, 2014)

<table>
<thead>
<tr>
<th>Health risk</th>
<th>AQHI</th>
<th>At-risk population*</th>
<th>General population</th>
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</thead>
<tbody>
<tr>
<td>Low</td>
<td>1 to 3</td>
<td>Enjoy your usual outdoor activities</td>
<td>Ideal air quality for outdoor activities</td>
</tr>
<tr>
<td>Moderate</td>
<td>4 to 6</td>
<td>Consider reducing or rescheduling strenuous activities outdoors if you are experiencing symptoms</td>
<td>No need to modify your usual outdoor activities unless you experience symptoms such as coughing and throat irritation</td>
</tr>
<tr>
<td>High</td>
<td>7 to 10</td>
<td>Reduce or reschedule strenuous activities outdoors if you experience symptoms such as coughing and throat irritation</td>
<td>Consider reducing or rescheduling strenuous activities outdoors if you experience symptoms such as coughing and throat irritation</td>
</tr>
<tr>
<td>Very high</td>
<td>&gt;10</td>
<td>Avoid strenuous activities outdoors. Children and the elderly should also avoid outdoor physical exertion</td>
<td>Reduce or reschedule strenuous activities outdoors, especially if you experience symptoms such as coughing and throat irritation</td>
</tr>
</tbody>
</table>

*Individuals with heart or breathing problems are at greater risk

TABLE 2
Summary of educator survey results

<table>
<thead>
<tr>
<th>Question</th>
<th>Responses (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. What type of educational activity did you complete?</td>
<td>UBC online course (3)</td>
</tr>
<tr>
<td></td>
<td>Government webinar (2)</td>
</tr>
<tr>
<td></td>
<td>Other (1)</td>
</tr>
<tr>
<td>2. What is the predominant patient population that you see in your clinic?</td>
<td>Respiratory (4)</td>
</tr>
<tr>
<td></td>
<td>Cardiac (1)</td>
</tr>
<tr>
<td>3. What was the approximate time period it normally took for you to provide the AQHI education strategy to your clients?</td>
<td>&lt;5 min (1)</td>
</tr>
<tr>
<td></td>
<td>5 min to 10 min (2)</td>
</tr>
<tr>
<td></td>
<td>&gt;10 min (2)</td>
</tr>
<tr>
<td>4. The AQHI was easy to explain to my clients</td>
<td>Completely agree (2)</td>
</tr>
<tr>
<td></td>
<td>Agree (2)</td>
</tr>
<tr>
<td></td>
<td>N/A (1)</td>
</tr>
<tr>
<td>5. My clients were able to understand where to find the daily AQHI reading</td>
<td>Completely agree (2)</td>
</tr>
<tr>
<td></td>
<td>Agree (1)</td>
</tr>
<tr>
<td></td>
<td>Completely disagree (1)</td>
</tr>
<tr>
<td></td>
<td>N/A (1)</td>
</tr>
<tr>
<td>6. My clients were able to understand how to modify their activities based on the daily AQHI reading</td>
<td>Completely agree (2)</td>
</tr>
<tr>
<td></td>
<td>Agree (2)</td>
</tr>
<tr>
<td></td>
<td>N/A (1)</td>
</tr>
<tr>
<td>7. The AQHI is something I feel is important to include in the education plan for my clients</td>
<td>Completely agree (2)</td>
</tr>
<tr>
<td></td>
<td>Agree (1)</td>
</tr>
<tr>
<td></td>
<td>Completely disagree (1)</td>
</tr>
<tr>
<td></td>
<td>N/A (1)</td>
</tr>
</tbody>
</table>

AQHI Air Quality Health Index; N/A Not applicable; UBC University of British Columbia (Vancouver, British Columbia)

and cardiovascular disease about the AQHI and the potential harm of outdoor air pollution.

Respiratory therapists interact daily with clients who have respiratory and cardiovascular diseases. They work in various practice environments such as respiratory clinics, rehabilitation programs, respiratory research, home care and acute care settings.

In January 2012, the NSCRT, with funding from Environment Canada, proposed a pilot project. The main purpose of this study was to assess the use of the AQHI by vulnerable populations in a ‘low-risk’ region. The specific objectives of the present project were: to develop and evaluate an AQHI education strategy; to investigate whether awareness of the AQHI impacts self-management in vulnerable populations in low-risk (AQHI ≤3) regions; and to identify enabling factors and/or barriers concerning use of the AQHI by both health care professionals and their patients.

METHODOLOGY

The research design for the present pilot study was quasi-experimental, using an educational intervention with a pre- and postsurvey. The intervention was an education strategy on the utility and application of the AQHI. Ethics approval for the present study was obtained from the Research Ethics Board (REB) of Health Canada, as well as specific district health authorities within NS.

A convenience sample of clients and educators at cardiac and respiratory clinics across NS were recruited. Participation in the study was voluntary, and subjects and educators could have removed themselves from the study at any time. Subjects and educators gave informed consent to participate in the study.

Educator subjects

Educators at cardiac and respiratory clinics were identified in areas where the AQHI is measured in NS, including Halifax, Annapolis Valley and Cape Breton.

Six of the eight educators (five respiratory and one cardiac) volunteered to participate in the study and signed informed consent forms. Of the four geographical areas identified for measurement of AQHI, educators were successfully recruited from three: Halifax, Annapolis Valley and Cape Breton.

On recruitment into the study and signing of informed consent forms, educators were required to complete a minimum of 1 h of formal education on outdoor air quality and the AQHI (e.g., Nova Scotia Environment web-based seminar or course offered by the University of British Columbia [Vancouver, British Columbia]).

The study respiratory educator met with each educator individually to review the study protocol, subject recruitment and the AQHI educational intervention. The AQHI educational intervention was generated by a small focus group of respiratory therapists who all completed the University of British Columbia AQHI course. Two members of the focus group were also certified respiratory educators. Educators were asked to recruit subjects for the study and were given Health/Environment Canada educational material such as brochures and bookmarks on the AQHI to distribute to subjects.

Educational intervention

Educators delivered a short education session of approximately 5 min to 10 min on the use and application of the AQHI (Table 1) to their clients. Educators provided subjects with verbal instructions and print materials of how to access information on the current AQHI level of risk in their local area, as well as the predicted AQHI values for the following day. Educators taught subjects how to monitor their symptoms and modify their daily physical activities based on the current level of air pollution. The educators incorporated this AQHI information into the triggers and/or symptom monitoring section of the subjects’ disease self-management plan.

On completion of the subject recruitment phase and implementation of the AQHI education strategy, educators were invited to complete an online survey using the Opinio platform (Version 6.63), licensed to Dalhousie University. The survey questions (Table 2) were developed by the research team to collect the educators’ feedback on the enabling factors and barriers to implementing the AQHI education strategy into clinical practice.
Client subjects
Individuals with chronic cardiovascular and/or respiratory disease were recruited from four respiratory clinics (Halifax, Kentville, Middleton and Sydney) and one cardiac clinic (Halifax) across NS. On agreeing to participate and signing informed consent forms, subjects completed a preintervention survey exploring their current symptoms, and level of understanding and use of the AQHI.

The pre- and postintervention surveys (Table 3) were developed by the research team. The surveys used a combination of quantitative and qualitative measures, and were administered in paper format. The preintervention surveys were completed by the study participants while visiting the clinic. The postintervention surveys were mailed to the participants’ homes. Approximately one-third of the postintervention surveys were conducted by telephone interview.

The inclusion criteria for involvement in this AQHI education study were as follows:

- At least 18 years of age; and
- Diagnosed with a chronic cardiovascular or respiratory disease.

Subjects were excluded from participating if they met any of the following exclusion criteria:

- Acute exacerbation of their chronic illness causing a change in medication, physician or emergency room visit or hospitalization during the recruitment period;
- Cognitive impairment (eg, dementia, Alzheimer’s); and
- Inability to read or comprehend English.

As part of their disease self-management education program, subjects received instruction on the use and application of the AQHI. Subjects were informed with verbal instructions and print materials of how to access information on the current AQHI level of risk in their local area. Subjects were taught how to monitor their symptoms and modify their daily physical activities based on the current level of air pollution using Environment Canada’s AQHI Risk Levels and Health Messaging for At-Risk and General Populations (Table 1). Because the AQHI is a risk- and self-management tool, this information was incorporated into the triggers and/or symptom monitoring section of the subjects’ disease self-management plan. Subjects were provided with a symptom log to record information on days when their symptoms worsened. The postintervention survey explored their current symptom management, as well as their level of understanding and use of the AQHI.

### Table 3

<table>
<thead>
<tr>
<th>Question</th>
<th>Pre-education</th>
<th>Posteducation</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I understand the meaning of the AQHI</td>
<td>3.00</td>
<td>4.35</td>
<td>0.0072*</td>
</tr>
<tr>
<td>2. I know where to find the daily AQHI reading</td>
<td>2.24</td>
<td>4.00</td>
<td>0.025*</td>
</tr>
<tr>
<td>3. I know how to modify my activities based on AQHI levels</td>
<td>2.38</td>
<td>4.17</td>
<td>0.0013*</td>
</tr>
<tr>
<td>4. I find it easy to use the AQHI to regulate my outdoor activities</td>
<td>1.95</td>
<td>3.61</td>
<td>0.0036*</td>
</tr>
<tr>
<td>5. I find it difficult to use the AQHI to regulate my outdoor activities</td>
<td>3.20</td>
<td>2.47</td>
<td>0.40</td>
</tr>
<tr>
<td>6. By modifying my activities based on the AQHI, I am better able to manage my symptoms</td>
<td>2.29</td>
<td>4.00</td>
<td>0.0091*</td>
</tr>
</tbody>
</table>

*Indicates survey responses that were significantly different at the ≤0.05 level. Mann-Whitney-Wilcoxon test results comparing pre-education with posteducation answers. AQHI Air Quality Health Index

### Table 4

<table>
<thead>
<tr>
<th>Variable</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disease</td>
<td></td>
</tr>
<tr>
<td>Asthma</td>
<td>6</td>
</tr>
<tr>
<td>Asthma and chronic obstructive pulmonary disease</td>
<td>1</td>
</tr>
<tr>
<td>Chronic obstructive pulmonary disease</td>
<td>12</td>
</tr>
<tr>
<td>Sarcoidiosis</td>
<td>2</td>
</tr>
<tr>
<td>Age, years</td>
<td></td>
</tr>
<tr>
<td>30–39</td>
<td>1</td>
</tr>
<tr>
<td>40–49</td>
<td>5</td>
</tr>
<tr>
<td>50–59</td>
<td>5</td>
</tr>
<tr>
<td>60–69</td>
<td>3</td>
</tr>
<tr>
<td>70–79</td>
<td>5</td>
</tr>
<tr>
<td>80–89</td>
<td>2</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>9</td>
</tr>
<tr>
<td>Male</td>
<td>12</td>
</tr>
<tr>
<td>Clinic type</td>
<td></td>
</tr>
<tr>
<td>Respiratory</td>
<td>21</td>
</tr>
</tbody>
</table>

### Statistical analysis

Nonparametric tests were used to perform statistical comparisons due to the ordinal (non-normal) data and the small sample sizes. The Wilcoxon signed-rank test was used for pairwise pre-/postcomparisons. The Mann-Whitney-Wilcoxon test was used to test the relationship between the pre-/posteducation response differences and sex.

### RESULTS

#### Client data

Twenty-one patients from five respiratory clinics consented to participate in the study, with 18 of 21 subjects completing the posteducation survey. The majority of subjects had a diagnosis of COPD (12 of 21) with the remaining subjects having asthma (seven of 21) or sarcoidosis (two of 21). The majority of subjects were between 40 and 89 years of age, consistent with the age demographic for COPD. There were slightly more men (12 of 21) recruited than women (nine of 21).

No cardiac clinic clients consented to participate in the study.

Table 4 describes the client population.

Using a Wilcoxon signed-rank test with paired data, questions 1, 2, 3, 4 and 6 (from Table 3) had statistically significant changes in response to pre- and posteducation, all trending toward higher levels of agreement with the provided statements. Table 3 demonstrates these significant differences. Question 5 showed responses trending toward less agreement, but did not reach significance.

Note that all pre-/posteducation responses changed in the positive direction, regardless of sex.

#### Variation based on client characteristics

There were no significant differences in the responses to the pre-education survey according to sex. In the posteducation survey, responses changed more for female respondents than male respondents. Noting that the samples for the two groups pre/post are quite small (nine women and nine men responded both pre and post), females changed more on each question. The difference in the changes were statistically significant for question 2 and question 4 (P=0.03) and (P=0.035), respectively (Wilcoxon signed-rank test).

Three male participants did not provide any posteducation responses; their pre-education responses were lower than average. They were excluded from the pre-post statistical testing; therefore, this did not influence the tests involving sex.

Statistical tests were not performed on responses according to age or disease due to even smaller sample sizes per group. However, each
age and disease group had a more positive average response posteducation across all questions, aside from question 1 and 4 in the 30 to 39 years of age group (which had only one subject).

Overall, there were 104 responses pre- and posteducation that could be matched according to respondent. Of these, 11 of 104 (10.6%) responses were less positive posteducation, 28 of 104 (26.9%) stayed the same and 65 of 104 (62.5%) of the responses were more positive posteducation.

Qualitative data
Some common themes that emerged from qualitative data collected on the pre- and postquestionnaires included:

- Confusing the AQHI with other weather-related factors (eg, humidex, pollen, temperature).
- Reported ability to modify their activities based on the AQHI level (eg, stay indoors, modify or limit activities, exercise at a different time of the day).
- Uncertainty about the cause of symptom changes (eg, weather conditions, medications, activities).
- The majority of subjects knew where to find the AQHI values; the most common access point for the AQHI was the Environment Canada website.
- Lack of access to the Internet prevented some subjects from accessing the AQHI.

AQHI data
Daily AQHI forecasted and measured readings were recorded in Sydney, Halifax and Greenwood during the five-month recruitment period (December 1, 2012 to April 30, 2013). The average forecast and observed AQHI was ≤ 3 (low risk) in all study areas for the entire period. In the Halifax region, the AQHI was forecast to be 4 (moderate risk) for only five of 150 days. Of those five days, the observed AQHI reached 4 on only one day.

DISCUSSION
Educators from eight clinics were invited to participate in the present study. Six educators at five clinics were successfully recruited and consented to participate. Four of the clinics were respiratory and one cardiac. However, the cardiac clinic was not successful in recruiting any subjects despite the educator’s best efforts. The educator approached numerous clients to be involved in the study but none consented to participate.

The study results reflect the implementation of the AQHI with only respiratory clinic patients, and do not include cardiac clinic patients. There were several challenges in recruiting cardiac clinics and subjects. There appeared to be less awareness and appreciation for the cardiovascular health effects of outdoor air pollution among health professionals working with cardiac patients. It appears that cardiac educators received their first introduction to the AQHI and its health effects through the current study.

The one cardiac clinic that was recruited to be involved in the study reported difficulty in recruiting subjects due to workload and operational constraints.

The AQHI and its health effects was previously introduced to respiratory educators in NS through an initiative of the Lung Association of Nova Scotia and through a previous study conducted by the NSCRT.

The subjects in the present study reported an increase in knowledge and utilization of the AQHI. There was generally a significant difference (pre-posteducation survey) between the subject’s reported ability to understand the AQHI and use it to modify their daily activities. The reported increase in knowledge and use of the AQHI was greater in women compared with men. The results indicate the subjects reported less difficulty using the AQHI to modify their outdoor activities after the education program; however, the difference was not statistically significant (P=0.40).

All subjects were provided with a symptom log and asked to record the dates and the AQHI on days when their symptoms worsened. However, only five of 21 subjects completed a symptom log and most of these contained minimal entries. Therefore, we cannot draw any conclusions about symptom management related to the AQHI in this particular study group.

Patient symptom logs can be useful in understanding the temporal nature of triggers that exacerbate symptoms; however, keeping a symptom log requires time and effort (13). A systematic review (14) that compared electronic versus pen and paper methods of collecting patient-reported data showed the electronic method was superior to pen and paper in several measured outcomes (feasibility, compliance, data accuracy and subject acceptability).

Factors, such as patient motivation and buy-in, can improve accuracy and compliance (15). In the present study, a possible reason for noncompliance with the use of symptom logs may include the fact the AQHI is normally ≤ 3 in the study regions. There were also comments from both educators and subjects stating lack of concern about the AQHI and health effects due to the fact it is almost always in the ‘low-risk’ category.

The present study demonstrates that after implementing an AQHI educational program with a short follow-up period (two to four months), respiratory clinic patients reported an improvement in AQHI knowledge and utilization.

Educators reported the AQHI educational program was relatively simple to implement into their chronic disease education plan. The survey results indicate the majority of educators reported this activity took approximately 5 min to 10 min. The majority (four of five) of educators reported that, in their opinion, their clients were able to understand where to find the AQHI values and how to use them to modify their activities.

The majority (four of five) of educators reported an AQHI education program is an important component of a chronic disease education plan.

Barriers and limitations
The researchers reported several barriers and limitations to conducting the present study:

- In addition to Health Canada’s REB approval, individual jurisdictional REB approval was required, which was labour and time intensive.
- Due to delays awaiting REB approval, the recruitment period was reduced.
- It was challenging to recruit cardiac educators and clinics to participate in the study, possibly due to a lack of awareness of the health effects of the AQHI.
- Lack of a research coordinator at the study clinics to actively recruit subjects.
- Small sample size of research study subjects and educators.
- Selection bias, because educators introduced the study to subjects who they believed would understand and apply the AQHI.

Clients and educators reported several barriers concerning the use of the AQHI:

- Clients/patients access to the Internet is not always available in this population; therefore, it is challenging to find the current or forecasted AQHI values.
- The AQHI is not consistently reported in media such as newspaper, television or radio.
- Client/patient confusion with other indexes, such as the pollen index and the humidity index.
- Common understanding among both clients/patients and educators that NS is a low-risk region for outdoor air pollution and, therefore, the AQHI may not be as relevant to their chronic disease education plan compared with other factors.
Enabling factors
Educators reported the following enabling factor concerning the use of the AQHI:

- The AQHI education program was easy to incorporate into their chronic disease education plan.

CONCLUSION
An AQHI educational program improved knowledge and utilization of the AQHI reported by respiratory clinic patients. Respiratory educators reported the AQHI education program was relatively simple to implement into their chronic disease education plan. A larger-scale study examining medication use and primary care visits when the AQHI is at moderate or high risk levels is recommended.

DISCLOSURES: Financial support for this project was provided to the Nova Scotia College of Respiratory Therapists by Environment Canada. The funders had no role in the development of the study’s design, data analysis or preparation of the manuscript.

REFERENCES
We are looking for new and experienced peer reviewers with expertise in the following areas (and more):

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- Anesthesia
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- Critical Care
- Clinical Trials
- COPD
- Ventilation
- Oxygen Therapy
- CPAP
- Emergency Medicine
- ECMO
- Evidence Based Practice
- Neonatology
- Obstructive Sleep Apnea
- Oscillation
- Population Health
- Quality improvement
- Resuscitation
- Sepsis
- Sleep Medicine
- Spirometry
- VAP
- Education
- Leadership

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- Review manuscripts using our online system, PulsusTrack
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**HOW TO APPLY**

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editor@csrt.com
InTRODUCTIOn/OBJECTIVES: For more than a decade, healthcare professionals have learned the process of using research evidence to inform clinical decision-making (known as evidence-based decision making (EBDM)). Lack of knowledge of the EBDM process or failure to incorporate it into the practice setting may lead to the delivery of suboptimal or even ineffective treatment, poor patient outcomes, cost-ineffectiveness in the provision of services, and ultimately decreased quality of life1,2. While EBDM is included in respiratory therapy curricula and our National Competency Profile3, and is recognized as important to the provision of best practice, no study has evaluated the capacity of Canadian healthcare providers to make evidence-informed decisions. To ensure that Respiratory Therapists and other healthcare providers are providing the best possible care, a tool for assessing EBDM competency is essential. Currently no tool exists for evaluating practicing healthcare providers’ competency in all components of EBDM4,5. Objectives for this study were: 1) To create a tool to measure HCP’s knowledge and skills to make evidence-informed decisions, and 2) To use this tool to evaluate the current level of registered respiratory therapists’ (RRTs) proficiency to make evidence-informed decisions.

METHODOLOGY: The Delphi technique was used to develop an assessment tool for measuring healthcare providers’ competency in EBDM. The Delphi technique is a quantitative research method commonly used to obtain feedback from a group of experts in order to facilitate decision-making6. In this study, a three-tiered Delphi technique was used to generate, develop and evaluate multiple-choice questions for an EBDM Capacity Assessment tool. Questions were categorized into five domains reflective of the EBDM process. Upon development of the assessment tool, a pilot study was conducted to evaluate practicing healthcare providers’ knowledge and use of EBDM. An invitation to participate in the pilot was sent via respective Colleges/Associations to all active practicing clinical psychologists, occupational therapists, physiotherapists, registered nurses, respiratory therapists, and social workers in Nova Scotia. Using Opinion survey software, participants were asked a series of demographic questions and to complete the EBDM

REfEREnCES:

ABSTRACTS

Poster abstracts from the 2014 Conference of the Canadian Society of Respiratory Therapists

THE 50th annual Canadian Society of Respiratory Therapists (CSRT) Education Conference was held in Montreal (Quebec) on May 22 to 24, 2014, hosted by the CSRT in collaboration with the Ordre professionnel des inhalothérapeutes du Québec (OPIQ). Over the course of the three-day conference, posters were displayed in the exhibit hall in two separate competitions: for one respiratory therapist (RTs) and one for students. We had a record number of applications this year, with eight student posters and 17 RT posters being presented. The winning RT poster was from Kathleen Spurr et al, “Creation of a tool for assessing evidence-based decision-making knowledge and use in respiratory therapists”. The winning student RT poster was from Madeline Turkula from the University of Manitoba (Winnipeg, Manitoba) for her poster, “Effectiveness of inpatient smoking cessation programs.”

As evidenced by the abstracts reproduced below, the work of our colleagues in 2014 highlighted current research and practice innovations led by RTs. The editorial board looks forward to receiving these manuscripts for consideration for publication in the Canadian Journal of Respiratory Therapy. Please note that these abstracts have not been peer-reviewed.

RT POSTER ABSTRACTS

COMPETITION WINNER

RTP01
CREATION OF A TOOL FOR ASSESSING EVIDENCE-BASED DECISION-MAKING KNOWLEDGE AND USE IN RESPIRATORY THERAPISTS
K Spurr1,2, G Dechman3, K Lackie4, R Gilbert1
1School of Health Sciences, Dalhousie University; 2Capital District Health Authority; 3School of Physiotherapy, Dalhousie University; 4RN Professional Development Centre, Halifax, NS
kspurr@dal.ca

The assessment tool consisted of 26 multiple-choice questions that evaluated knowledge and/or skills in five different competencies of EBDM (Table 1). 12,884 healthcare providers were invited to participate in the study. 873 (6.8%) people started the assessment. 471 completed all questions, including 32 respiratory therapists. The mean overall score was 17.7 (out of 26; 68%). There was no significant difference (p>0.10) among professions in overall score on the assessment. The mean score on Domain 5 (applying evidence to clinical practice) was significantly less than the others, with an average score of only 52%.

There was a significant difference between all education levels in overall performance (p<0.001). As the year of completed education went up (more recent), the overall assessment score increased significantly (p<0.0001).

This data suggests that RRTs could benefit from skill development in all EBDM domains, with particular need in Domain 5, applying evidence to clinical practice.

CONCLUSION: This study created a tool that can be used to measure respiratory therapists’ EBDM knowledge and skills. Information gained from using this validated assessment tool will allow us to identify areas in need of development and direct the creation of programs to enhance EBDM skills in respiratory therapists.

TABLE 1
The assessment tool consisted of 26 multiple-choice questions that evaluated knowledge and/or skills in five different domains of EBDM

COMPETENCIES OF EVIDENCE-BASED DECISION MAKING

<table>
<thead>
<tr>
<th>Domain</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Defining a clinical question</td>
</tr>
<tr>
<td>2</td>
<td>Performing a strategic search</td>
</tr>
<tr>
<td>3</td>
<td>Identifying sources of evidence</td>
</tr>
<tr>
<td>4</td>
<td>Appraising the literature/evidence</td>
</tr>
<tr>
<td>5</td>
<td>Applying evidence to clinical practice</td>
</tr>
</tbody>
</table>

RTP02
PEDiATRIc HIgh ACuITY supporT TEAM (PHAST): INITIAL PHASEs AND IMPLEMENTATION WIThIN A smAll URBAN PEDiATRIc HEALTH CENTRE
E Bales BHS: RRT, K Joudrie BScN RN, J Gallant BSc: BScN RN, C Donnelly RN
IWK Health Centre, Halifax, NS
emily.bales@iwk.nshealth.ca

INTRODUCTION: Rapid response teams (RRTs) are comprised of specialized healthcare professionals who deliver high acuity care to the bedside of inpatients experiencing a significant deterioration in clinical status (Massey, Aitken, & Chaboyer, 2010; Wolf, 2007). The structure of the RRT varies between hospitals, but the common competencies include the ability to provide critical care outside of the ICU via: 1) obtaining central venous access, 2) providing advanced airway management, and 3) the prescription and delivery of medications and diagnostic therapies (VanVoorhis & Willis, 2009). The ultimate goal of the RRT is to improve quality of care and health outcomes through the reduction of morbidity and mortality (Massey, Aitken & Chaboyer, 2010; Safer Healthcare Now! The Quebec Campaign, 2009).

OBJECTIVE: At the present time the IWK Health Centre in Halifax, Nova Scotia has not yet implemented a RRT, despite active care delivery to critically ill children. The IWK is restructuring their pediatric critical care program to achieve excellence and improve their healthcare delivery. At the heart of this redevelopment is the formation of a Pediatric High Acuity Support Team (PHAST) Committee to work toward the implementation of a RRT.

PLAN: Through the use of “Getting Started Kit: Rapid Response Teams How-to Guide” (Safer Healthcare Now! The Quebec Campaign, 2009) and additional literary resources, eight steps have been developed to implement PHAST:
1) Identification of a gap in current clinical care provided
2) Formation of an interdisciplinary, collaborative research group
3) Literature review; Family and staff survey; Benchmarking; Obtain staff support
4) Compile data
5) Identify need for PHAST
6) Presentations to key stakeholders
7) Staff the team; Development of policies; Education; Allocation of resources
8) Roll out: activating and evaluating PHAST

FUTURE GOALS: Recently a six-month pilot has been approved by upper level management at the IWK, which will be funded by Pediatric Critical Care. The pilot project will provide an opportunity to collect data, assess and evaluate the function of PHAST at the IWK Health Centre. This is an evidenced-based project with the end goal of providing the best possible care to patients and families.

REFERENCES:

RTP03
COMPLICATIONS INCREASE WITH GREATER THAN ONE ENDOTRACHEAL INTUBATION ATTEMPT: EXPERIENCE IN A CANADIAN ADULT TERTIARY CARE TEACHING CENTRE
LV Duggan MD FRCP, KS Minhas BSc RRT, TI Miller BSc RRT, J Zurba BSc RRT, B Deady MD, R Noseworthy MD, LV Carter BA RN, DE Griesdale MD MPH FRCP, SC Reynolds MD FRCP
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This prospective review/poster was undertaken to better understand out-of-operating room endotracheal tube intubations (ETI) at our hospital. A multi-disciplinary designed collection card was used to record complications of intubations over a 13-month period. Respiratory therapists recorded, collected, and analyzed these data cards. From this review, greater than 1 attempt at ETI was associated with a 4.5-fold increase in severe complications, and a 4-fold increase in total complications. This information is mapping a change in practice and a multidisciplinary team initiative to improve patient care and safety.

RTP04
STANDARDIZING THE USE OF IHALED NITRIC OXIDE IN NICU: EARLY RESULTS FROM A QUALITY IMPROVEMENT INITIATIVE
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BACKGROUND: The primary objective of this study is to compare the use of inhaled nitric oxide (iNO) and common associated neonatal outcomes in our Neonatal Intensive Care Unit (NICU) two years before and one year after implementation of a standardized iNO administration guideline. Implementation of new evidence-based guidelines standardizing the indications, methods of administration, evaluation of response and weaning of iNO in our NICU has resulted in significant reduction in its use without any adverse effects on patient outcomes.

INTRODUCTION: Prompted by unexpectedly high usage, the policy on the use of iNO was revamped in our Neonatal Intensive Care Unit NICU in July 2012. While the indications and dosing of iNO remained unchanged, new policy focused on ‘patient optimization’ prior to initiating therapy, promoted use of functional echocardiography for diagnosis, and developed strict criteria for establishing response to therapy and its subsequent weaning. A year after implementation, data were collected to review the impact of new policy on iNO utilization and overall patient-related outcomes.

METHODOLOGY: All infants treated with iNO at our NICU 4 years before (epoch 1-1st June 2008-31st May 2012) and 1 year after (epoch
2-1st September 2012-31st August 2013) introduction of the new policy were included. Treatment duration of iNO was extracted from our unit's iNO database. Patient demographic and outcomes data were extracted from Canadian Neonatal Network (CNN) database. Overall population characteristics and outcomes for our unit were also compared. Primary outcomes were indices of iNO utilization while common associated neonatal morbidities were considered as secondary outcomes.

RESULTS: During epoch 1, a yearly average (range) number of infants treated and duration on iNO was 27 (21-36) and 1500 (946-2764) hours respectively vs. 21 infants and 581 hours for epoch 2. The yearly median (IQR) iNO use as hours/patient was 36 (13,64), 19 (5,48), 33 (4,90) and 29 (14,79) during epoch 1 vs. 7 (3,22) for epoch 2. In spite of lower iNO utilization during epoch 2, the major patient outcomes remained unaffected. Our unit's overall population characteristics and outcomes also remained unchanged.

CONCLUSIONS: Standardization of the use of iNO in NICU is feasible and may result significant reduction in its use and associated healthcare costs without any worsening of related patient outcomes. iNO therapy should be used judiciously in a manner that is safe, cost-effective and beneficial to patient outcomes.

RTP05
IMPROVING PATIENT CARE BY USING SIMULATION TO EMPOWER HEALTH PROFESSIONAL PRECEPTORS AND MENTORS TO PRACTICE COLLABORATIVELY: A HEALTH WORKFORCE ACTION PLAN (HWAP) PROJECT
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BACKGROUND: Across Alberta, it has become increasingly difficult to secure quality clinical placements for students. Current preceptors and mentors consistently report not having adequate skills for this role, which is exacerbated by the current focus on interprofessional (IP) competency acquisition. Knowing that they lack these skills, preceptors are anxious to role model collaborative practice to students. Research suggests that interactive and reflective learning experiences for preceptors and mentors can optimally be offered through simulation-based education.

GOAL: This project aims to develop a province-wide simulation curriculum to enhance preceptor skills across disciplines, with a focus on interprofessional (IP) competencies. Research questions: Does the simulation intervention improve IP competencies including knowledge, attitudes, and behaviors of preceptors and mentors?

METHODS: Recruited from three zones in Alberta (Calgary, Edmonton and South Zone), professionally diverse staff and physicians (n=75-100) working at medical-surgical units will participate in two 4.5 hour IP simulation workshops. A pilot study (n=21) took place at the Foothills Medical Center Unit 44 (Trauma) from January-February 2014. A pre-post study design will evaluate changes to the three competency measures using validated questionnaires (Teamwork Attitudes Questionnaire, Mayo High Performance Teamwork Scale, McMaster-Ottawa TOSCE) and a developed knowledge test.

RESULTS: The results from the pilot will inform the HWAP curriculum and data collection phase, which will take place from March-August 2014. We anticipate that the results from this study will inform the creation of a provincial wide IP curriculum.

CONCLUSION: If successful, the simulation curriculum will be widely disseminated for preceptor and mentor training across Alberta.

RTP06
SMOKING CESSION IN THE PULMONARY FUNCTION LAB: THE ROLE OF ALLIED HEALTH PROFESSIONALS IN CHRONIC DISEASE MANAGEMENT AND PREVENTION
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BACKGROUND: The Pulmonary Function Lab is a Respiratory Therapist Lead Unit, providing outpatient consultation and diagnostic testing to patients who present primarily with chronic lung diseases. Smoking is often a key risk factor. A gap analysis was conducted based on the Registered Nurses Association of Ontario (RNAO) Best Practice Guideline: Implementing Smoking Cessation into Daily Nursing Practice. The process was initiated to review current practices and to determine areas for improvement. The goal is to promote health through smoking cessation interventions and to prevent early onset COPD in healthy clients who smoke.

METHODS: Utilizing the knowledge-to-action framework, front line staff participated in the development of an action plan to implement minimal smoking cessation. Education for staff included completion of the RNAO e-learning course “Nurses and Other Health Care Professionals Helping Clients Quit Smoking,” a one-day workshop. Brief Counseling Techniques for Tobacco Use Cessation and information sessions were provided by the smokers’ helpline. Three staff members are enrolled in the Centre for Addiction and Mental Health’s TEACH Program. The 4 As (ask, advise, assist, arrange) were added to the patient questionnaire and a letter was sent to community physicians informing them of this service.

DISCUSSION: Engagement of staff and point of care leadership through Best Practice Champions was crucial to success. Physician engagement through increased referrals was not an anticipated outcome and it supports chronic disease management prevention. Data collection through paper documentation audits is time consuming, and adopting electronic documentation is currently being developed.

RESULTS: In a five-month period, screening patients for smoking has increased to 94%. Referrals to the smokers’ helpline increased to include 48% of current smokers, and ex-smokers of less than six months. Physicians are now referring smokers for pulmonary function tests as chronic disease management prevention strategies.

RTP07
INFLUENCE OF HEAT AND MOISTURE EXCHANGER USE ON MEASUREMENTS PERFORMED WITH MANOVACUOMETER AND VENTILOMETER IN HEALTHY ADULTS
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INTRODUCTION: The use of evaluation tools such as manovacuometry and ventilometry is frequent, and disinfection is usually limited to the external surfaces. This is insufficient and raises concerns because of the potential spread of infectious diseases. Hydrophobic heat and moisture exchangers (HME) are used in mechanical ventilation and have microbiological filters that can possibly reduce contamination, increasing the safety of related procedures. It is unknown, however, if the addition of an exchanger to the manovacuometry and pulmonary volumes affects the measurements obtained.

OBJECTIVE: To verify if the use of an HME interferes in maximal inspiratory / expiratory pressures (assessed using the manovacuometer) and vital capacities (evaluated using the ventilometer) in healthy adults.

METHODOLOGY: A controlled transversal trial was carried out. Twenty healthy young adults were included in the study. Vital capacity, maximal inspiratory pressure (MIP) and maximal expiratory pressure (MEP) were assessed with and without the use of an HME. The paired t-test was employed to compare both situations.

RESULTS: No significant difference was found between the values pre- and post-HME use in vital capacity measurements: (3878.8±202.2 mL vs 3925.3±206.0 mL; p=0.116). The same was observed regarding respiratory muscle strength measures MIP (−99.0±8.9 vs −95.5±9.0 cmH2O; p=0.149) and MEP (92.5±7.5 vs 92.5±7.7 cmH2O; p=1.0).

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CONCLUSION: We conclude that the use of an HME does not significantly modify lung volumes and respiratory muscle strength, so they should be used in order to prevent the occurrence of pulmonary infection.

RTP08
DEVELOPMENT OF THE ANESTHESIA ASSISTANT ROLE IN A COMMUNITY HOSPITAL
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INTRODUCTION/OBJECTIVE: In 2012, Halton Healthcare Services (HHS) introduced the Anesthesia Assistant (AA) role to the surgical program. This poster depicts the value of the AA role in a community-based hospital in terms of increasing operating room (OR) efficiency and enhancing patient care.

METHODOLOGY: Data were collected using the INFOmed platform and OR Manager program. Trends were examined over a 3-year period for support of the demand for AAs in the peri-operative environment. Procedures performed by AAs on a daily basis post-implementation were analyzed. Anecdotal evidence was also collected from the interprofessional team.

RESULTS: The results show the addition of the AA to assist the anesthetist has improved the OR efficiency in the areas of safety, patient flow, and availability of the anesthetist (Figure 1). In terms of monitored anesthetic care and pain management, the AA role allows the Anaesthesia Care Team (ACT) to focus on best practice regarding regional anesthesia, safe patient monitoring, and holistic patient care (Figure 2). The integration of the AA role into the evening shift has shown an overall positive effect on the ability of anesthesia to manage caseload afterhours in the OR and in Labor and Delivery (L&D) (Figure 3).

Figure 1) Contributions of AA Role 6 Months Post-Implementation

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Figure 2) Increase in Regional Anesthesia over 3-year period

CONCLUSION: The introduction of the AA role into the peri-operative environment has fostered improvements in efficiency and safety of patients by the AA acting as a clinical extender of the anesthetist.

NEXT STEPS:
1) Continued workload collection of AA roles and responsibilities at HHS to provide a more robust data set for statistical analysis;
2) Expansion of the procedural sedation role outside of the surgical program;
3) Initiation of a regional block room to further facilitate best practice in pain management and improved efficiency of the OR.

RTP09
RESPIRATORY THERAPISTS: DO WE MEASURE UP? EVALUATING OUR PRACTICE
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BACKGROUND: The importance of utilizing a low tidal volume strategy in mechanically ventilated patients has been known since the landmark ARDS network study. Since that time numerous articles have identified barriers to implementing this lung protective strategy. In our critical care units, all ventilated patients are measured and ventilated to a target tidal volume of 6-8 mL/kg of predicted body weight. A daily audit over three years was undertaken to see if this was being done. It was found to ensure the success and sustainability of this practice, it needs to be consistently and reliably tracked with reportable compliance data.

INTRODUCTION/OBJECTIVE: The quantify lung protective ventilation in our units and identify barriers to this practice.

METHODOLOGY: Compliance was measured daily, reviewed and tracked on a monthly basis. All ventilator flow sheets were reviewed. Data was collected for three years, from January 2010 to January 2013 from both sites within our organization.

RESULTS: Initial data reviewed a lower than expected compliance to measuring patients and ventilating to 6-8 mL/kg predicted body weight. Site-to-site fluctuation in compliance rates were noted, and linked to respiratory staff experience in years. Barriers were identified and subsequently addressed. Compliance rates have steadily increased over the three year audit, and now are consistently over 80%.

CONCLUSIONS: With monthly tracking and reporting of compliance data at department huddles, staff meetings, and corporate critical care quality meetings, best practice and adherence to standards is continually emphasised. We now track a number of quality indicators including cuff pressures, PaO2/FiO2 ratios, etc. Evaluative practice has become an important part of our daily operation and has allowed us to be accountable for our practice. The department contribution to the delivery of high quality and safe patient care is clearly evident through our focus on continuous quality improvement.
RTP10
THE IMPLEMENTATION OF AN INTER-PROFESSIONAL MODEL OF PATIENT CARE IN AN ACADEMIC HEALTH SCIENCES CENTER: RESPIRATORY THERAPISTS AS INTEGRAL MEMBERS OF THE TEAM
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INTRODUCTION: With the increasing demand for healthcare services and the call for interprofessional collaboration and teamwork to address these needs, innovative approaches to care delivery are necessary. The Ottawa Hospital Inter-Professional Model of Patient Care (TOH IPMPC©) is one of four building blocks in TOH's system redesign and appears to be the first of its kind. TOH IPMPC© is a set of guiding principles that are centred on concepts of collaborative leadership, shared decision-making, and interprofessional communication. They are flexible enough to be utilized in a variety of health care settings, patient populations, and inter-professional teams.

OBJECTIVES:
1) To share an innovative and unique Interprofessional model of patient care
2) To describe the involvement of respiratory therapy in the development, implementation, and sustainability of TOH IPMPC©

METHODS: TOH IPMPC© was created by patients and healthcare providers (HCPs), including respiratory therapists, and is guided by a steering group that has representation from across the disciplines. It has been implemented with 98 teams across a large academic health science center. Each team reflected on the guiding principles and decided on how these principles are actualized within the team. The team then developed an action plan encompassing the changes to be implemented to meet the guiding principles.

OUTCOMES: The model is being evaluated by a longitudinal study that is utilizing a mixed methods approach to assessing the impact of the model on specific indicators from the perspectives of patients and HCPs. The preliminary findings support an enhanced quality of patient care through improved inter-professional collaboration, staff well-being, and organizational climate.

CONCLUSION: Over 5000 HCPs, including respiratory therapists, have participated in the implementation. The sustainability of the model is being addressed through the continuing leadership of the steering group, dedicated facilitator roles, an interprofessional education program, and interprofessional unit councils.

RTP11
RESP ROUNDS: AN INITIATIVE TO INSPIRE COLLABORATION
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INTRODUCTION: Success in bridging the gap between knowledge and practice requires a means or framework by which knowledge can be translated into practice (1,2). Often, the focus of evidence based practice implementation is from a single profession. There is support however, that inter-professional education and collaborative efforts can enhance knowledge translation and improve evidence based practice (3). The Interprofessional Networking Practice Initiatives in Respiratory Excellence (INSPIRE) is an example of a group of clinicians who recognize the added value of interprofessional education and collaboration. The group was recently established with the aim of improving the quality of respiratory care provided by clinicians involved in respiratory care practices (MDs, RTs, and others).

METHODS: One of the first initiatives of the INSPIRE group was to identify practice gaps, and provide a forum for knowledge translation and practical learning: Respiratory Education Supporting Practice (RESP) Rounds. Subject matter experts are recruited to speak and lead discussion about a particular topic. Sessions are intended to be interactive with questions, discussions and general sharing of experience and information. They

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Figure 1: RESP Rounds is an effective means to engage in education and collaboration.
**ACKNOWLEDGMENTS:** RESP Rounds 1 and 2 were graciously sponsored by the Health Disciplines Professional Practice group at St. Michael’s Hospital.

**REFERENCES:**
3. Zwarenstein M, Reeves S. Knowledge Translation and Interprofessional Collaboration: Where the Rubber of Evidence-Based Care Hits the Road of Teamwork. The Journal of Continuing Education in Health Professions 2006;26(1):46-54

**DISCUSSION:** RESP Rounds has served as a means to eliminate the silos in which clinicians operate. It has brought clinicians who are involved in respiratory care practices in the same room to discuss very specific practice issues. RESP rounds have and will continue to serve as an interactive session with questions, discussion and general sharing of experiences and information. With the identification and discussion of practice gaps, focused working groups have formed to further facilitate closing the gaps.

**CONCLUSION:** Through the INSPIRE group, practice gaps are identified. RESP Rounds serve as a valuable platform to discuss a particular knowledge–practice gap. This initiative is ongoing and will serve as an excellent opportunity for interprofessional education and collaboration.

**FUTURE GOALS:**
1) Capture off-site attendee’s attendance and evaluation
2) Be more inclusive to allied health disciplines and nursing groups
3) Develop more focused interprofessional working groups

**METHODOLOGY:** We decided to use the Model for Improvement, a quality improvement methodology, in our approach to generating a quick reference guide and algorithm for tracheostomy care. Our quality improvement (QI) team, comprised of RTs working in all areas of the hospital, completed 4 PDSA cycles (plan, do, study, act) to generate the guide and algorithm. We collected qualitative data based on surveysing bedside RTs and their response to the quick reference guide and algorithm.

**RESULTS:** Surveys showed an overall positive response to the quick reference guide and algorithm. We used feedback from clinical RTs in PDSA cycle 4 in order to generate our current quick reference guide and algorithm.

**CONCLUSIONS:** Our next PDSA cycle will involve using the quick reference guide and algorithm at the bedside. We will continue to gather qualitative data in the form of feedback from clinicians and use it to further modify the tool. QI framework allows us to engage clinical RTs in developing bedside tools that provide care. This methodology is also advantageous because it allows for continuous changes and evaluation in order to optimize care.

**RTP12 DEVELOPMENT OF A TRACHEOSTOMY STOMA CARE QUICK REFERENCE GUIDE AND ALGORITHM USING A QUALITY IMPROVEMENT METHODOLOGY**

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**INTRODUCTION:** With advances in medical therapies and surgical techniques in the last 20 years, we are seeing increased survival and medical complexity in our infant and pediatric patients, including more patients receiving tracheostomies. Our objective was to generate a quick reference guide for clinicians that would outline the stoma care products available within the hospital and their indications for use. In addition, we also aimed to generate an algorithm to standardize stoma care therapies and products for optimal stoma health.

**METHODOLOGY:** We decided to use the Model for Improvement, a quality improvement methodology, in our approach to generating a quick reference guide and algorithm for tracheostomy care. Our quality improvement (QI) team, comprised of RTs working in all areas of the hospital, completed 4 PDSA cycles (plan, do, study, act) to generate the guide and algorithm. We collected qualitative data based on surveying bedside RTs and their response to the quick reference guide and algorithm.

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**RTP13 KNOWLEDGE TRANSLATION OF EVIDENCE-BASED MEDICINE IN RT: ATTITUDES, KNOWLEDGE, PRACTICE AND PERCEIVED BARRIERS**

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**INTRODUCTION/OBJECTIVE:** Evidence Based Medicine (EBM) is defined as the process in which clinicians systematically evaluate the most recent research to address questions encountered in clinical practice. The use of EBM largely relies on the clinician’s ability to critically evaluate the quality and validity of research, and the suitability of findings for implementation in current practice/patient population. Very few studies regarding RTs’ understanding and views towards EBM have been conducted. As barriers are context dependent, the implementation of strategies to bridge research and practice must be tailored according to the specific barriers identified and their context. Hence, the objectives of the current study were to identify attitudes, beliefs, knowledge and understanding of research, and perceived barriers to implementation of EBM amongst RTs in Ontario.

**METHODOLOGY:** An advertisement placed in the Fall 2013 College of Respiratory Therapists of Ontario (CRTO) and Respiratory Therapy Society Ontario newsletters introduced the study to RTs and provided a link to the self-administered study questionnaire. All RTs registered with the college and employed in Ontario (n = 1808) who received the newsletter were eligible to participate. The BARRIER scale questionnaire from Jette DU et al (2003) and Funk SG et al (1995) was adapted so as to be specific for RT practice. Data were collected from three domains: attitudes and beliefs EBM, perceived barriers to implementation of EBM, and RT background knowledge and understanding of research. Responses to questions regarding subject demographics were computed as frequency counts for categorical data or as means ± standard deviations for continuous data. For these questions using Likert scales, percentage responses for each category were calculated. Responses to open-ended questions were analyzed by the research team to identify any trends/themes.
RESULTS: Of the 294 respondents, the vast majority (76.3%) were females from the Greater Toronto area (54.1%), working full time (76.6%) for an average of 16.2±10.3 years primarily in teaching hospitals (78.4%). There was an equal representation of respondents whose highest level of education was a diploma (44.5%) or bachelor's degree (47.2%). With respect to attitudes regarding EBM, the majority of respondents agreed (39.0%) or strongly agreed (57.5%) that EBM is necessary in the practice of RT and that it improves the quality of patient care (89.6% agreed or strongly agreed) and helps clinicians making decisions about care (79.8%). However, the majority (73.0%) of respondents identified that they need to increase the use of EBM in their daily practice. Barriers to implementation of research could be categorized (from greatest to lowest extent) as: characteristics of the organization (settings, barriers, limitations); characteristics of the adopter (RTs values, skills and awareness); characteristics of the communication (presentation and accessibility); and characteristics of the innovation (quality of the research). The findings from the open-ended questions in the BARRIER scale questionnaire investigating the greatest barriers correlate with the findings from the barriers scale. The top four barriers identified are items that are included in the characteristics of organization: settings, barriers and limitations. Results showed that the majority of RTs hold positive attitudes toward applying EBM in their daily practice. Barriers to remaining updated and applying EBM were identified as was lack of time and skills to gather and analyze information from the literature, and a lack of support from management and other member of the healthcare team to implement new ideas into practice.

CONCLUSION: Identifying factors influencing the knowledge translation of EBM into practice can potentially facilitate development and implementation of appropriate strategies to capitalize on facilitators and address barriers to promote application of EBM in the clinical setting. Intervention(s) can be tailored to address the needs in specific context and collaborative effort would be explored among different institution, community, regulatory body and education facilities.

RTP15

ASSESSING THE UTILIZATION OF THE AIR QUALITY HEALTH INDEX (AQHI) BY VULNERABLE POPULATIONS IN A “LOW RISK” REGION: A PILOT STUDY

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1School of Health Sciences, Dalhousie University; 2Capital District Health Authority; 3Nova Scotia College of Respiratory Therapists, Halifax, NS

INTRODUCTION: A number of studies have shown a relationship between exposure to outdoor air pollution and adverse health effects, and people with specific chronic diseases appear to be particularly vulnerable. An important opportunity exists for respiratory therapists to inform at-risk clients, especially those with lung disease, about outdoor air pollution and its role in self-management.

The Air Quality Health Index (AQHI), a national program led by Health Canada and Environment Canada, is intended to inform individuals about the level of health risk associated with air pollution in Canadian communities, and to provide a tool to manage those risks.

The main purpose of this study was to assess the utilization of the AQHI by vulnerable populations in a “low risk” (AQHI of 3 or less) region. The specific objectives were: 1) to develop and evaluate an AQHI education strategy; 2) to investigate if awareness of the AQHI impacts self-management in vulnerable populations in low risk regions; and 3) to identify enabling factors and/or barriers concerning use of the AQHI by both healthcare professionals and their patients.

METHODOLOGY: A pilot study was conducted using a small convenience sample of clients/patients and educators at respiratory clinics across Nova Scotia. A short educational activity on the utility and application of the Air Quality Health Index (AQHI) was incorporated into their regular clinical practice. Data related to enablers and barriers to accessing AQHI information was sought. The AQHI educational program was related to improvements in knowledge and application of AQHI information. The AQHI educational program was evaluated using a brief questionnaire investigating the greatest barriers to utilizing the AQHI by vulnerable populations in low risk regions.

RESULTS: Twenty-one clients from three respiratory clinics consented to participate in the study and received the AQHI education program. Using a Wilcoxon signed-rank test with paired data, five of six survey questions had statistically significant changes in response to pre- and post-education.

Some common themes that emerged from qualitative data collected included: limited access to the Internet; lack of its reporting in the media; confusion with other indices; and relevancy of the AQHI in Nova Scotia, a “low risk” region.

CONCLUSION: An AQHI educational program improved knowledge and utilization of the AQHI reported by respiratory clinic patients. Respiratory educators reported the AQHI education program was relatively simple to implement into their chronic disease education plan. A larger scale study involving participants living in a moderate or high-risk region is recommended.

RTP16

EMERGENCY DEPARTMENT ASTHMA CARE PATHWAY

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ABSTRACT: The Emergency Department Asthma Care Pathway (EDACP) is an evidence-based guide to managing asthma in emergency departments (ED). The EDACP is an initiative within the Asthma Program (AP), an integrated asthma strategy for Ontario. Beginning in 2009, the Ontario Lung Association assembled an interdisciplinary content expert working group to develop a pediatric pathway (P-EDACP) with 5 key priorities in mind. These are 1) Assessment of exacerbation severity, 2) Evidence-based treatment, 3) Patient education prior to discharge, 4) Comprehensive discharge instructions, and 5) Follow-up treatment. Evidence-based pathways for ED’s have been designed to prompt best practice guidelines across all emergency departments in Ontario with consistency.

INTRODUCTION/OBJECTIVE: A coroner's inquest following an asthma-related teen death led to the creation of an integrated asthma strategy for Ontario called the Asthma Program (AP). One of the 13 AP initiatives, the EDACP is an evidence-based care pathway for managing acute asthma in Ontario EDs.
METHODS: A multidisciplinary steering committee guided adult and pediatric expert content working groups in developing an Adult (A) and Pediatric (P) EDACP. Key priorities guiding deliberations were: assessment of exacerbation severity, evidence-based treatment, patient education prior to discharge, comprehensive discharge instructions, and follow-up arrangements. Following pilot implementation in 2006, the A-EDACP was disseminated across Ontario from 2008-2011. To incorporate new evidence, the A-EDACP was revised in 2012. Development of (P) EDACP began in 2009, with pilot implementation commencing in late 2012.

RESULTS: EDACP tools include: pre-printed physician orders, medication guidelines, education checklists, and discharge instructions. To address treatment delays noted during the A-EDACP implementation, both pathways now include a medical directive to authorize administration of bronchodilators and systemic corticosteroids prior to physician assessment.

CONCLUSIONS: Evidence-based ED pathways for pediatric and adult asthma have been designed to promote best practice in any ED setting. Hospital leads and stakeholder organizations are being engaged to pursue a comprehensive strategy to guide dissemination and implementation support for both pathways. For more information and to access the Pathways please go to www.on.lung.ca/edacp.

RTP17
COMPARISON OF THE SET AND MEASURED PRESSURES WHEN USING THE NEOTECH™ RAM CANNULA IN A NEONATAL TEST LUNG MODEL
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BACKGROUND: Many different devices have been developed and used to deliver continuous positive airway pressure (CPAP) to the neonate. Currently, the variable flow generator (Sipap) is the primary device of choice over Heated High Flow Nasal Prongs (HHFNP), since they do not have a mechanism to monitor or regulate the generation of excessive positive airway pressure. A new interface, the Neotech RAM Cannula, is now available to use as a nasal CPAP device for our neonates. It is suspected that the design of the Neotech RAM Cannula may have an increase in resistance to gas flow resulting in the attenuation of set CPAP and flow rate delivered to the patient.

OBJECTIVES: There have been many centers trialing the Neotech RAM Cannula with limited evidence supporting this therapy. Little research has been done to quantify this attenuation in pressure and flow. The current study aims to shed light on actual flow rate and pressure delivered to the patient through a series of bench testing using a variety of neonatal ventilators available on the Canadian market. This poster presents the findings from the bench testing and aims to aid clinicians in clinical decision making when using the RAM Cannula interface in providing NCPAP with the use of a mechanical ventilator.

METHODS: Flow and pressure testing was performed with all three available sizes of Neotech RAM Cannula; the preemie size suggested for patients less than 1000 grams, the newborn size recommended for patients 1000-2500 grams, and the infant size for patients greater than 2500 grams. The inner and outer diameter of the tubing and the inner diameter of the prongs were measured for each RAM Cannula size. All three sizes were used and measurements were obtained from four different models of mechanical ventilators available to the research team at Surrey Memorial Hospital and BC Children’s Hospital including: CareFusion Avea® Ventilator, Maquet Servo-I® Ventilator, Heinen und Löwenstein Leoni Plus Ventilator and the Dräger Babylog® VN 500 Ventilator. The following pictures depict the flow measurement system (Figure 1) and pressure test lung system (Figure 2) developed.

RESULTS: Overall, with regards to the measured pressures, the combination of using the infant prongs with the Avea yielded the largest difference between the set and measured pressure, where the measured pressure was far lower than the set NCPAP. The mean pressure measured 0 cmH2O when set at 5 cmH2O up to a mean measured pressure of 1.33±0.58 cmH2O when set at 10 cmH2O. On the other hand, the combination of using the newborn sized prongs with the Servo-I ventilator showed the smallest discrepancy between set and measured pressures. The mean pressure measured 3.02±0.3 cmH2O at a set pressure of 5 cmH2O up to a mean measured pressure of 8.00±0.2 cmH2O at a set pressure of 12 cmH2O. When comparing ventilators alone, the use of the Avea ventilator showed the greatest attenuation of pressure across all prong sizes while the Servo-I had the smallest attenuation in pressure. When considering prong sizes alone, the infant sized prongs yielded the greatest difference in pressure while the newborn sized prongs showed the smallest difference between set and measured pressures. (Figure 3 & Figure 4)

Figure 1) Flow from vent

Figure 2) Flow from vent

Figure 3) Comparison of Set CPAP vs Measured CPAP on Premie Sized RAM Cannula
With respect to the actual flow exiting the RAM Cannula is far less than the displayed base flow on the ventilator. This was true with the use of all three available sizes of the RAM Cannula across three of the four ventilators in this study. As the size of the prongs increase the attenuation of flow decreased; that is, as the size of the prongs increase, a smaller difference between the measured and base flow was observed.

**DISCUSSION:** As hypothesized, the attenuation of flow is likely attributed to the tapering of the inner diameter of the prongs from the 5 mm tubing to the prong openings, which are 4 mm in diameter. With respect to pressure measurements, the greatest discrepancy in pressure (across all prong sizes) was seen with the Avea ventilator while the smallest differences was observed with the Servo-I ventilators. When comparing between the size of the RAM Cannula, the infant sized prongs showed the largest decrease in pressure across all ventilators, while the Newborn sized prongs showed the smallest difference in set and measured pressures. The large difference in pressure seen in the Avea in combination with the infant prongs may be attributed to the sheer size of the infant prongs and the requirement of at least a 50% leak around the prongs for exhalation. These results hint at the fact that patient selection might be a key factor in the success of RAM cannula use. The selection of the ventilator is key as well, seeing how each machine operates uniquely.

Limitations of this study include the following. Due to the design of the flow and pressure measurement systems, minute leaks may be present around the waterproof tape and Cannulaide used. However, these leaks are likely minimal and negligible and would not largely affect the results. Another limitation is that the current test lung system fails to mimic conditions during which the infant’s mouth is opened creating a large leak. Lastly, the digital pressure manometer used only offers measurements in whole integers, hence small pressure changes fails to be detected.

**CONCLUSION:** RAM cannula can be used effectively in neonates to provide CPAP if the limitations of the interface and the ventilator are understood. There is potential for a substantial loss in pressure and flow across all sizes of the RAM cannula, and it may be necessary to increase set pressures much higher than normal to achieve a desired measured CPAP. If the clinicians can understand these limitations and provide therapy within reasonable and patient-specific parameters, RAM cannula can be effective and possibly even more comfortable than conventional CPAP delivery devices.

**RESULTS:** The literature presents a strong relationship between the uses of in-hospital behavioral counselling with follow-up support and smoking cessation rates. This effect on smoking cessation rates is even more profound when combined with the use of pharmacotherapy. The primary outcome of this review was increased smoking cessation rates at six months after initiation of intervention.

**CONCLUSION:** For hospitalized patients who smoke, inpatient smoking cessation programs are effective (as represented by smoking cessation rates at six months compared to no inpatient smoking cessation programs).

**SP01**
**EFFECTIVENESS OF INPATIENT SMOKING CESSATION PROGRAMS**
M Turkula SRT, A West MAppSc DipPH RRT
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**BACKGROUND:** Smoking remains one of the major causes of cancer, respiratory diseases such as COPD, cardiovascular disease, and many other chronic health conditions, preventable diseases and death. Twenty percent of hospitalized patients are smokers. Hospital smoking bans and access to resources provide an opportune moment to implement in-patient cessation education programs.

**OBJECTIVE:** The objective of this review is to determine the effectiveness of in-patient smoking cessation programs for hospitalized patients who smoke. It is believed that behavioral intervention initiated during the hospital stay increases smoking cessation rates, especially when combined with pharmacotherapy. In addition, more intensive behavioral intervention with follow-up support after discharge is more likely to increase smoking cessation rates in comparison to no intervention.

**METHODS:** A systematic literature review was conducted to evaluate the effectiveness of in-patient smoking cessation programs on hospitalized patients with varying admission diagnoses. Search strategies were limited to randomized control trials to minimize the risk of bias in data included. Interventions of interest were behavioral counselling, the use of pharmacotherapy, as well as follow-up support. The primary outcome of this review was increased smoking cessation rates at six months after initiation of intervention.

**RESULTS:** The literature presents a strong relationship between the uses of in-hospital behavioral counselling with follow-up support and smoking cessation rates. This effect on smoking cessation rates is even more profound when combined with the use of pharmacotherapy.

**CONCLUSION:** For hospitalized patients who smoke, inpatient smoking cessation programs are effective (as represented by smoking cessation rates at six months compared to no inpatient smoking cessation programs).
CONCLUSIONS: Long-term oxygen therapy programs have been proven to be cost effective as they increase survival time in some individuals. However, in order for the oxygen to have an effect, it must be used continuously on patients with severe hypoxemia.

SP03
EFFICACY AND COMPARISON OF NON-INVASIVE MECHANICAL VENTILATION THERAPY IN CARDIOPULMONARY EDEMA
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OBJECTIVE: To discuss the effectiveness of CPAP and NIPPV in the treatment of acute cardiogenic pulmonary edema, and the potential role of BNP in these two methods.

METHODS: A systematic review was conducted to evaluate the effectiveness of non-invasive mechanical ventilation therapy in the treatment of cardiogenic pulmonary edema, and to compare the differences between CPAP and NIPPV. A literature search was conducted using PubMed, EMBASE and Scopus, looking at results from the past 10 years (2004-2014) and using the following keywords: “Non-invasive”, “mechanical ventilation”, “CPAP”, “NIPPV”, “BiPAP”, “Bi-level”, “cardiogenic pulmonary edema”, “brain natriuretic peptides”, “heart failure”, “randomized controlled”, and “meta-analysis”.

RESULTS: A total of 33 RCT or meta-analysis articles were used in the review. The majority of the studies support non-invasive ventilation therapy as having the most benefit to patients. The evaluation indicators included short-term mortality, rate of endotracheal intubation and invasive ventilation, and length of hospital stay and ICU stay. The results differed when comparing CPAP and NIPPV. Most authors found no difference between the two methods, but some recent results showed NIPPV to have more benefits than CPAP. During the research it was noted that most of the studies lacked a biomarker as a prognostic indicator when analysing the difference between CPAP and NIPPV. Three studies showed the level of BNP continuing to increase as the ACPE progressed, and decreasing with remission of symptoms accompanied by the treatment, including non-invasive mechanical ventilation.

CONCLUSION: Most of the clinical research provided evidence to support the benefits of CPAP and NIPPV in the treatment of acute cardiogenic pulmonary edema. However, evidence shows that home-based programs could achieve the same results as those based in hospitals under specific conditions. These findings should make PR for COPD patients more accessible in Canada.

SP05
THE IMPACT OF EXTRACORPOREAL MEMBRANE OXYGENATION (ECMO) ON MORTALITY AND NEUROLOGICAL OUTCOMES FOR ADULTS IN CARDIOPULMONARY ARREST IN AND OUT OF HOSPITAL COMPARED TO CONVENTIONAL CPR
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BACKGROUND: Cardiopulmonary arrest is a major cause of death for adults with approximately 40,000 cardiac arrests occurring each year in Canada. The gold standard for cardiac arrest is cardiopulmonary resuscitation, but it has poor outcomes for many patients. The use of extracorporeal membrane oxygenation may help improve survival and outcomes.

OBJECTIVES: To investigate if extracorporeal membrane oxygenation (ECMO) decreases mortality and improves neurological outcomes for adult patients in hospital or brought into hospital (out-of-hospital) with cardiopulmonary arrest, compared to conventional cardiopulmonary resuscitation.

METHODS: Articles were searched through the electronic databases of PubMed and Scopus, which were restricted to English-only full texts.
CONCLUSIONS: The use of extracorporeal membrane oxygenation is supported by research when patients are unresponsive to conventional cardiopulmonary resuscitation in- or out-of-hospital. Further research is needed to determine if extracorporeal membrane oxygenation improves outcomes for patients responding to conventional cardiopulmonary resuscitation.

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SP06 METHODS OF TITRATING OPTIMAL PEEP IN ARDS PATIENTS
C Male GRt
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BACKGROUND: Acute Respiratory Distress Syndrome (ARDS) is characterized by the acute onset of hypoxemia, bilateral infiltrates that are consistent with pulmonary edema, and no clinical evidence of left heart failure. In the patient population, mechanical ventilation can be a lifesaving intervention, but also has the potential to induce further lung injury such as barotrauma, volutrauma, atelectrauma, and biotrauma. Inappropriately set PEEP can result in increased deadspace, reduced compliance, hemodynamic compromise, inflammation, shear stress, overdistention, and atelectasis.

OBJECTIVE: The ARDSnet Ventilation Protocol traditionally utilized an oxygenation goal to titrate a level of PEEP and fraction of inspired oxygen (FIO2) guided by a PEEP table. This method of titrating PEEP does not take into account individual patient lung mechanics and has the potential to worsen ventilator-induced lung injury (VILI) in some patients rather than provide benefit. This review’s purpose is to examine existing, recent literature regarding alternative optimal PEEP titration methods in ARDS patients and discuss a possible future PEEP trial.

METHODOLOGY: A total of 17 current (2007-present) scholarly, peer-reviewed journal articles collected from November 2013 to March 2014 were reviewed.

RESULTS: Five alternative PEEP titration methods were discerned, including incremental and decremental PEEP titration based on optimization of deadspace and static respiratory system compliance, PEEP set corresponding to a stress index range of 0.9-1.1, PEEP set at the level of the expiratory limb inflection point of the pressure-volume (P-V) loop, and PEEP set to achieve a transpulmonary pressure of ≥5 cm by estimating pleural pressure on end expiration utilizing esophageal balloon manometry.

CONCLUSIONS: Although valuable physiologic data has been attained based on these PEEP trials, they lack external validity based on inadequate sample sizes. Due to the multitude of physiologic parameters PEEP has the capability to affect if inappropriately set, future large-scale randomized controlled PEEP trials are necessary to further investigate how to set optimal PEEP and demonstrate its potential benefit toward patient outcomes when set correctly.

SP08 CYSTIC FIBROSIS AND THE NEW DRUGS
C Sullivan SRT
Respiratory Therapy Program, Fanshawe College, London, ON c_sullivan5@fanshaweonline.ca

BACKGROUND: Cystic fibrosis (CF) is a group of genetic disorders characterized by defective or absent chloride channels, which results in unusually viscous secretions and respiratory and gastrointestinal morbidity. Traditionally, a wide regimen of drugs has been used to treat individual symptoms. Now, genotyping and acknowledging the structure and function of the CF transmembrane regulator (the main chloride channel implicit in CF pathology) is enabling pharmaceutical developers to target the cause.

INTRODUCTION: To provide an overview of drugs used for treating cystic fibrosis as a channelopathy and their clinical efficacy, as well as their status as orphan drugs, concomitant costs, and the social justice issues associated with making them financially accessible to patients.

METHODOLOGY: The five classes of CF genetic mutations were reviewed, which correspond to altered function in the CF transmembrane regulator (CFTR, the primary chloride channel). Research was summarized on how different approaches are necessary to treat different CF genotypes (i.e. G551D only needs a potentiator to activate faulty chloride ion channels already present on the cell surface). Approaches still in development were also reviewed (upregulating alternative chloride ion channels, stop-codon inhibitors, protein stabilizers). Finally, the drug Ivacaftor was researched (approved Nov 2012 by Health Canada) including its clinical efficacy, and financial barriers to its use.

RESULTS: Randomized, double-blind, placebo-controlled, phase III clinical trials prove Ivacaftor to be effective in CF patients over 12 years of age who carry the G551D allele. It causes substantial increases in % predicted FEV1 and weight gain, and decreases in pulmonary exacerbations, hospitalization, and sweat chloride levels.

CONCLUSIONS: Ivacaftor is effective in treating patients with the G551D mutation, and stabilizes CF symptoms in patients whose bodies are already compromised by years of the disease. It has the further potential, pending pediatric trials, to prevent the CF disease process. It is available in many countries through public healthcare, but is only accessible in Canada through private insurance, making this a social equity issue that concerns us directly as respiratory clinicians.
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2014


August 17-20, Ottawa, Ontario: 147th Annual Meeting of the Canadian Medical Association. Contact the Canadian Medical Association, 1867 Alta Vista Drive, Ottawa, Ontario K1G 5W8. Telephone 888-855-2555 / 613-236-8864, e-mail cmamsc@cma.ca, website www.cma.ca/aboutcma/annualmeeting

September 6-10, Munich, Germany: European Respiratory Society (ERS) International Congress 2014. Contact the ERS Headquarters, 4, Avenue Ste-Luce, Lausanne, CH 1003, Switzerland. Telephone 41-21-213-0101, fax 41-21-213-0100, e-mail info@ersj.org.uk, website www.erscongress.org

September 17-21, Vancouver, British Columbia: The 2014 Canadian Surgery Forum. Contact the Canadian Surgery Forum, 421 Gilmour Street, Suite 300, Ottawa, Ontario K2P 0R5. Telephone 613-822-5977, fax 613-249-3326, e-mail cboland@cags-accg.ca, website www.canadiansurgeryforum.com

October 1-4, Calgary, Alberta: Canadian Society of Internal Medicine 2014 Annual Meeting. Contact the Canadian Society of Internal Medicine, 421 Gilmour Street, Suite 300, Ottawa, Ontario K2P 0R5. Telephone 613-422-5977, fax 613-249-3326, e-mail info@csim.ca, website www.csim.ca

October 15-18, Geneva, Switzerland: 2015 European Lung Cancer Conference. Contact the European Society for Medical Oncology, Via L, Taddei 4, Lugano, Ticino 6902, Switzerland. Telephone 41-91-973-1900, fax 41-91-973-1902, e-mail esmo@esmo.org, website www.esmo.org


2015

April 15-18, Geneva, Switzerland: 2015 European Lung Cancer Conference. Contact the European Society for Medical Oncology, Via L, Taddei 4, Lugano, Ticino 6902, Switzerland. Telephone 41-91-973-1900, fax 41-91-973-1902, e-mail esmo@esmo.org, website www.esmo.org
TUDORZA GENUAIR demonstrated a statistically significant improvement in lung function (morning pre-dose [trough] FEV₁) at 24 weeks vs. placebo (TUDORZA GENUAIR 400 mcg BID, 55 mL vs. placebo, -73 mL, p<0.0001)²,³†
**Indication & clinical use:**

SEEBRI* BREEZHALER* (glycopyrronium bromide) is indicated as a long-term once-daily maintenance bronchodilator treatment in patients with chronic obstructive pulmonary disease (COPD), including chronic bronchitis and emphysema.

- Not indicated for the relief of an acute deterioration of COPD
- Can be used at the recommended dose in elderly patients 65 years of age and older
- Should not be used in patients under 18 years of age

**Contraindications:**

- Hypersensitivity to glycopyrronium or to any other component of SEEBRI* BREEZHALER*

**Relevant warnings and precautions:**

- Not indicated for treatment of acute episodes of bronchospasm
- Not indicated for treatment of acutely deteriorating COPD
- Caution in patients with narrow-angle glaucoma
- Caution in patients with urinary retention
- In severe renal impairment (estimated GFR <30 mL/min/1.73m²), use only if the expected benefit outweighs the potential risk
- Risk of paradoxical bronchospasm: discontinue immediately

**For more information:**

Please consult the Product Monograph at www.novartis.ca/SeebriMonograph for important information relating to adverse events, drug interactions, and dosing information which have not been discussed in this piece. The Product Monograph is also available by calling the Medical Information department at 1-800-363-8883.

**References:**

6. RAMQ, June 1, 2013.