



CANADIAN SOCIETY OF RESPIRATORY THERAPISTS
SOCIÉTÉ CANADIENNE DES THÉRAPEUTES RESPIRATOIRES

Poster Abstracts from the 2017 Conference of the Canadian Society of Respiratory Therapists

We are pleased to present abstracts from the posters that were displayed at the CSRT Annual Education Conference in Halifax, Nova Scotia, on 11-13 May 2017. Over the course of the conference, posters were displayed in the exhibit hall in two separate competitions: one for respiratory therapists (RTs) and one for students.

The winning RT poster was from Julie Brown et al., "Does an E-learning Module Improve Health Science Students' Venipuncture Skills?" The winning student RT poster was from Susan Abdo from Dalhousie University, School of Health Science, Respiratory Therapy, for her poster, "A Selective-Binding Agent in Replacement of Anticholinesterase Inhibitors for the Reversal Neuromuscular Blockade." Congratulations to everyone who participated!

As evidenced by the abstracts reproduced below, the work of our colleagues in 2017 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 Please note that these abstracts have not been peer-reviewed.

RESPIRATORY THERAPY POSTER COMPETITION ABSTRACTS WINNER

DOES AN E-LEARNING MODULE IMPROVE HEALTH SCIENCES STUDENT'S VENIPUNCTURE SKILLS?

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The development of psychomotor skills and the confidence associated with performing professional tasks are key milestones for health sciences students. Traditionally, these students are provided with lectures, readings, and limited simulated lab time in the didactic component of their education. Due to heavy course loads it is difficult to provide one-on-one training for all students and to ensure that this training translates into strong professional competence. We have therefore created an E-learning module to be used in conjunction with traditional didactic education for a common healthcare skill: venipuncture. There is limited research on the effectiveness of E-learning modules in developing psychomotor skills for health sciences students and practitioners; our goal is thus to evaluate the effectiveness of our supplementary module in traditional didactic programs. Students from these programs at Fanshawe College will be recruited and randomly assigned to a control or a study group. Students will be scored based on three main components: (1) psychomotor skills, (2) level of confidence, and (3) academic competence. We hypothesize that the study group will outperform the control group in all three areas of evaluation. Overall, this work will provide insights into the utility of E-learning in helping students achieve key competencies required in their future professions.

DOES THE DELIVERY OF VARIOUS FLOW RATES FROM A HIGH-FLOW NASAL CANNULA DECREASE PEAK INSPIRATORY FLOW RATES MEASURED AT THE AIRWAY OPENING OF HEALTHY ADULT SUBJECTS?

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High-flow nasal cannula (HFNC) can improve oxygenation due to small increases in end-expiratory pressure and fixed inspired oxygen fractions. Pressurized metered dose inhalers (pMDIs) improve aerosol deposition when combined with valved holding chambers (chambers). Anecdotal observations suggest some patients receiving HFNC cannot produce efforts necessary to open chamber one-way valves; however, removing HFNC for pMDI may cause alveolar derecruitment and oxygen desaturation. In an independent, observational correlational study, a relationship between HFNC and peak inspiratory flow rate (PIFR) through the mouth was sought. Post baseline PIFRs, HFNC was applied, PIFR was then repeated at 10, 30, and 60 L/min HFNC. American Thoracic Society (ATS) standards were used; goal for in-test reproducibility of PIFR was set at 5%; average attained was 2.9%, (SD = 0.025). Numerical data disprove our hypothesis that flow from HFNC would have a dampening effect on PIFR (findings revealed average PIFRs at baseline were lower than at 60 L/min); however, less data were collected as HFNC flow rates increased. Spirometer error occurred with some subjects; specifically, the "Perform Maximal Inspiration at Any Time" error message was produced and inspiratory flow/volume would not be measured during FIVC. Prior to HFNC application, all (n = 31) completed baseline FIVC maneuvers without error; error occurred with HFNC only. Subjects who could not be measured at any given flow rate were female (n = 13) and, on average, were shorter in height than those who didn't error (n = 18). Researchers believe the frequent error indicated that

flow/pressure from HFNC was sensed by the pneumotach on the subject side (where a valved chamber would be) rendering FIVC unmeasurable. As HFNC flows increased, observations of air leaving the mouth increased. While significance of observations are unclear, further investigation is warranted; guidelines for HFNC in combination with pMDI do not exist. Anecdotal observations suggest their combination may be ineffective.

VENTILATOR ASSOCIATED EVENTS IN A PEDIATRIC INTENSIVE CARE UNIT: APPLYING THE 2013 CENTERS FOR DISEASE CONTROL AND PREVENTION VAE DEFINITIONS

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BACKGROUND: Ventilator associated pneumonia (VAP) is a common hospital-acquired infection. In 2013, the CDC introduced new VAP criteria providing a more objective approach to defining VAP. The criteria were amended for adults but not for the pediatric population.

OBJECTIVE: To identify if patients admitted to SickKids diagnosed with VAP using established pediatric CDC definitions would fulfill VAP criteria according to newly introduced 2013 CDC VAE algorithm. To compare how this categorization affects clinically relevant outcomes.

METHODS: A retrospective chart review of children diagnosed with VAP from January 2006 to December 2015. Subjects identified from an infection control database included patients from a cardiac and general pediatric ICU. Patients were excluded if on high frequency ventilation, ECMO support, or re-intubated 24 hours following extubation. Primary outcome; proportion of subjects who fulfilled the updated VAP criteria. Secondary outcome; comparison of length of stay (LOS) in ICU, hospital and length of mechanical ventilation (MV). Student t test was used for between group comparisons.

RESULTS: A total of 325 subjects were identified with 279 meeting eligibility for review. Forty six subjects were excluded. According to the VAE algorithm $n = 58$ (21%) met VAC; $n = 53$ (19%) met IVAC; $n = 52$ (19%) met VAP and $n = 5$ (2%) met the VAE criteria. Failure to fulfill the new definitions was based on inadequate increase in positive end expiratory pressure or fraction of inspired oxygen. An independent t test showed no significant difference in ICU and hospital LOS and length of MV between those with the established definition and the new CDC criteria. **CONCLUSION:** Only a minority of children with VAP diagnosis under the established pediatric criteria met the updated, adult-based diagnostic criteria. The updated criteria also failed to provide stronger associations with clinically relevant outcomes. This work suggests that additional studies are required before new definitions for VAP are introduced for children.

THE HYPOXIC DRIVE MYTH

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INTRODUCTION: The Hypoxic Drive Theory started in 1949, when Davies and Mackinnon wrote an article describing the neurological effects of patients with emphysema who were given high concentrations of oxygen. Since then many health care workers live in fear of patients with the hypoxic drive. Should they? That depends on if you still believe in the hypoxic drive. If you do, it prompts some questions; why don't all retainers stop breathing when given high levels of oxygen, why are do some people believe retainers don't exist, why do some people give them too much oxygen no matter what? These are questions addressed in this literature review.

OBJECTIVES: To understand the relationships of the neurological basis of breathing, chemoreceptors, ventilation perfusion mismatch and the Haldane effect. To explain the physiology of patients who are chronically hypercapnic and their response to breathing 100% oxygen. To offer

explanations as to why some patients who are chronically hypercapnic become more hypercapnic.

METHODS: The literature was reviewed for articles on "COPD and hypoxic drive", and "COPD and oxygen-induced hypercapnia". Studies were reviewed if they looked at the response of retainers breathing 100% oxygen, while not receiving any assisted ventilation.

RESULTS: Four articles were found looking at patients who are chronically hypercapnic and their response to breathing 100% oxygen. All four studies showed PCO_2 increased when patients were asked to breathe 100% oxygen. The studies noted inconsistent response of minute ventilation, respiratory rate and PO_2 . All studies found at the end of the exposure to 100% oxygen that the changes in the above parameters were not significant enough to explain the rise in PCO_2 .

CONCLUSIONS: Research since 1980 has shown that when patients who are chronically hypercapnic are given 100% oxygen to breathe their drive to breathe remains intact. These articles do not support the explanation that patients who are chronically hypercapnic are given 100% oxygen to breathe will have a decreased drive to breathe. Thus, the explanation for hypercapnia must be due to another mechanism that causes the buildup of CO_2 and interferes with the ability of a retainer to remove CO_2 . Therefore, these patients are considered to have Oxygen-Induced Hypercapnea, not a loss of hypoxic drive.

DOES TIMING OF TRACHEOSTOMY INFLUENCE OUTCOMES IN THE CRITICALLY ILL?

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BACKGROUND: Tracheotomy is one of the most commonly performed interventions on critically ill adults; however, optimal timing for tracheostomy in this patient population remains controversial.

OBJECTIVE: To investigate whether mortality rates and the incidence of ventilator-acquired pneumonia are decreased with early tracheostomy as compared to late tracheostomy.

METHODS: A systematic search was conducted on databases Pubmed and CINAHL in adherence with PRISMA guidelines for randomized controlled trials that evaluated and compared patients managed with early versus late tracheostomy. Data were obtained on outcomes of interest: mortality rates and VAP.

RESULTS: Out of 67 studies identified in the initial search, five studies were included in the systematic review including a total of 2314 patients. There was no significant reduction in 30 to 90-day mortality between early versus late tracheostomy patients. No effective conclusions could be made on the incidence of VAP in early versus late tracheostomy patients.

CONCLUSION: Early tracheostomy performed within 7 days of the initiation of mechanical ventilation was not associated with a reduction in mortality rate as compared to late tracheostomy performed between days 8 and 15. The effect of tracheotomy timing on the incidence of VAP varied between individual studies and therefore, no definite conclusions were drawn. Based on the results within individual studies the ideal timing for tracheotomy remains challenging to determine.

A SOCIO-CULTURALLY INFORMED INSTRUCTIONAL DESIGN FRAMEWORK FOR CLINICAL SIMULATION IN RESPIRATORY THERAPY

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BACKGROUND: Socio-cultural perspectives on learning suggest that instructional design in clinical simulation should maintain focus on supporting learner cognition with technology-enhanced learning strategies

rather than expecting that learning occurs as a result of any particular technology. While existing instructional design frameworks in respiratory therapy often encompass a variety of complex environmental design factors, they do not fully address the integrated nature of learning, technology, and the environment. Moreover, technologically oriented conceptualizations of fidelity continue to emerge in clinical simulation practice and research, without considering socio-cultural theories of learning in complex learning environments.

OBJECTIVE: Adopting the perspective that a shift in theoretic lens from individualistic to a more socio-cultural orientation may better support our understanding of learning through simulation in respiratory therapy education, we propose an enhanced instructional design framework.

DESCRIPTION OF INNOVATION: Building on the conceptual framework for instructional design developed by the Canadian Network for Simulation in Healthcare (Chiniara et al., 2013), this enhanced framework incorporates the attributes of the learners' experience with the technology, addressing the physical, semantical, and phenomenal aspects of fidelity. This enhanced instructional design framework recognizes the joint learning relationship that exists between learners and simulation environments, and highlights how designs that foster this relationship can enhance simulation fidelity. A practical implementation algorithm of the framework is provided to assist simulation practitioners in taking socio-cultural perspective into their educational designs.

IMPACT: This enhanced instructional design framework is augmented by a socio-cultural definition of fidelity and informed by educational theory on knowledge-building in technology-enhanced learning environments. The framework will be useful in fostering the relationships that support an effective clinical simulation learning environment. This will be of particular value to instructional designers, researchers, theorists, and practitioners in the clinical simulation-based respiratory therapy education field.

STUDENT POSTER COMPETITION ABSTRACTS WINNER

A SELECTIVE-BINDING AGENT IN REPLACEMENT OF ANTICHOLINESTERASE INHIBITORS FOR THE REVERSAL NEUROMUSCULAR BLOCKADE

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BACKGROUND: Post-operative residual curarization (PORC) occurs in 60% of anesthetized patients. The morbidly obese undergoing neuromuscular blockades for surgical procedure are at a higher risk of undergoing post-operative complications like PORC attributed to insufficient reversal of induced paralysis. New emerging agents for the reversal of neuromuscular blockade, such as the selective binding agent, sugammadex, may prove to be more efficient in providing a faster and more permanent reversal of paralytics than traditional anticholinesterase inhibitors such as neostigmine.

RESEARCH QUESTION: Does sugammadex, a selective relaxant-binding agent, have a faster reversal time than, neostigmine, a cholinesterase inhibitor, on morbidly obese patients on rocuronium as neuromuscular blockade?

METHODS: A systematic search of the literature was conducted across the databases: PubMed, EMBASE, and Cochrane. Only English randomized control trials (RCTs), clinical trials, and systematic reviews published during the last 10 years were included.

RESULTS: Three RCTs were reviewed, all of which suggested a significant difference regarding paralytic reversal time. Studies compared times to reaching a train of four ratio (TOFR) ≥ 0.9 following the administration of either neostigmine or sugammadex. Across all examined studies, sugammadex reached a TOFR ≥ 0.9 in less time than neostigmine, with a mean reversal time of 2.7 minutes compared with neostigmine, which attained reversal in 9.6 minutes. Studies also demonstrated the length

of time from agent administration to post-anesthesia care unit (PACU) discharge to be noticeably shorter with the use of sugammadex.

CONCLUSION: Sugammadex allows for permanent paralytic reversal, providing reassurance to practitioners in the PACU. This permanent reversing capability gives sugammadex edge over anticholinesterase inhibitors, which fail to eliminate the threat of PORC. Additional research is needed to determine dosing recommendations of sugammadex before clinical implementation. Given its speed and efficiency in paralytic reversal, sugammadex appears to be a possible solution for PORC in the morbidly obese.

WHERE IS THE INCENTIVE IN INCENTIVE SPIROMETRY?

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INTRODUCTION: Incentive spirometry (IS) is a respiratory adjunct commonly used to reduce the risk of postoperative pulmonary complications (PPCs). Examples of PPCs include: atelectasis, unexplained fever, and pneumonia. PPCs have the highest occurrence in upper abdominal surgery patients and result in increased mortality and hospital stay. The underlying principle of IS, a sustained maximal inspiration, is physiologically valid. But what, if any, benefits exist in using IS over deep breathing and cough (DB&C), often considered a simpler therapy utilizing the same principle?

RESEARCH QUESTION: For postoperative abdominal surgery patients, is incentive spirometry more effective than DB&C at decreasing postoperative pulmonary complications?

METHODOLOGY: A literature search was conducted in the PubMed, CINAHL, EMBASE, and Cochrane Library databases. Keywords including abdomen, surgery, incentive spirometry, postoperative complications, and deep breathing were used. Evidence was in English and included adult abdominal surgery patients, IS, and DB&C in comparative groups and rates of PPCs as a measured outcome. Preference was given to randomized controlled trials (RCTs), systematic reviews (SRs), and clinical practice guidelines (CPGs) published from 2006 to 2017.

RESULTS: Three RCTs, six SRs, and two CPGs were included (14 total). Three studies were excluded as they did not meet the inclusion criteria. Two RCTs, four SRs, and one CPG showed IS to be as effective as DB&C. One RCT, two SRs, and two CPGs showed IS to be less effective than DB&C. We were unable to find any high level evidence showing IS to be more effective than DB&C.

CONCLUSION: No high level of evidence (RCT or greater) was found that supports IS as being more effective than DB&C at preventing PPCs. The results demonstrate that IS, at its best, is only as effective as DB&C. These findings suggest the role of IS in the clinical environment is due for re-evaluation.

WHAT ARE THE LONG-TERM PULMONARY EFFECTS OF SMOKING SHISHA?

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BACKGROUND: The desire to smoke shisha is stimulated by its captivating exotic look, joy experienced as it is a social activity, and the assumption of its harmlessness. Its use is escalating tremendously being a re-emerging global epidemic. Unique population health challenges are posed by the hazardous indoor air quality, second- and third-hand smoke, and its prevalence among youth, university students, and certain ethnic backgrounds. The main objective of this study was to investigate the long-term pulmonary effects of smoking shisha on relation to forced vital capacity (FVC), forced expired volume in 1 second (FEV1), FEV1/FVC, and diffusion capacity of lung for carbon monoxide (DLCO).

Methods: A systematic review was conducted by searching the databases PubMed and Scopus. Shisha has different names throughout the world;

hence, different search terms were utilized. Language restriction was applied to only English and Arabic. Five observational studies were critically appraised, which were published between January 2007 and January 2017.

RESULTS: Two of the three studies that compared shisha smokers to nonsmokers, found a significant ($p < 0.001$) decrease in FVC values, whereas one study found no difference ($p = 0.351$). However, when comparing shisha smokers to cigarette smokers, one study found FVC, FEV1, and FEV1/FVC to be significantly higher ($p < 0.05$) in shisha smokers, whereas another study found the same values significantly lower ($p < 0.001$). Also, a negative correlation was found in shisha smokers' PFT values, in relation to the amount, duration, and total amount smoked.

CONCLUSION: Although it is not clear if shisha smoking is more harmful than cigarette smoking, it was found to have a serious impact as it is associated with declined pulmonary function. In particular, deep inhalation and duration of shisha smoking could deteriorate long-term health. Given the unique socio-cultural contexts in which shisha is used, there is a necessity for a culturally proficient, client-centered, focused approach on prevention, control and shisha-smoking cessation. Since the current research on shisha smoking convey distinctive, but also inconclusive pulmonary effects, longitudinal, evidence-based research will help us in understanding this mode of smoking as we continue to evolve in the trends of the 21st century.

CONTAMINATION OF HEALTH CARE PROVIDERS WITH THE USE OF PPE – A REVIEW

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INTRODUCTION: Personal protective equipment (PPE) has become a widely used and accepted method of protecting health care workers from potential disease. Health care providers (HCPs) provide care to a variety of patients and are potentially exposed to organisms or infectious disease that could be hazardous to themselves or other patients. There is a wide range of infection control practices that differ based on the organization, increasing confusion on the proper practices for infection control. With differences in practices, HCPs develop habits for their use of PPE that may not be the most effective and may lead to an increase of self-contamination. The effectiveness of PPE is dependent on HCP compliance, organizational policies and procedures, and training.

OBJECTIVE: To identify limitations and common errors in the use of PPE in clinical practice. Identify areas for improvement through investigation of available literature.

METHODOLOGY: PubMed and Cochrane library databases were used to compile studies that explored the effectiveness of PPE practices used in clinical practice in North America.

RESULTS: Results from literature review were unanimous. Two studies and 1 systematic review that studied contamination with PPE use in HCPs found that a large portion of users self-contaminated with PPE use, specifically during the removal process. These studies indicate that poor technique/improper use, rushed removal, and gaps in following infection control recommendations lead to remarkably high levels of contamination. Lack of education and training has been highlighted in other studies examining adherence to infection control measures. Clearer signage on the removal of PPE has also been suggested in addition to signage on isolation precautions to improve standardization of PPE doffing.

CONCLUSION: There is an overwhelming amount of literature showing contamination of HCPs even with the use of PPE through improper use. Most HCPs surveyed in studies indicate there is very minimal training in the use of PPE. Standardized protocols for the use, preparation, and removal of PPE need to be established and enforced to improve clarity of isolation practices. More strategic training regimens could be implemented for all clinical and non-clinical staff, reducing different practices between different staff.

THE EFFECTIVENESS OF PROPHYLACTIC ANTIBIOTICS IN PREVENTING AECOPD

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BACKGROUND: Recent studies have predicted that by 2030, chronic obstructive pulmonary disease (COPD) will become the 3rd leading cause of death worldwide. COPD is both a treatable and preventable disease, which affects mostly those who currently smoke or have a history of smoking. Acute exacerbations of COPD (AECOPD) will occur on average of 1.4 times per year per patient, which will likely send these patients to the hospital resulting in an increased cost of health care as well as a decline in the patient's quality of life and lung function. The use of prophylactic antibiotics to prevent AECOPD is a growing interest; however, they are not standardized in the treatment of COPD in conjunction with current medication therapy.

OBJECTIVES: To determine whether or not the use of prophylactic antibiotics is effective in preventing acute exacerbations in patients with COPD.

METHODS: A systematic literature search was conducted in January 2017 using the following computerized databases: PubMed and Ovid Medline. Randomized controlled trials (RCTs) were the only publications of interest in the search. A secondary search was performed by reviewing the citations of relevant publications.

RESULTS: Twenty-five publications were identified in total after conducting the primary and secondary search. After applying inclusion and exclusion criteria and screening the abstract and full-text articles, two RCTs were included in the present literature review. Both RCTs reviewed in the present literature review were double-blind, placebo-controlled studies, which were interested in the frequency of AECOPD during the study trial. One study showed evidence that prophylactic antibiotics reduced the frequency of AECOPD and improved quality of life at the expense of possibly acquiring antimicrobial resistance. In contrast, one study showed no evidence of the emergence of antimicrobial resistance; however, the use of antibiotics did not significantly reduce the frequency of AECOPD.

CONCLUSIONS: Each study conducted showed a reduction in hospital admissions; however, they both lacked data that proved the safety and effectiveness after one year.

B2 ADRENERGIC AGONIST TACHYPHAXIS

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RTs are often peripherally aware that B2 adrenergic agonists, such as salbutamol, have diminishing returns but don't realize the extent. This is troubling as salbutamol is our frontline medication for the treatment of acute asthma exacerbations, both in the hospital and self-administered in the community. This poster explores current literature to establish the effects and scope of chronic B2 agonist use, including B2 adrenergic receptor desensitization, airway hyper-reactivity to inhaled allergens, bronchial cell changes, and patient outcomes. Current literature suggests that the bronchodilatory effects of salbutamol are reduced by as much as 30% with just 2 weeks of chronic B2 adrenergic agonist use. Additionally, airway hyper reactivity that is selective for allergens has been noted. Possible explanations for these effects are explored, including immune system destabilization, and intracellular movement of B2 receptors. Data examined reveals that salbutamol monotherapy and LABA use correlate with poor patient outcomes. In light of the data examined, there seems to be great potential for a positive feedback loop to develop. As patients become desensitized to B2 adrenergic agonists they will need to use higher doses to achieve the desired effect, which in turn will lead to further desensitization and greater airway reactivity in response to allergens. In light of this, recommendations are made to improve patient education, change the way we think about asthma treatment,

avoid salbutamol monotherapy at all costs, and explore alternatives to long acting B2 adrenergic agonist use, such as inhaled corticosteroids, mast cell stabilizers, or genotype guided pharmacology therapy.

EFFECT OF IMMUNOTHERAPY ON MEDICAL USE IN ASTHMA: A RAPID REVIEW

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BACKGROUND: Immunotherapy is a treatment involving either sublingually or subcutaneously administering known allergens to a patient in the effort of desensitizing the patient to those allergens. I undertook a critically appraised topic approach to compare the effectiveness of sublingual versus subcutaneous immunotherapy looking at the specific outcome of medication usage for asthma.

OBJECTIVES: The aim of this CAT was to assess the effectiveness of immunotherapy in reducing the required doses and amounts of medications as compared to treatment without immunotherapy.

METHODS: Using the keywords [asthma] and [immunotherapy] a search was undertaken of Ovid (all EBM reviews), PubMed, CINAHL, and Google Scholar. As a requirement of the rapid review process a strong bias towards recent publication and high levels of evidence were used to select articles. For this topic, two recent systematic reviews were identified evaluating the effectiveness of either subcutaneous or sublingual immunotherapy.

RESULTS: Subcutaneous immunotherapy was reported to have a SMD -0.53 (95% CI: -0.80 to 0.27) while subcutaneous had an SMD of -0.78 (95% CI: -1.45 to -0.11). It was noted that there was some heterogeneity within the individual studies. This heterogeneity may be attributed to differences in how medication usage data is collected and analysed.

IS THE USE OF ULTRASOUND EFFECTIVE IN DIAGNOSING PNEUMONIA IN CHILDREN?

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BACKGROUND: Pneumonia is an acute respiratory infection that causes inflammation of the alveoli, causing the lungs to fill with fluid and purulent material. It is one of the single largest infectious causes of death in children (WIIO, 2016). Chest radiography (CXR) is the most common diagnostic tool to visualize signs of pneumonia. Lung ultrasound (LUS) is a noninvasive tool that is said to have a greater accuracy in detecting pneumonia and may serve as an alternative to CXR; however, LUS is currently not included in the guidelines for diagnosing pneumonia (Copetti et al., 2008).

OBJECTIVES: The objective of this systematic review was to determine the accuracy ultrasound in diagnosing pneumonia in children.

METHODS: A systematic literature search was conducted in October 2016 using PubMed and Scopus. Randomized controlled trials and clinical trial studies were the only publications included in the search. A secondary search was conducted by reviewing the references of relevant publications.

RESULTS: A total of 58 publications were identified after conducting the primary and secondary search. A total of five publications were included in the present systematic review.

DISCUSSION: The primary outcomes measured in each of the studies were the rates of diagnosis for pneumonia in the participants from LUS findings in comparison with rates of diagnosis from CXR findings. Detection and diagnosis of pneumonia in the subjects with ultrasound were higher in comparison with CXR.

CONCLUSIONS: Lung ultrasound is a simple and reliable diagnostic tool that can be used by clinicians on those with suspicion of pneumonia. Although the publications included in the present review displayed higher detections rates or pneumonia with the use of LUS compared with CXR, further randomized controlled trials with a larger sample size are required for better statistical analysis.

SILDENAFIL: A RISING TREATMENT FOR PERSISTENT PULMONARY HYPERTENSION OF THE NEONATE?

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BACKGROUND: Persistent pulmonary hypertension of the neonate (PPHN) is characterized by severe hypoxemic respiratory failure that presents soon after birth. It occurs in 2/1000 births, with a mortality rate of 4%–33%. The current standard of treatment is the practice of mechanical ventilation with inhaled nitric oxide (iNO), a selective pulmonary vasodilator not available at every health care center due to high cost. Additionally, up to 30% of neonates with PPHN do not respond to iNO treatment. Phosphodiesterase inhibitors, such as sildenafil, promote pulmonary smooth muscle vessel relaxation and could prove a cost-effective alternative to the treatment of PPHN.

RESEARCH QUESTION: In neonates with pulmonary hypertension, does the use of sildenafil lead to decreased oxygenation indexes (OIs)?

METHODS: PubMed, Cochrane Library, EMBASE, and CINAHL were searched for randomized control trials (RCTs) and systematic reviews (SRs). Studies were considered if they compared sildenafil against another therapy, against a placebo, or if sildenafil was used as an adjunctive therapy. Primary outcome evaluated was OI. Secondary outcomes evaluated were time on mechanical ventilator and mortality.

RESULTS: Six RCTs were included. Two of these RCTs (265 patients) compared sildenafil against another PPHN therapy, MgSO₄. Both studies found significantly decreased OIs and mechanical ventilator time in sildenafil groups. The four remaining RCTs (137 patients) compared sildenafil against placebos. All four studies found significant decreases in OI and mortality, while two found decreased mechanical ventilator time. Two SRs were included, both reviewing RCTs comparing sildenafil against placebos.

LIMITATIONS: Considerable variability was noted in patient sizes, measured outcomes, dosing, and control measures.

CONCLUSIONS: There is no clear evidence to support using sildenafil for PPHN patients in areas where iNO is available. More robust data are needed comparing sildenafil against other PPHN therapies as a stand-alone pulmonary vasodilator, against placebos as well as an adjunctive therapy.

HOW CAN ANATOMY ENRICH INTERPROFESSIONAL EDUCATION FOR RESPIRATORY THERAPY STUDENTS?

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Interprofessional health education (IPHE) is a fast-growing concept. Students of different health care professions come together to learn about each other's roles and the importance of teamwork with the goal of improving patient outcomes. Currently, IPHE focuses on clinical simulation, with little concentration on fundamental sciences such as anatomy. While the current Respiratory Therapy (RT) curriculum includes extensive in-class teaching about human anatomy, hands-on learning is limited, sporadic, and based on availability. Integrating IPHE into RT students' curriculum through the study of anatomy enhances the quality of training. Students have the opportunity to understand the roles of other health care professions while experiencing interactive learning of the human body. In an effort to increase RT students' exposure to human anatomy, a three-hour cadaveric examination laboratory was designed and subsequently instructed by medical students. Three first-year medical students created learning objectives focusing on cardiopulmonary

anatomy, including the upper and lower respiratory tracts, and cardiac anatomy. Both respiratory students, who did not have any hands-on experience with cadavers prior to the event, and medical students benefited from the anatomy laboratory session. Tangible anatomy helped to create a better understanding of the human body. The RT students were able to make connections between in-class content of cardiopulmonary anatomy and clinical scenarios. The medical students who ran the session gained a better understanding of the role of the respiratory therapist and the extent of anatomy taught in the RT curriculum. Overall, students were satisfied with the session. Both parties developed skills in communication and professionalism, and learned the value of interprofessional health education at any point in one's professional career. A reciprocal IPHE event instructed by RT students is anticipated for the future. The session will include respiratory care topics relevant to a medical student's curriculum.

SHOULD OXYGEN BE USED IN A MYOCARDIAL INFARCTION?

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BACKGROUND: The use of oxygen in normoxemic patients having an acute myocardial infarction (MI) remains a debate. Recently, the 2015 Advanced Cardiac Life Support (ACLS) guidelines updated their recommendations on the use of oxygen in normoxemic patients as emerging evidence has suggested it may be harmful to the patient.

RESEARCH QUESTION: For normoxemic adults having an acute MI, does receiving room air pre-hospital decrease myocardial injury (decreased infarct size, decreased troponin and creatine kinase) compared with those receiving supplemental oxygen prehospital?

METHODS: Four databases were reviewed (CINAHL, Pubmed, Cochrane, EMBASE) for research within the last 10 years using keywords "myocardial infarction," "infarct size," and "oxygen." Studies were excluded when oxygen or room air was not started prehospital. Endpoints of interest were myocardial infarct size and peak troponin and creatine kinase (CK) levels.

RESULTS: Two randomized control trials (RCT) and one systematic review (SR) were included in the review of the literature. When comparing the oxygen to air groups, one RCT reported a significant increase in CK and infarct size and no significant increase in troponin. The other RCT did not find any significant increase in infarct size or peak troponin in the oxygen groups. The SR on the use of oxygen or air in a MI found existing evidence too weak to evaluate.

CONCLUSION: Existing evidence of the role of oxygen in normoxemic myocardial infarction patients is limited and conflicting. There is some evidence to suggest it may cause cardiac damage but larger studies will need to be done to confirm this.

VENTILATOR-INDUCED LUNG INJURY: PROTECTING THE LUNGS VS. THE ALVEOLI: ARE WE OPTIMIZING OUR VENTILATION STRATEGIES?

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Ventilator-induced lung injury (VILI) is an iatrogenic consequence that can lead to physiological complexities such as acute respiratory distress syndrome (ARDS), or may occur secondary to pre-existing ARDS. VILI further complicates the clinical course and interventional strategy for affected patients, and although unavoidable at times, it should be better prevented by using appropriate ventilation parameters and strategies individualized for each patient. The breath-mechanical profile has been used to describe alveolar dynamics during breathing and identify the three major mechanisms of VILI: static overdistension, alveolar recruitment/de-recruitment, and stress concentration. Current strategies to prevent VILI focus on using low tidal volumes and optimal positive end-expiratory pressure (PEEP), however low tidal volumes may still have potential to cause alveolar trauma based on the mechanisms of VILI, and methods of finding optimal-PEEP may be restricted as per

capabilities between clinical sites. Exploring the use of already existent cost-effective strategies such as: stress-indices (derived from pressure-time curve of constant inspiratory flow), deadspace fraction (calculated from volumetric capnography), and time-controlled PEEP (optimizing expiratory flow-cycling to maintain intrinsic PEEP) may provide much value in improving safe lung-protective mechanical ventilation practice.

BIOMARKERS AND PATHOPHYSIOLOGY OF ARDS: FUTURE DIRECTIONS OF DIAGNOSIS, PROGNOSIS AND TREATMENTS

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Acute Respiratory Distress Syndrome (ARDS) is defined as an acute-onset, progressive, hypoxic condition with bilateral lung infiltration and diffuse alveolar damage. An investigation revealed that overall ICU hospital mortality of ARDS patients is higher than 40% in adults, and ARDS accounts for up to 30% of all pediatric ICU mortality. The incidence of ARDS almost doubled during last 23 years and is expected to rise continuously. Our understanding of the pathology of ARDS is still incomplete, and it is necessary to re-evaluate our clinical translation of diagnostic, preventive, and therapeutic strategies. A grasp of the cellular and molecular mechanisms of ARDS is essential for developing effective therapies. Recent studies demonstrate that biomarkers of acute lung injury and ARDS in plasma and bronchoalveolar lavage fluid provides a hope to better elucidate pathophysiological mechanisms of ARDS and to identify the severity and prognosis and potential effective treatments. The purpose of this paper is to review and summarize the current knowledge on biomarkers of ARDS, provide important insights into the pathophysiological mechanisms, and identify the future directions of diagnosis, prognosis and treatment of ARDS. The important biomarkers of ARDS, including biomarkers of exudative phase and biomarkers of fibroproliferative phase, will be listed and discussed in this paper.

DOES THE USE OF PRONE POSITIONING IMPROVE SURVIVAL IN PATIENTS WITH ARDS?

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INTRODUCTION: Prone positioning has potential to be an effective treatment to improve oxygenation in patients with ARDS due to changes in lung physiology. This research intends to investigate the use of prone positioning to improve survival in adult patients with ARDS, and to provide a fulsome outlook on the research conducted on prone positioning and ARDS.

METHODOLOGY: A systematic literature search was conducted in October 2016, using the databases PubMed and Ovid. A total of five articles were included in the qualitative synthesis process after primary abstract screening and secondary full text reviews. Randomized control trials comparing prone to supine positioning were included in this review. All participants in the included studies are adult patients (over 16 years of age) who had been diagnosed with ARDS within 36–72 hours. The primary outcomes measured in the studies are mortality (28–90 day mortality) and PaO₂/FiO₂ ratios.

RESULTS: In four of the five studies reviewed, ICU mortality was the primary outcome. The other study's primary outcome was PaO₂/FiO₂ ratio. Four out of the five studies supported the use of prone positioning, whereas one did not.

CONCLUSION: Only two of the studies had sufficient sample sizes to reach statistical significance. Based on these two studies, prone positioning appears to be an effective treatment strategy for ARDS when applied early and for long periods of time. However, the treatment needs to be applied with caution as complications are common. More research in this area is required to determine how efficacious prone positioning is in treating ARDS, how early it should be applied to be efficacious, and for how long prone sessions should last.

**EXPLORATION OF MEDICAL ASSISTANCE IN DYING
IN CANADA: USE FOR PATIENTS DIAGNOSED WITH
AMYOTROPHIC LATERAL SCLEROSIS**

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This paper will explore the journey Canada has taken to allow patients access to Medical Assistance in Dying (MAID) and the reasons why this change in legislature is a positive advancement in the Canadian healthcare system for the terminally ill, specifically those with amyotrophic lateral sclerosis (ALS). On 6 February 2015, the Supreme Court of Canada (SCC) decriminalized the use of MAID. The following year, Bill C-14 was implemented throughout Canada on 17 June 2016.

This new regulation contains specific MAID safeguards to allow for continuity and fluidity nationwide. To understand the diversity from patient case to case, the arguments in favour of the legalization and use of MAID, such as the right to self-determination and relief from suffering, and the arguments in opposition, such as religious, ethical, and moral reasons, will be examined. Furthermore, this paper will look in detail at the MAID systems and regulations already in place in Alberta. Additionally, examination of research regarding the use of MAID for those patients diagnosed with ALS in other jurisdictions will help highlight the importance of this new end of life options in Canada. Seeing as MAID is so recent to the Canadian legislature, more research needs to be conducted and more education to all Canadians is required to allow for nationwide implementation.