



Posters from the Canadian Society of Respiratory Therapists 2021 Annual Conference

We are pleased to present abstracts from the poster presentations that were displayed virtually between May 5–7, 2021. As evidenced by the following abstracts, the work of our colleagues in 2021 highlights current research and practice innovations led by respiratory therapists and students.

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 Please note these abstracts have not been peer reviewed.

RT POSTERS

WINNER

01 EFFECTS OF INHALED FUROSEMIDE ON DYSPNEA AND PULMONARY FUNCTION IN COPD: A SYSTEMATIC REVIEW

Z. Atwi BHSc, RRT

Dalhousie University, Halifax, NS, Canada

zeina.atwi@dal.ca

Background: Chronic obstructive pulmonary disease (COPD) is a highly prevalent disease throughout the world that is preventable and treatable. Dyspnea resulting from COPD can be detrimental to the quality of life of patients; thus, finding ways to alleviate breathing discomfort is clinically significant. In patients with COPD, pulmonary function values are linked to the severity of symptoms and confirms the presence of airflow obstruction. There is emerging evidence showing inhaled furosemide, a common loop diuretic, may be useful in relieving dyspnea and improving pulmonary function values in patients with COPD.

Objective: To assess if inhaled furosemide can lead to decreased perception of dyspnea and improved pulmonary function values in patients with COPD.

Methods: A systematic search of PubMed, CINAHL, Cochrane Library, and EMBASE was conducted and screening of the retrieved citations was made. This systematic review used three randomized control trials and a literature review in which the participants consisted of or included patients with COPD receiving inhaled furosemide as a potential treatment option for their dyspnea and low pulmonary function values.

Results: Searches in the 4 databases and secondary sources using 3 key terms yielded 83 unduplicated articles. All studies measured dyspnea as an outcome and 3 found a statistically significant improvement in patient reported symptoms. Pulmonary function values were measured in three studies in which all found significant improvements.

Conclusion: The effect of inhaled furosemide on the dyspnea and pulmonary function values in people with COPD remains promising but uncertain and questions have emerged regarding the long-term impact on these patients. While this therapy is favorable for dyspnea relief and

improvement of pulmonary function values in people with COPD, further consideration and additional data still need to be gathered.

02

VIRTUAL MASK FITTING IN PEDIATRIC PATIENTS DURING COVID-19: A CASE SERIES

T. Tran HBSc, RRT¹, M. Nonoyama RRT, PhD^{2,3,4}, N. Cithiravel HBSc, RRT¹, F. Syed HBSc, RRT¹, J. Janevski RN, NP⁵, J. Chiang MA MD⁵, R. Amin MD MSc, FRCP^{5,6}

¹Department of Respiratory Therapy, The Hospital for Sick Children, Toronto, ON, Canada; ²Department of Respiratory Therapy & Child Health Evaluative Sciences, The Hospital for Sick Children, Toronto, ON, Canada; ³Faculty of Health Sciences, Ontario Tech University, Oshawa, ON, Canada; ⁴Rehabilitation Sciences Institute & Department of Physical Therapy, University of Toronto, Toronto, ON, Canada; ⁵Division of Respiratory Medicine, The Hospital for Sick Children, Toronto, ON, Canada; ⁶University of Toronto, Toronto, ON, Canada

tuyen.tran@sickkids.ca

Introduction: The COVID-19 pandemic has been an unprecedented threat to our health care system. Clinicians had to pivot and develop creative and timely “virtual” solutions to provide clinical care. Our aim was to develop a standardized approach to virtual “mask fitting” for children who are either being initiated or are already on existing long-term ventilation (LTV) at a pediatric hospital.

Case and outcomes: We present three cases involving the care of children who required mask fitting for non-invasive ventilation (NIV). LTV team consultations were delivered via a telemedicine platform (videoconference or phone). With the guidance of the respiratory therapist (RT), the family caregiver (FC) took measurements on their child using a standardized clinical approach (developed by the LTV RTs). Based on the measurements, an appropriate mask was selected. Successful mask fit was based on patient/FC reports, as well as objective leak data obtained from the NIV download data.

Discussion: Virtual clinics used for managing patients in our LTV program were feasible and efficient resulting in improved workflow for the RTs, and convenience for patients and FCs. Patients and FCs had significantly less pressure to attend in-person clinics and expressed high



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satisfaction in terms of their experience and importantly, meeting respiratory care needs. Within the context of COVID-19, remote patient education and intervention can be delivered effectively, while reducing the risk of exposure from in-person visits to hospital.

Conclusion: A virtual/telemedicine program to manage pediatric patients requiring mask fitting for LTV was a feasible option during COVID-19.

03
DOES SHORT-TERM RESPONSE PREDICT LONG-TERM EFFECTIVENESS OF INHALED CORTICOSTEROIDS IN PRETERM INFANTS <29 WEEKS' GESTATION?

H. Najjar MD¹, E. Oddi RRT², A. Mukerji MD, MSc¹

¹*Division of Neonatology, Department of Pediatrics, McMaster University, Hamilton, ON, Canada;* ²*Department of Respiratory Therapy, Hamilton Health Sciences, Hamilton, ON, Canada*
 oddiemily@gmail.com

Introduction: Inhaled corticosteroids (ICS) offer an attractive alternative to systemic steroids in preterm babies at risk of bronchopulmonary dysplasia, with a presumption of better side-effect profile. The objective of our study was to assess whether short-term response to ICS predicts long-term effectiveness, hypothesizing a relationship between the two.

Methodology: In this single-centre retrospective cohort study, infants <29 weeks' GA admitted between Jan 1, 2017 and Dec 31, 2018 were included if they received ICS. Patients with congenital or genetic abnormalities were excluded, and any patient with an concomitant illness or administration of any other medication 48 h before or after initiation of ICS were also excluded. Infants were considered responders if they showed a ≥ 20% improvement in any one or more of FiO₂, mean airway pressure (MAP) or CO₂ within 48 h. Baseline demographic and clinical outcome data were collected and analyzed using appropriate univariate analyses. A logistic regression model was performed to identify adjusted odds ratio (aOR) of predictors of short-term ICS response.

Results: Of 104 babies who received ICS during the study period, 44 infants were ultimately included after assessing for exclusion criteria, 21 of whom were categorized as responders while the remaining 23 were non-responders. Responders tended to be of lower GA, with higher tendency to be still intubated on day 7 of life and had a higher respiratory index (MAP × FiO₂) than non-responders. After correcting for GA, respiratory index was higher among responders (aOR 1.49; 95% CI 1.07–2.08). However, contrary to our hypothesis, there were no differences in clinical outcomes.

Conclusion: Based on our findings from this small cohort, short-term response to ICS may not predict longer-term benefit with use of ICS.

Methods: Peer-reviewed articles from 2014 to 2020 on LVRS in end-stage COPD patients were examined. Quality of life (QOL), Pulmonary function tests (PFTs), and survivability of subsequent LTx were analyzed.

Results: Patients with end-stage COPD demonstrated increased QOL 5 years post-LVRS, through improvements in exercise capacity, 6-min walk test and shortness of breath questionnaires. Patients also yielded improved PFT values (FEV1, FVC, and RV) at the 1-year follow-up. Further, a 2018 study showed increased survivability by 21 months for patients who underwent LVRS before LTx compared to LTx alone.

Conclusion: End-stage COPD patients should be considered for LVRS as a bridging treatment to LTx or as a standard treatment for patients who do not qualify for transplant. LVRS shows improved QOL, increased PFT values, and greater survivability for future LTx. However, all studies reviewed were retrospective single-institution studies with several methods for performing LVRS and showed variable results. Therefore, it is difficult to predict patient outcomes accurately. A prospective, multi-institutional, longitudinal analysis should be conducted to better predict the efficacy of LVRS as an alternative or bridging treatment to LTx.

05
LONG ACTING BETA 2 AGONIST/LONG ACTING MUSCARINIC ANTAGONIST (LABA/LAMA) VERSUS LABA/INHALED CORTICOSTEROIDS (ICS) IN THE TREATMENT OF MODERATE CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD) IN ELDERLY PATIENTS

G. Oyeniyi SRT

Southern Alberta Institute of Technology, Calgary, AB, Canada
 adebimpe.oyeniyi@yahoo.ca

Background: COPD is a chronic respiratory disease associated with fixed airway obstruction and accompanying respiratory symptoms which include persistent and progressive breathlessness, chronic productive cough, and limited exercise capacity. Inhaled bronchodilators are the preferred medications to prevent or reduce symptoms of moderate COPD.

Methods: The recent GOLD guidelines, various systematic reviews, and network meta analysis recommend Fixed Dose Combinations (FDCs) of LABA/LAMA as preferred pharmacotherapy(s) over LABA/ICS. LABA/LAMA are cost effective and consistently more effective at maintaining symptom relief than LABA/ICS. Although LABA/ICS may be helpful in COPD patients with Forced Expiratory Volume in 1 second (FEV1) < 60% predicted, some major adverse effects are associated with its use, such as increased risk of pneumonia and possible exacerbation.

Outcomes: LABA/LAMAs have shown significant and remarkable benefits over monotherapy and/or LABA/ICS for the majority of evaluated outcomes. Also, LABA/LAMA can be administered via one medication device, which is very beneficial for patient adherence. Glycopyrronium/Indacaterol, a type of fixed dose combination of LABA/LAMA, reveals a more consistent and higher efficacy profile with no serious side effects in moderate COPD patients.

Conclusions: Further studies can be done on individual FDCs LABA/LAMA drug components. These studies are needed in relation to their individual efficacy(s), because lung ventilation improvements obtained by treatments could vary depending on drug components, device performance and resistance, peak inspiratory flow rate achieved by COPD patients (which depends on the disease severity), and dimension of drug particles.

06
NUMERICAL STUDY OF THE EFFECT OF VACUUM FLOW RATE ON MASK EFFICIENCY WITH EXHALO™ DEVICE

K. Haller BSc¹, R. Mehri PhD¹, E. Matida PhD, PEng¹, F. Fiorenza BHS, RRT^{2,3}

¹*Department of Mechanical & Aerospace Engineering, Carleton University, Ottawa, ON, Canada;* ²*Product Development,*

STUDENT POSTERS

WINNER

04
LVRS AS AN ALTERNATIVE OR BRIDGING TREATMENT TO LTx IN END-STAGE COPD PATIENTS

E. Dileonardo SRT, T. Gibson SRT, K. Gulas SRT

Conestoga College, Kitchener, ON, Canada
 tgibson0403@conestogac.on.ca

Introduction: Lung transplantation (LTx) is a proven treatment for extending and improving life for an end-stage COPD patient. Lung volume reduction surgery (LVRS) is an effective alternative when LTx is unavailable or contraindicated, but is not widely used in standard care.

Objective: The current review will examine literature on LVRS to determine the efficacy of using LVRS as an alternative or bridging treatment to LTx in end-stage COPD patients.

McArthur Medical Sales Inc., Rockton, ON, Canada; ³Respiratory Therapy Department, University of Ottawa Heart Institute, Ottawa, ON, Canada

kirahaller@cmail.carleton.ca

Objective: Patients using oxygen masks for oxygen therapy, even with a vacuum suction line, may vent respiratory droplets (aerosols) to the surroundings. The EXHALO™ device has been developed to be used in conjunction with masks to contain more particles released by exhalation. This study was conducted to determine the effectiveness of the EXHALO™ device for different vacuum suction flowrates.

Methodology: Numerical simulations of particle dispersion and deposition were performed using a commercial package (CFX, Ansys, Inc). To simulate exhaled particles, 1000 particles with diameters of 2.5 µm were released and tracked in the computational domain. Different suction flowrates of 0, 10, 50 and 100 L/min were tested. The resulting particle locations were analyzed and categorized as follows; deposited onto the mask, removed by the vacuum suction line or released to the room. The results are shown as a percentage of total particles released.

Results: As the vacuum suction flowrate increased, a lower number of particles were released to the ambient air, a lower number of particles were deposited onto the mask and a greater number of particles were collected by the vacuum suction line. Vacuum flowrates of 0, 10, 50 and 100 L/min for the mask and EXHALO™ device was 0.2%, 41.7%, 77.7% and 99.2% effective at capturing particles, respectively.

Conclusion: The use of an oxygen therapy mask used in conjunction with the EXHALO™ device assists in containing exhaled aerosols, with its effectiveness further improved by increasing the suction flowrate of the vacuum suction line. It is recommended that the current EXHALO™ device be used with a vacuum suction flowrate of 100 L/min in order to maximize the number of particles contained by the device.

07 BENEFITS OF PRONE POSITION ON OXYGENATION IN COVID-19 PATIENTS

L. Lake HBSc, SRT, S. Jamal BSc, SRT, M. Koshy BSc, SRT

Conestoga College, Kitchener, ON, Canada

louise.lake.10@gmail.com

Introduction: COVID-19 is an acute respiratory syndrome caused by SARS-Cov-2 that results in severe hypoxemia. It is associated with a high mortality rate and increased admission into the intensive care unit. Proning is a way to improve oxygenation and involves the patient lying on their abdomen, redirecting perfusion and creating a better ventilation/perfusion match. Proning COVID-19 patients in the early phase of the disease showed to be beneficial for oxygenation and limited the need for intubation.

Objective: To determine whether proning is an effective technique to improve oxygenation in COVID-19 patients.

Methodology: A literature review was conducted using the EBSCO database through Conestoga Library Services. All types of articles were included in this literature review, including a systematic literature review, retrospective cohort study, prospective observational cohort study, and individual case studies.

Results: A systematic literature review in 2020 found that participants in proning groups showed significant improvements in oxygenation in 8 of the 10 studies in the review. Further studies reported that proning increased their patients' oxygenation levels, shown by an increase in S:F or P:F ratios. Oxygenation was increased in one individual in a case study who had higher PO₂ levels on an ABG.

Conclusion: It is seen through SpO₂, PF ratios, and PaO₂ measurements that there is significant improvement in oxygenation through more uniform ventilation in the lungs. It is especially beneficial for the prognosis of the illness if proning was done earlier during treatment procedures. Hypoxemia in these patients is shown to be successfully managed by self-proning, and this simple therapy can be done to lessen the need for intubation and ventilation.

08 A LITERATURE REVIEW: HIGH FIDELITY SIMULATIONS IMPACT ON PRE-CLINICAL HEALTHCARE STUDENTS

S. Beadle SRT, M. Breeze SRT, J. Daher Costa SRT, J. Cubides Lopez SRT, S. Goel SRT, K. Somerset SRT

Fanshawe College, London, ON, Canada

breeze.morgan@gmail.com

Introduction: Different research studies on high fidelity simulation have found it to be a successful educational tool to prepare students training in different fields of healthcare. Many universities and healthcare programs employ this style of learning in order to teach valuable skills and build confidence before students are able to professionally work. It has been shown to effectively increase confidence, preparedness, skill development as well as provide ethics education to students. High fidelity simulations provide students with an increased confidence and reduces medical errors in the face of high risk and critical care environments.

Discussion: There are many hurdles for the widespread implementation of this teaching method. The main one, highlighted by most of the studies, is the lack of literature about the subject. Some other obstacles identified were: the skills acquired via simulation may not effectively carry over to clinical practice.

Results: Diverse factors influence the level of fidelity in high fidelity simulation, such as types of fidelity (physical, emotional, conceptual), learner experience, and learner objective (cognitive, affective, psychomotor). Other studies have demonstrated that the psychological immersion and the cognitive burden are greater during high fidelity simulation, which has been evidenced by eye-tracking and interviews; Besides, the perception of difficulty was greater in high fidelity simulation when compared to low fidelity simulation students.

Conclusion: Implementation of high fidelity simulations in pre-clinical students has impact on the readiness and confidence of Emergency Response Team (RT, RN, RPN, Paramedic) students for clinical placement in Canada. Our team believes that the implementation of such will greatly benefit students in terms of preparedness, skills development, and confidence for clinical placement. It has been shown that post-secondary students prefer to gain knowledge and skills through hands-on learning experiences.

09 INTERPROFESSIONAL EDUCATION: HOW DOES IT IMPACT HEALTHCARE WORKERS, PATIENT OUTCOMES, AND HEALTHCARE INSTITUTIONS?

S. Bains, SRT

Southern Alberta Institute of Technology, Calgary, AB, Canada

sbains28@gmail.com

Introduction/objective: My proposed research will examine why inter-professional education (IPE) is an important aspect in healthcare and how IPE impacts the performance of healthcare workers, patient outcomes, and institutional costs and medical error rates. Examining these topics is significant in the practice of Respiratory Therapy as respiratory therapists often work in multidisciplinary teams. To ensure effective teamwork and patient safety, it is imperative that the roles and responsibilities of each discipline are well established. This can further help prevent negative patient outcomes and increase patient satisfaction. Encouraging collaborative decision-making with multidisciplinary teams allows the team to focus on a common goal and streamline care for the patient.

Methodology: Research for this paper was collected through a literature review.

Results/conclusion: It was evident that IPE provided a positive impact on various avenues in the healthcare profession. There is strong evidence to suggest that IPE improves healthcare efficiency and effectiveness. The impact of IPE goes beyond individual performance and knowledge.

Knowledge and skills gained through IPE interventions resonate throughout the participant's professional career. IPE interventions can encourage healthcare workers to feel comfortable and competent in their decisions. It can encourage good conflict resolution skills and create open, safe environments with good communication. With improved job clarity and perceived safety culture, patients are also receiving improved health outcomes with decreased readmission rates, prompt and effective treatments, continuity of care, and decreased mortality rates. Cost-effective treatments are being administered to patient's which in turn is reducing institutional costs. Additionally, with less medical error rates there is less patient harm, which further saves costs and resources that would have been allocated towards correcting and compensating for medical errors. Having strong diverse multidisciplinary teams allows for complete care to be provided to complex patients who have multidimensional needs.

10 COMPARISON OF VIDEO LARYNGOSCOPY DEVICES: C-MAC® AND GLIDESCOPE IN ADULTS

A. Ahmed, SRT

The Michener Institute of Education at UHN, Toronto, ON, Canada

anum.aquil@gmail.com

Background: Direct laryngoscopy (DL) is the traditional technique for endotracheal intubation in clinical settings. With advances in technology, Video laryngoscopy (VL) was introduced for difficult intubations. The C-MAC® (Karl Storz, Tuttingen, Germany) resembles the Macintosh blade from DL but with the addition of a micro camera at the tip of the blade. This makes it a suitable choice for both easy and difficult intubations. The GlideScope (Verathon Medical, Bothell, WA) consists of the GVL 0-4 blade, which has a hyperangulated, 60-degree curvature for improved glottic exposure in difficult airways with oral, pharyngeal and laryngeal axis alignment issues (Verathon Inc. 2018). These features offer an advantage for difficult intubations such as cases of tongue swelling, pharyngeal obstruction, or cervical spine issues.

Objective: This poster is a critical comparison of the C-MAC® and GlideScope, in terms of application, blade type, technology, advantages and precautions as found in clinical research and current practice.

Clinical implications: For successful intubation with VL, the clinician should follow each manufacturer's guidelines, with respect to ETT's pre-shaping and the proper maneuvers when resistance to advancement of the ETT occurs. In clinical practise and based on device availability, experienced clinicians are likely to be comfortable with GlideScope as it is relatively older than C-MAC®. C-MAC® would be easy to use for clinicians with any skill level due to the DL MAC blade.

Conclusion: Despite the key design differences between both devices, current research reports fewer articles stating one device is better than the other. GlideScope would be recommended for a perceived difficult intubation. C-MAC® is a good option for teaching new healthcare professionals and develop a strong foundation for DL. The emergence of COVID-19 has increased the frequency of VL for easy intubations to reduce duration of intubation. It keeps healthcare professionals at a farther distance from the patient's face and reduces incidence of airway injury.

11 THE POTENTIAL SIGNIFICANCE OF VITAMIN D LEVELS IN COVID-19 POSITIVE PATIENTS

A. Munro SRT, J. Morris SRT, T. Ngo-Akhien SRT

Conestoga College, Kitchener, ON, Canada

aemmunro@gmail.com

Introduction: The SARS-CoV-2 virus that causes COVID-19 has resulted in over 111 million identified cases and nearly 2.5 million deaths. Of that, 80-85% cases are asymptomatic. However, 7.7% still

require hospitalization. Data has shown that 90% of patients being hospitalized have underlying medical conditions such as hypertension, obesity, cardiovascular disease or diabetes. African Americans are 2x more likely to die of COVID-19 compared to Caucasian Americans. These medical conditions and African ethnicity are contributing factors to vitamin D deficiency (VDD).

Objective: To determine whether there is a correlation of vitamin D levels and COVID-19 outcomes, and if vitamin D supplementation could be proactive in COVID-19 management.

Methodology: The search of journal articles and review papers on the role of vitamin D in COVID-19 patients. Between January 22nd and February 26th 2021, there were multiple searches conducted using databases like Conestoga Library and Google Scholar to produce the research.

Results: This review includes three studies of the relationship between vitamin D and COVID-19. Results suggest that 85% of ICU patients and 57% of non-ICU hospitalizations had a VDD. A higher prevalence of VDD is associated with darker skin ethnicities, which appear to be linked to increased risk of severe COVID-19 infection. In the US, 82.1% of African Americans have VDI, compared to the 41.6% overall. Common comorbidities were found in 90% of COVID-19 patients in the ICU. 81% had vitamin D levels below 50 nmol/L, while 68.8% hypertension, 40% were diabetic, 34.4% suffered from predisposed respiratory illnesses, and 25.7% of the COVID-19 patients were medically labelled as obese.

Conclusion: VDD has been linked to an increased incidence and severity of COVID-19. There are a variety of diseases in addition to African ethnicity linked to VDD. Therefore, it is reasonable to suspect VDD as an underlying predisposition to COVID-19.

12 SCLERODERMA (SYSTEMIC SCLEROSIS) AND MANAGEMENT OF INTERSTITIAL LUNG DISEASE

A. MacDonald, SRT

Thompson Rivers University, Kamloops, BC, Canada

alexandria.cmacdonald@gmail.com

Systemic Sclerosis (SSc) is a rare autoimmune disease that is associated with organ fibrosis that includes the lungs, skin, kidneys, and heart amongst others. Connective tissue disease-associated interstitial lung disease (ILD) results from the inflammation and fibrosis occurring in the lungs and is the primary cause of death amongst SSc patients. This literature review investigates various management strategies for those with connective tissue disease associated ILD specific to SSc patients. Further research regarding SSc patients and ILD management is significant due to the limited knowledge and education of the disease itself. SSc is not a one-size-fits-all condition and there is not one way to treat ILD for everyone, but a more comprehensive approach is needed. The objective of this review is to discuss management strategies based on previous research which covers all realms of ILD from diagnosis to treatment to end-stage care. Additional information and education on this rare condition and how ILD affects this specific population are also integrated within the management strategies. Various categories of management are discussed, including general management along with pulmonary function tests, pharmacologic therapy and the treatment of co-morbidities. Other factors such as multidisciplinary care and the diagnostic process itself along with management of the disease are critical in attempting to slow the progression and the overall treatment of the ILD. For patients with SSc, it is especially important to treat the co-morbidities and inflammation along with the symptoms of ILD itself. Supportive care and education are also a substantial part of their treatment which includes oxygen therapy, pulmonary rehabilitation and pulmonary hygiene. Additional research is also needed on pharmacologic therapies as a variety exists with their various risks and benefits. In conclusion, management strategies should include multidisciplinary teams that look at various risk factors and use diagnostic testing frequently to diagnose and treat disease progression of ILD in SSc patients.