A Breath of Fresh Air / Une bouffée d'air frais

Abstracts from the 2010 Canadian Respiratory Conference
Résumés du Congrès canadien sur la santé respiratoire 2010

April 29 to May 1, 2010
Halifax, Nova Scotia

The present online supplement highlights the poster abstracts selected for presentation at the 3rd Annual Canadian Respiratory Conference (CRC) held in Halifax in April 2010. The CRC is a partnership initiative of The Canadian Thoracic Society, Canadian Respiratory Health Professionals, The Lung Association and the Canadian COPD Alliance, and has become the premiere national educational and scientific meeting for the respiratory community in Canada. I would like to acknowledge the leadership and expertise of the Scientific Committee, our conference speakers and abstract presenters, all of whom contributed to the delivery of an excellent program. The next Canadian Respiratory Conference will be held in Niagara Falls, Ontario, April 28 to 30, 2011 (www.lung.ca/crc). We look forward to seeing you there.

Rob McFadden, Chair
Canadian Respiratory Conference Scientific Committee

Le présent cybersupplément fait ressortir les résumés par affiche sélectionnés en vue d'être présentés au 3e Congrès canadien sur la santé respiratoire (CCSR) annuel, qui s'est déroulé à Halifax en avril 2010. Le CCSR, un partenariat entre la Société canadienne de thoracologie, Les Professionnels canadiens en santé respiratoire, L'Association pulmonaire et l'Alliance canadienne sur la MPOC, est devenu le principal congrès scientifique et de formation national pour le milieu de la pneumologie au Canada. Je tiens à souligner le leadership et les compétences du comité scientifique, des conférenciers et des présentateurs de résumés, qui ont tous contribué à l'excellence du programme. Le prochain Congrès canadien sur la santé respiratoire aura lieu à Niagara Falls, en Ontario, du 28 au 30 avril 2011 (www.poumon.ca/crc). Nous avons hâte de vous y rencontrer.

Rob McFadden, président,
Comité scientifique du Congrès canadien sur la santé respiratoire

Stream 1: Sleep, Environment And General Respirology
Séance 1: Sommeil, environnement et pneumologie générale

Stream 2: COPD
Séance 2: MPOC

Stream 3: Knowledge Translation and Program Implementation
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Stream 4: Pediatric
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Stream 5: Asthma, Muscle/Exercise
Séance 5: Asthme, muscle/exercice

General Poster Session (Non-moderated) /
Le Séance génerale de presentation d'affiches (sans modérateur)

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MUSCLE WEAKNESS AND RESPIRATORY FAILURE FROM AN ORPHAN DISEASE: ADULT ONSET POMPE DISEASE (ACID ALPHA-GLUCOSIDASE DEFICIENCY)

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A 48 year old Caucasian women presents with approximately five year history of progressive dyspnea, orthopnea, hypersomnolence and proximal muscle weakness resulting in wheelchair use for mobilization. She was discovered to have sleep apnea, hypoventilation and chronic hypercapnic respiratory failure secondary to diaphragm and respiratory muscle weakness. She clinically benefited from institution of nocturnal noninvasive bilevel positive airway pressure (BIPAP) ventilation. Eventually, the diagnosis of Pompe disease was established by muscle biopsy.

Pompe disease (glycogen storage disease type II, acid maltase deficiency) is a rare autosomal recessive genetic disorder that results in accumulation of glycogen in the lysosomal storage vacuoles. The imbalance promotes cell dysfunction and eventually cell death primarily in skeletal, cardiac muscle, hepatocytes and the nervous system. Three forms of acid maltase deficiency have been described: the infantile, juvenile and adult. In the adult form, in contrast to other neuromuscular diseases, severe respiratory failure may be the initial clinical feature and be preceded by only mild to moderate skeletal muscle weakness as in our case. Treatment, until recently have been supportive measures, and the overall prognosis was poor with the main cause of death being from respiratory failure. In 2006, Health Canada approved enzyme replacement therapy with alfa glucosidase (Myozyme®) as treatment for Pompe disease. This treatment has extended survival and improved quality of life with improvements in respiratory and motor function. Initial symptoms are often nonspecific and slowly progressive leading to delay in diagnosis. The importance of considering this Orphan Disease as a differential diagnosis in patients presenting with respiratory failure and muscle weakness has now become even more critical with the availability of effective treatment with enzyme replacement. We will present the clinical, pathological presentation and investigations along with current approach to management of Pompe disease.

Financial support: None

IMPACT OF PULMONARY ENDARTERECTOMY ON PULMONARY ARTERIAL COMPLIANCE IN PATIENTS WITH CHRONIC THROMBOEMBOLIC PULMONARY HYPERTENSION

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RATIONAL: Chronic thromboembolic pulmonary hypertension (CTEPH) is predominantly a disease of the elastic pulmonary arteries. However, the impact of CTEPH and the results of pulmonary endarterectomy (PEA) on pulmonary arterial compliance (Cp) have not been analyzed systematically.

METHODS: Cp was assessed in 47 consecutive patients with CTEPH. Cp was defined by stroke volume over pulse pressure (SV/PP), and SV was calculated by cardiac output (CO) divided by heart rate. PH was defined by mPAP >25 mmHg at rest.

RESULTS: Cp ranged between 0.5 and 3.8 (median 1.1) mL/mmHg. There was an inverse relationship between Cp and pulmonary vascular resistance ($p<0.0001$). Cp was abnormal in 5 patients with CTEPH (1.9 to 3.4, median 2.2 mL/mmHg) despite the absence of PH at rest. Among 33 patients undergoing PEA, 1 died postoperatively for an in-hospital operative mortality of 3%. Cp improved from 1.4±0.9 to 3.2±1.6 mL/mmHg ($p<0.0001$). After a median follow-up of 22 months (range 1-50 months), all but one patient have remained stable functionally. NYHA class improved from 3.2±0.6 to 1.4±0.5. All patients with postoperative Cp>4 mL/mmHg were in NYHA class I. The 6' walk distance improved from 346±142m preoperatively to 460±95m after PEA ($p=0.002$). There was a significant correlation between the change in Cp and improvement in 6' walk distance.

CONCLUSIONS: Cp can be abnormal in CTEPH despite the absence of PH at rest. Cp is an important marker to assess patients with CTEPH and response to PEA.

Financial support: None

SLEEP DISTURBANCES IN A CANADIAN POPULATION WITH ASTHMA OR CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD)

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RATIONALE: Asthma (A) and chronic obstructive pulmonary disease (COPD) can be associated with sleep disturbances.

OBJECTIVE: To compare the self-reported prevalence of sleep duration and quality in patients with asthma, chronic bronchitis (CB), or undefined COPD in the Canadian population.

DESIGN: This cross-sectional survey was done using the Public Use Microdata File Canadian Community Health Survey (CCHS) Questionnaire for Cycle 1.1 (2000-2001). Ninety-eight percent of the Canadian population was represented by a sample of 133,000 persons, aged 12 or older.
RESULTS: A higher frequency of difficulty falling or staying asleep most of the time was observed in people with asthma (19.1%), chronic bronchitis (29.7%), or COPD (30.9%) compared to the general population (GP: 12.8%). Less patients with these conditions reported finding their sleep "refreshing" most of the time (A: 50.7%; CB: 42.1%; COPD: 45.1%) compared to those without these ailments (62.3%). A difference was also observed in regard to the difficulty to stay awake most of the time during the day (A: 8.3%; CB: 10.5%; COPD: 11.0%; GP: 5.7%) and on the report of chronic fatigue (A: 1.7%; BC: 3.2%; COPD: 5.2%; GP: 0.8%).
CONCLUSION: Canadians with asthma and COPD report more sleep disturbance and chronic fatigue than healthy people.
Source de financement : fonds locaux

FAMILIAL PULMONARY FIBROSIS: AN EXPLORATORY STUDY

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RATIONALE: Idiopathic pulmonary fibrosis (IPF) is a progressive, fatal, fibrotic disease of the lung. There are no treatments available that have been shown to halt or reverse its progress. Familial pulmonary fibrosis (FIPF) is defined as pulmonary fibrosis identified in two or more members of a family. Current hypotheses speculate that a combination of genetic predisposition, host, and environmental factors interact to result in the final phenotype expression. The clinical characteristics, histopathology, and prognosis associated with FIPF are indistinguishable from that of IPF. The estimated incidence of FIPF is 2-3%. Anecdotal evidence from our clinic suggests that this may be an underestimation and that the incidence of FIPF may be as high as 20%.
HYPOTHESIS: The prevalence of FIPF is greater than 3%.
METHODS: This is an exploratory study of adults with a diagnosis of IPF followed in the Interstitial Lung Disease Clinic in Calgary. Data were prospectively collected via focused interviews and chart reviews in clinic.
RESULTS: 47 consecutive patients were screened for this study. Twenty patients had a clinical diagnosis of IPF. Thirteen of these patients (65%) had a family history of any lung disease. Five patients had one or more relatives with a history of pulmonary fibrosis (20%). Two of these patients (10%) met the definition of FIPF. The quality of the familial data was poor: although one patient provided autopsy evidence of a diagnosis of UIP in a family member, most of the diagnoses were based on hearsay.
CONCLUSION: This study provides preliminary data for a planned larger study whose aims are to identify subjects at risk for FIPF based on family history.
The research was funded by the University of Calgary ILD Database fund.

ANALYSIS OF HOSPITAL DISCHARGE DATA TO CHARACTERIZE OBSTRUCTIVE SLEEP APNEA AND ITS MANAGEMENT IN PEDIATRIC AND ADOLESCENT PATIENTS HOSPITALIZED IN CANADA: 2006 TO 2007

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RATIONALE: The prevalence of obstructive sleep apnea syndrome (OSA) is estimated to be between 2-3% in the pediatric and adolescent population. Currently the Canadian Thoracic Society Sleep Disordered Breathing Committee recommends that patients with OSA and undergoing procedures associated with sedation, analgesia and anesthesia be considered at increased risk of adverse events. However the prevalence and management of OSA has not been described in hospitalized patients in Canada. The aim of this study was to describe the prevalence and clinical management of OSA in pediatric and adolescent patients hospitalized in Canada.
METHODS: A retrospective analysis of all hospitalized pediatric and adolescent patients with a discharge diagnosis that included OSA was completed. Cases of OSA were identified from the 2007 CIHI-DAD, coded according to the International Classification of Diseases, Tenth Revision, Canadian version (ICD-10-CA). The ICD-10-CA code used to identify OSA was G47.30. For this OSA cohort we sought information on age, gender, province of treatment, length of stay, most responsible diagnoses, secondary diagnoses and health interventions.
RESULTS: In 2007 there were 163,726 acute care hospital separations for patients in the age group birth through adolescents. 1.2% (n=2010) of this cohort had a discharge diagnosis that included OSA and this syndrome was most prevalent between the ages 0-9 years. Coding of OSA was highest in Alberta and lowest in Prince Edward Island. The most common comorbidities for patients in this OSA cohort were diseases related to hypertrophy of the adenoids and tonsils. Fifty-four percent of children, with a hospital discharge diagnosis that included OSA, received an adenotonsillectomy during their stay.
CONCLUSIONS: The percentage of hospitalized patients with a diagnosis that included OSA was less than half that of the estimated prevalence. Practices pertaining to the reporting and coding of OSA may account, in part, for these findings.
Financial Support: None

PATHOGENS AND ANTIMICROBIAL RESISTANCE DETERMINANTS IN BIOAEROSOLS OF CAGE-HOUSED AND FLOOR-HOUSED POULTRY OPERATIONS

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RATIONALE: Many antibiotics used in human medicine are also used in the poultry industry as growth promoters, at low doses in feed or water, to increase animal daily weight gain. Antimicrobial resistance (AMR) acquired directly, through zoonotic infections, or indirectly, through transfer of resistance genes from animal bacteria to human pathogens, is a major public health concern. Pathogens can be transmitted through contaminated food or water and through contact with infected animals. Respiratory transmission of pathogens and AMR genes is recognized, but poorly characterized. It presents a possible risk to poultry workers, their families and the community. AMR determinants are commonly identified in poultry feces, rarely in bioaerosols. Few studies exist that compare the environments between cage-housed and floor-housed poultry operations. To our knowledge, this is the first investigation of AMR prevalence in cage-housed and floor-housed bioaerosols. Our objective is to detect pathogens and AMR determinants in bioaerosols from poultry operations in order to assess the risk of respiratory transmission.
METHODS: Bacteria were quantified, using real-time PCR, and AMR genes detected, using end-point PCR, in bioaerosols from poultry facilities. DNA was extracted from air samples collected from 15 cage-housed and 15 floor-housed Saskatchewan poultry operations.
RESULTS: Staphylococcus, Enterococcus and E. coli were the most frequently measured bacteria and were present at significantly higher quantities in floor-housed bioaerosols ($p<0.001$). C. perfringens was present at significantly higher quantities in cage-housed bioaerosols ($p<0.05$). Campylobacter was detected in only 2 floor-housed samples and Salmonella was undetected.
CONCLUSIONS: Staphylococcus, Enterococcus and E. coli are frequent in poultry bioaerosols and are known to harbour resistance genes against

antibiotics used in human medicine. Our data suggest a possible respiratory route for pathogen transmission. The presence of AMR determinants in bioaerosols requires further investigation.

Financial support: This research project is supported by the Canadian Institutes of Health Research.

RESPIRATORY RESPONSES AND COMPONENTS IN AGRICULTURAL DUSTS

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RATIONALE: Individuals engaged in work in intensive animal houses experience some of the highest rates of occupationally related respiratory symptoms and lung function decrements. Within the poultry industry there are differences in respiratory symptoms based on the type of poultry handled where cage-housed (CH) poultry operation workers report greater current and chronic respiratory symptoms compared to workers from floor-housed (FH) operations. Organic dust and, in particular, endotoxin has been most closely associated with respiratory symptoms and lung function changes, however, agricultural dust is a complex mixture in which endotoxin appears to explain only a fraction of the respiratory response. Characterization of dust samples from a farm house, a swine barn, and a cage housed and floor housed poultry operation were undertaken to identify common elements within these dusts which may assist in explaining respiratory reactions in workers.

METHODS: Settled dust samples from a farm home, a swine barn, and a cage-housed and a floor-housed poultry operation were collected. Extracts were analyzed using a number of approaches including assays for total N, P, K, S, B, Ca, Fe, Mg, Mn, Zn; endotoxin assays; scanning electron microscopy. Major water-soluble organic components were separated by FPLC, visualized using SDS-PAGE gels and prominent bands underwent mass spectrometry and identification through the NCBInr database. The individual FPLC fractions were further assayed for their abilities to induce IL-6 and IL-8 release from A549 cells and Ca^{++} flux within human peripheral blood monocytes.

RESULTS: The dusts from the different agricultural operations contained varying levels of endotoxin (swine 2400 EU/mg; CH poultry 901 EU/mg and FH poultry 538 EU/mg). Endotoxin in the respirable fraction of the dust accounted for 22% of the total endotoxin in the CH poultry operations whereas it accounted for only 11% in the FH poultry operations. In the swine operation the major organic compounds identified by mass spectroscopy were swine feed components (soy, canola and barley). The different FPLC fractions elicited different IL-6, IL-8 and Ca^{++} flux patterns but their endotoxin loads did not correlate well with their abilities to activate cells.

CONCLUSIONS: Dust from different agricultural operations has varying levels and distinct components and these variably elicit inflammatory responses. Dust complexity based on type of animal housing and feed source may be factors of interest in explaining respiratory reactions of workers.

Financial Support: Provided by the Canadian Institutes of Health Research – CCHSA-Centres for Research Development Grant Pilot Project funding

TUBERCULIN SKIN TEST SIZE AND RISK OF TB AMONG NON-TREATED CONTACTS OF TB CASES

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RATIONALE: To our knowledge, no studies have assessed the risk of developing TB among untreated contacts of TB cases.

OBJECTIVE: To assess the risk of developing TB based on tuberculin skin test sizes in contacts of TB cases who did not receive treatment for latent TB infection.

METHODS: This is a population-based retrospective cohort study with a 12 year follow-up of contacts of active TB cases recorded in British Columbia, Canada. The risk of developing active TB for infected and non-infected contacts – according to tuberculin skin test size – was estimated using incidence rates. The information about immunosuppressive conditions was obtained by cross-linking several provincial databases. Contacts with HIV infection or with previous TB were excluded.

RESULTS: Among 26,542 contacts, 180 individuals developed TB (tuberculosis rate 678/100,000). Household contacts with a tuberculin skin test size 0-4 mm had a TB rate of 1,014/100,000; those with 5-9 mm a TB rate of 2,162/100,000 and those with 10-14 mm a rate of 4,478/100,000. Children 0-10 yrs old, with 0-4 mm, had a TB rate of 806/100,000, those with 5-9 mm a TB rate of 5,556/100,000 and those with 10-14 mm a rate of 42,424/100,000. Immunosuppressed contacts with skin test sizes 0-4 mm had a TB rate of 630/100,000; those with 5-9 mm a TB rate of 1,923/100,000 and those with 10-14 mm a rate of 1,770/100,000.

CONCLUSIONS: TB rates were high for all tuberculin skin test sizes in household contacts, 0-10 year-old contacts and immunosuppressed contacts. These contacts may benefit from treatment for latent TB infection, regardless of their tuberculin skin test size.

Financial support: None

THE EFFECT OF TOBACCO CONTROL ON THE SMOKING BEHAVIOUR OF CANADIANS IN QATAR

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INTRODUCTION: Canada has relatively strict tobacco control policies as public smoking is banned in most jurisdictions and cigarettes are heavily taxed. In Canada, cigarettes cost approximately $10 for a package of 20. Corresponding with an increase in tobacco control over the past several decades, smoking prevalence in Canada has decreased significantly, currently at 19%. Qatar has less strict tobacco control with a high prevalence of public smoking and cigarettes are not taxed. In Qatar, cigarettes cost approximately $2 for a package of 20. Data on smoking prevalence in Qatar is difficult to collect due to cultural and religious restrictions. However, some studies have estimated the smoking prevalence in Qatar to be greater then 50%.

RATIONALE: The rationale of this study was to evaluate the effect of a decrease in tobacco control on the smoking behaviour of Canadians.

METHODS: Cross-sectional design utilizing a web-based questionnaire to a convenience sample (n=181) of Canadians employed at a college in Qatar.

RESULTS: Prevalence of smoking among Canadians was found to be significantly higher while living in Qatar (Qatar – 18%, Canada – 14%; p=0.000). Over 60% of smokers consumed more cigarettes in Qatar. Current smokers cited low prices and increased public smoking as reasons for their recidivism and increased consumption.

CONCLUSIONS AND IMPLICATIONS: The availability of cheaper cigarettes and increased access to public smoking may lead to an increase in smoking prevalence and consumption of cigarettes. The results are important because they indicate if tobacco control in Canada is decreased, the prevalence of smoking and consumption of tobacco may increase.

ANALYSIS OF HOSPITAL DISCHARGE DATA TO CHARACTERIZE OBSTRUCTIVE SLEEP APNEA AND ITS MANAGEMENT IN ADULT PATIENTS HOSPITALIZED IN CANADA: 2006 TO 2007

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RATIONALE: Obstructive sleep apnea (OSA) affects 2-7% of middle-aged persons and represents a substantial healthcare burden. Despite its

prevalence little is known about the demographic characteristics or clinical management of hospitalized sleep apnea patients in Canada. The gold-standard for treating OSA in adults is continuous positive airway pressure (CPAP) therapy and compliance with this therapy may be especially important in patients experiencing concomitant acute and chronic disease and illness and those undergoing procedures associated with sedation, analgesia and anesthesia. The purpose of this study was to describe the clinical characteristics and management of hospitalized OSA patients in Canada.

METHODS: A retrospective analysis of extracted data of hospitalized patients with obstructive sleep apnea using the 2007 CIHI-DAD was completed. Cases of obstructive sleep apnea were obtained from discharge records coded according to the International Classification of Diseases, Tenth Revision, Canadian version (ICD-10-CA) and were identified using the ICD-10-CA code G47.30. A subset of these patients, those receiving CPAP therapy, was further identified using the Canadian Classification of Health Interventions code 1.GZ.31.CB-ND.

RESULTS: An examination of discharge data of 2,400,245 acute care hospital abstracts identified 8,823 cases of OSA. Approximately 52.4% of these individuals were 40-69 years old with a gender distribution of 66.5 % males. The most common co-morbidities in the adult OSA population were obesity, cardiovascular disease, type 2 diabetes mellitus and chronic obstructive pulmonary disease. Only 4.8% of hospitalized adult patients coded for OSA were reported to have received CPAP therapy during their stay.

CONCLUSIONS: Only a small percentage of hospitalized OSA patients were recorded as having received CPAP therapy during their stay. Issues relating to the accuracy, specificity and completeness of the CIHI-DAD specific to OSA and its management were identified. Practices pertaining to reporting, coding and management of adult OSA patients in hospital warrant further investigation and research.

Financial Support: None

COPD / MPOC

GOOD AIR DAYS, BAD AIR DAYS

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RATIONALE: There is ample evidence that air pollutants exacerbate chronic obstructive pulmonary disease (COPD), most notably the association of ozone (O_3) and particulate matter (PM) with respiratory hospital admissions, decrements in lung function, and premature deaths. However, little is known about what differentiates a "good air" day from a "bad air" day from a patient's perspective. The goal of this study was to determine what local atmospheric characteristics are associated with each type, and whether air quality (AQ) changes on a timescale of less than a day play a role.

METHODS: During the summers of 2002 and 2003 two cohorts of COPD patients (N=49) in London, Ontario, completed a daily questionnaire indicating the degree of shortness of breath they experienced while doing two everyday activities self-chosen from the short-form Chronic Respiratory Questionnaire (CRQ). Simultaneous 1-minute AQ data were accumulated at several sites in London. These included O_3, NO_2, PM_{10} (diameter less than 10 μm), and $PM_{2.5}$ (diameter less than 2.5μm), as well as atmospheric pressure, air temperature, and relative humidity. The health questionnaire–AQ data were analyzed using Spearman's rank correlation method.

RESULTS: Statistically significant ($p<0.001$) correlations were observed between breathing difficulty and daily means of O_3, $PM_{2.5}$, PM_{10}, and temperature. No correlation ($p>0.1$) was observed between breathing difficulty and relative humidity. A lag effect of one or two days was observed for O_3, $PM_{2.5}$, and PM_{10}. No independent measures of intraday AQ variability were significantly correlated with breathing difficulty.

CONCLUSION: With the significant exception of relative humidity, poorer daily AQ correlates positively with increased breathing difficulty for COPD patients involved in routine activities. AQ variability on a timescale of less than a day does not appear to play a significant role.

Financial Support: Canada Foundation for Innovation, Ontario Innovation Trust, Centre for Research in Earth and Space Technology

RISK OF MALIGNANCY OF PULMONARY NODULES WITH LOW ^{18}F-FDG UPTAKE ON INTEGRATED PET/CT IMAGES

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RATIONALE: Pulmonary nodules are common in clinical practice. Interpreting such findings is often a diagnostic challenge. Integrated PET/CT has been demonstrated to be a cost-effective strategy and is widely used for this purpose. However, little is known about the prevalence of malignancy among pulmonary nodules with low ^{18}F-FDG uptake (standard uptake value or SUV < 2.6) and their clinical presentation.

METHODS: From 2005 to 2007, we assessed all patients who had pulmonary nodules with a diameter from 8 to 30 mm and a SUV < 2.6 on whole-body PET/CT (n=77). We excluded patients with prior thoracic malignancies or known current cancer, nodules with benign calcifications or multiples nodules (n=12). A total of sixty-five patients with either a pathological diagnosis or a clinical follow-up until spontaneous regression or radiological stability for at least three years were included.

RESULTS: From the 65 patients, 20 (30.8%) had a proven malignancy (13 following thoracic surgery and 7 diagnosed by clinical follow-up). Most cases were adenocarcinomas or bronchioloalveolar tumors (15/20) and carcinoids (3/20).

	Benign nodules	Malignant nodules	p value
Nodule size (mm)	12.4 ± 4.1	12.9 ± 4.1	0.69
Spiculated nodule (%)	13	35	0.04
^{18}F-FDG uptake (SUV)	0.67 ± 0.83	1.64 ± 0.46	<0.001
Upper-lobe nodule (%)	62	55	0.58
Former or active smokers (%)	82	85	0.99
Prior malignancy (%)	18	20	0.99
Age (years)	64.2 ± 10.8	62.5 ± 11.8	0.55
Gender, female (%)	36	55	0.14

CONCLUSIONS: Nodules with low ^{18}F-FDG uptake (SUV< 2.6) were malignant in 30.8% of cases. Malignant nodules had a statistically higher SUV and were more often spiculated compared to benign nodules. Most cases were non-small cell lung cancers and therefore potentially curable if identified earlier with PET/CT.

Financial Support: Local Funds

THE EFFECTS OF PULMONARY REHABILITATION (PR) ON PEROXISOME PROLIFERATOR ACTIVATED RECEPTOR (PPAR) EXPRESSION IN SKELETAL MUSCLE IN COPD

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BACKGROUND: The transcription factors PPARs and PGC-1 coactivator (PGC-1) are key regulators of oxidative capacity in skeletal muscle. In

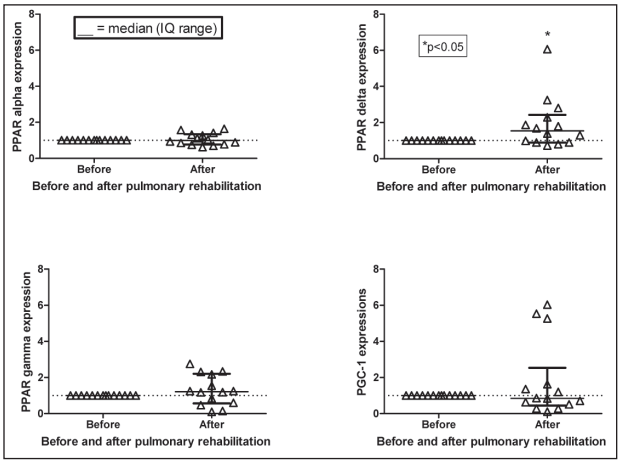
COPD there is a relative reduction in the proportion of type I oxidative fibres which can be partially reversed with exercise training. This pilot study investigates whether PPAR mRNA expression in skeletal muscle is altered after PR in COPD.

METHODS: 18 patients with COPD; mean (SD) age 67(7) yrs, FEV_1 % predicted 40 (15)% underwent seven weeks of pulmonary rehabilitation (PR). All patients performed an incremental shuttle walk test (ISWT) and had a percutaneous vastus lateralis biopsy before and after PR. MHC isoforms were analysed by gel electrophoresis and PPAR alpha (α), delta (δ), gamma (γ), and PGC-1 mRNA expression by quantitative PCR. The comparative $2^{-[\delta][\delta]}$ Ct method was used to describe the results of PR compared to a baseline of 1 using a housekeeping gene.

RESULTS: All four genes were expressed in the skeletal muscle at baseline, but PPAR δ was significantly higher ($p<0.001$). 14 patients completed PR. The mean (95% CI) change in ISWT with PR was 86 m (44 to 128 m) $p=0.001$. There was a relative increase in the proportion of type 1fibres after PR ($p<0.05$). The PPAR mRNA expression before and after PR is shown in figure 1. There was no correlation between the change in PPAR delta mRNA expression and the change in fibre type proportion or with the change in ISWT distance after PR.

CONCLUSION: PPARδ mRNA expression was significantly increased in skeletal muscle in COPD after seven weeks of PR. There was a heterogenous response with the other PPARs and PGC-1.

Financial Support: UHL NHS trust research fellowship



THE LIVED EXPERIENCE OF PROVIDING CARE FOR A SPOUSE WITH SEVERE COPD IN RURAL SASKATCHEWAN

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RATIONALE: COPD is a major public health concern and its prevalence is expected to rise in the coming years. With the provision of health care shifting from hospital to home, the major burden of care falls on informal caregivers, of whom 38% are aging spouses with their own health concerns. The many challenges of providing care for people with other chronic illnesses has been well documented in the literature; however, few studies have explored the unique issues inherent in providing care for someone with COPD. The challenges of providing care may be further compounded by residing in rural areas where accessibility may impact on care quality. The purpose of this study was to explore the lived experience and meaning of that experience for a sample of spousal care givers providing care to a person with severe COPD in rural Saskatchewan.

METHODS: Face-to-face, conversational interviews along with, close observation and field notes were used to gather information from six caregivers, (female n=5) of spouses with severe COPD in rural Saskatchewan. Hermeneutic phenomenological reflection, as guided by the works of van Manen, utilized writing, collaborative discussion, life world existentials, and imaginative variation to illuminate themes and the overall essence of this experience. Data, field notes and memos were retained to provide an audit trail.

RESULTS: Five themes identified stemmed from the essence of unrelenting responsibility: 1) Maintaining vigilance; 2) Assuming alternate roles; 3) Ensuing strain; 4) Ongoing ambivalence; 5) Intermittent reprieve.

CONCLUSIONS: The responsibility and support provided by these caregivers is essential for a person with COPD. To sustain caregivers in their roles, clinicians must monitor for signs of burden, advocate for respite services, and include caregivers in self-management education and decision making.

Financial Support: We gratefully acknowledge the financial support received by Shelly Hutchinson from a CRHP fellowship.

CARRYING ON WITH LIVING: THE IMPACT OF PULMONARY REHABILITATION ON THE HEALTH BEHAVIOUR OF OLDER ADULTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE

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RATIONALE: This study explored the health behaviour of older adults with COPD following a course of pulmonary rehabilitation. Objectives included: 1) to explore the meaning of successfully managing COPD; 2) to identify health behaviour strategies utilized; 3) to identify factors influencing health behaviour change; and 4) to understand the impact of pulmonary rehabilitation (PR) on health behaviour.

METHODS: For this qualitative study, a grounded theory approach was used in order to develop theory to explain the process of health behaviour change in older adults with COPD. In-depth interviews were conducted in a sample of 11 community-dwelling older adults who completed a PR program. Interview data were coded in three stages (open, axial, and selective) and constant comparative analysis was used to compare and contrast incoming data with emerging theory.

RESULTS: Two distinct models were developed representing participants' experience with COPD and health behaviour change in relation to the impact of pulmonary rehabilitation: Struggling with Living: Life with COPD before Pulmonary Rehabilitation; and Carrying on with Living: Life with COPD following Pulmonary Rehabilitation. In both models, health behaviour change was influenced by external and personal factors.

CONCLUSIONS: Older adults with COPD engaged in a limited repertoire of health behaviour strategies which were relatively ineffectual prior to participation in PR. PR had a major impact on health behaviour by affecting the COPD experience, increasing the repertoire of health behaviour strategies, influencing external factors, and enhancing personal coping resources. With greater awareness of the factors influencing health behaviour in older adults with COPD, health professionals can better target interventions to support health behaviour change in this population.

Financial support: Support for this research was provided through the Canadian Respiratory Health Professionals Fellowship Fund and the Ontario Respiratory Care Society Fellowship Fund.

GROWING OLD WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE

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Chronic Obstructive Pulmonary Disease (COPD) is an insidious, progressive debilitating disease that usually begins in the third decade of life. Unfortunately, COPD is often not detected until the fifth decade when considerable structural and functional change has occurred within and outside the lung. A widely held essential element of COPD care is comprehensive pulmonary rehabilitation (PR) which is designed to reduce symptoms, enhance functional status and stabilize or reverse systemic manifestations of the disease. Patient assessment, exercise training, education, nutritional interventions and psychosocial support are typical PR components. Optimizing each patient's quality of life is a key goal of PR. But there remains a need to more clearly delineate psychosocial outcomes and interventions to inform the content of PR. Growing interest lies in the

relationship between patients' illness perceptions and self-management strategies undertaken in response to illness and its treatment. Logically, patients' beliefs about growing old influence their perceptions about COPD and its treatment. But we lack valid instruments to study this field. The purpose of this descriptive pilot study was to explore the utility of a measure of peoples' views about growing old among people with COPD. Eighty-four patients with COPD, aged 47 to 87 years were recruited from a PR program in Edmonton. The Attitudes to Ageing Questionnaire (AAQ), used to measure views on ageing, was administered to study participants on two occasions post-PR. Other routinely measured PR outcome data included: FEV_1, 6 minute walk, peak exercise tolerance and disease specific and health related quality of life. The results showed the AAQ has reasonable internal consistency and test-re test reliability. Convergent and divergent validity evidence was demonstrated in correlations between the AAQ and the quality of life measures. The implications for future research and practice are highlighted.

Funding Source: Caritas Health Group

Knowledge Translation and Program Implementation / Application des connaissances et execution de programmes

INCREASING PHYSICIANS' KNOWLEDGE OF ASTHMA PATIENT CARE VIA AN ONLINE CONTINUING EDUCATION (CE) ASTHMA PROGRAM

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RATIONALE: The majority of studies on learning outcomes suggest that online continuing education (CE) programs are effective in enhancing participants' knowledge. Many of these studies are based on one group pre/post-test study designs in various clinical areas. The purpose of this study is to present the impact of an online CE Asthma program on physicians' knowledge.

METHODS: Twenty (N=20) identical pre-post knowledge assessment items completed by participants prior to, and immediately after, their participation in the course.

RESULTS: The program was available for one year; June 2008-2009. It was accredited for Maincert Section 1 credits (Royal College of Physicians and Surgeons of Canada), but was open to all health care providers. Content was presented around 11 topic areas. Pre/post questions were reflective of the topics within the course; an incorrect response on the pre-test directed participants to the specific topic to help focus their learning. The course had N=457 registrants; N=125 completed both pre and post-tests (completion of pre-test was voluntary). Results of a paired samples t-test show that there was a significant pre to post knowledge increase identified at the $p < .05$ probability level (p=.000).

CONCLUSIONS: The pre/post results for the Asthma course show that this online program has increased physicians' knowledge of the diagnosis, treatment, and management of the disease. This further supports the literature that a pre/post study design can be effective in guiding participants learning in an online format.

Financial Support: This online CE program is based on the Canadian Thoracic Society (CTS) accredited specialist education program "Charting New Courses in Asthma Management". Development was funded via an unrestricted educational grant from Astra Zeneca. It was delivered via MDcme.ca, which is funded by various sources, including federal & provincial government, national & provincial health professional associations, and the private sector via unrestricted educational grants

PEDIATRIC PULMONARY REHABILITATION: USING A MULTI-MEDIA APPROACH TO IMPROVE FITNESS IN CHILDREN WITH CHRONIC LUNG DISEASE

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RATIONALE: Reduced exercise capacity in children with chronic lung disease (CLD) is disabling and negatively affects quality of life. School performance, fatigability, and a reduction in emotional health have been associated with poor lung health. Many lung diseases are associated with reduced exercise capacity including obstructive lung diseases (asthma, bronchiectasis, bronchiolitis obliterans, and cystic fibrosis), restrictive lung diseases (interstitial lung diseases, chest wall disorders – e.g. scoliosis, and neuromuscular diseases) and other categories (e.g. ventilator dependency) and exercise intolerance can lead to worsening lung function. Clearly implementing a program that can improve exercise tolerance will benefit the child's health and emotional well-being. Pulmonary rehabilitation (adults) has been shown to reduce the symptoms of the disease experienced by the patient (such as dyspnea or shortness of breath), increase exercise performance, improve measures in quality of life, and reduce health care costs (direct and indirect).

PURPOSE: To develop a Pediatric Pulmonary Rehabilitation Program.

OBJECTIVES: A comprehensive Physician supervised (Pediatric Respirologist), Physiotherapist administered program to meet the needs of children suffering from chronic lung disease by developing a sensible exercise and educational program. The program is tailored to children & is disease specific to increase pulmonary fitness and reduce the burden of disease. Children for the program are identified through the Respirology Out-patient clinic and undergo evaluation including spirometry, standardized exercise testing, and nutritional assessment. The program runs after school hours and consists of activity, exercise and education. An individualized home program is provided which includes a Wii/ Wii-Fit plan to promote compliance at home. Following the intensive program (2 weeks), a maintenance program is implemented through the out-patient department and at school. Pediatric Pulmonary Rehabilitation is in its infancy and advocating for pulmonary health through programs such as this is essential to improve quality of life for children with chronic lung disease.

Financial Support: Children's Hospital Foundation: Child Health Grant

PEDIATRIC TRACHEOSTOMY GUIDELINES: MORE THAN A HOLE IN THE NECK. THE DEVELOPMENT OF GUIDELINES FOR PRE-OPERATIVE CONSIDERATIONS AND POST-OPERATIVE MANAGEMENT OF NON-URGENT PEDIATRIC TRACHEOSTOMY

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PURPOSE: To guide the multidisciplinary team in ensuring an efficient and effective process for decision making for non-emergent tracheostomy (trach) insertion in pediatric and neonatal patients within the Child Health Program, Health Sciences Centre site.

BACKGROUND: There are many reasons why a child may be considered for a tracheostomy but this should (in most circumstances) never be the only choice. A tracheostomy is often regarded as the "solution" to a host of airway difficulties/chronic respiratory insufficiency and for many health care providers the surgical procedure is viewed as the final resolution. A tracheostomy is more than a procedure; the child may require chronic mechanical ventilation and it (tracheostomy) is a life altering event which results in enormous challenges including not only the physical care and responsibility of the child but with significant psycho/social/family implications. The family will

be under a great deal of stress, with the potential of divorce higher than the Canadian norm. The family may need to relocate based on the medical needs of the child. Community resources are scarce and there is minimal 'out-of-home' respite available. Families often state that they are not prepared for the long-term consequences. Guidelines: Two guidelines have been developed to date: 1) Pediatric / Neonatal Tracheostomy: Decision-Making and Pre-Trach Management and 2) Pediatric/Neonatal Tracheostomy: Post-Operative Management and Care Planning.
OUTCOME: The guidelines have been implemented with all non-urgent requests for tracheostomy referred to the Trach team/committee which includes Bioethical consultation. The team then evaluates the situation, alternatives have been suggested: not every child referred has undergone tracheostomy. Post-operative management has resulted in improved efficiency in discharge planning.
The guidelines have served as effective tools for decision-making and to ensure that all ethical, medical & surgical options have been explored. A parent decision aid is under development.
Financial support: None

PATIENT AND CAREGIVER KNOWLEDGE ABOUT COPD: FEASIBILITY OF USING THE BRISTOL COPD KNOWLEDGE QUESTIONNAIRE

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RATIONALE: For individuals living with COPD and their caregivers, adequate knowledge regarding the illness and its treatment is critical to effective self-management, although there has been relatively little study of this issue.
METHODS: The feasibility of using the Bristol COPD Knowledge Questionnaire (BCKQ) with a Canadian sample was assessed as a component of two larger studies. This 65-item questionnaire assesses thirteen key topics related to COPD using true/false questions and demonstrated reliability and validity in the United Kingdom. The questionnaire was reviewed by two certified respiratory educators prior to administration to ensure the instrument reflected Canadian practices and one minor revision made based on their feedback.
Thirteen patients and nine caregivers were included in this preliminary analysis.
RESULTS: Patients and caregivers with varying amounts of COPD-related education were able to complete the BCKQ without difficulty. Out of a possible 65 total points on the BCKQ, patient scores ranged from 18 (29%) to 38 (59%), while caregiver scores ranged to 28 (43.1%) to 43 (66.2%). The mean scores were 46.3% (S.D. =10.3) and 55.2% (SD=8.2) for patients and caregivers respectively. All respondents correctly identified changes in phlegm color as an indicator of infection. Less than 25% of respondents provided correct responses to thirteen of the BCKQ items, with the greatest knowledge gaps related to breathlessness and the actions of steroids.
CONCLUSIONS: The BCKQ is a promising instrument for evaluation of the knowledge about COPD for patients and their caregivers within a Canadian context, although formal validation is required. Use of a standardized instrument to evaluate knowledge will assist health care providers to identify and remediate significant knowledge gaps, thereby promoting greater self management capacity. Changes in COPD knowledge are important outcome measures to evaluate the efficacy of interventions.
Funding: Financial support was provided through a research grant from the CRHP

ACTIVE AIRWAYS MARCH BREAK CAMP: WHERE ASTHMA, SPORTS AND FUN COME TOGETHER!

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INTRODUCTION: Asthma education is an integral part of asthma management and should aim primarily at changing patient behavior, rather than simply improving knowledge. Our camp explored opportunities to focus on a preventative health model versus a reactive response to asthma exacerbations.
KEY OBJECTIVES: To allow children with asthma, ages 6-12 yrs old, a camp experience emphasizing physical activity, in a fun, safe environment, incorporating best practice and consensus guidelines, in the provision of asthma education for the campers, parents and camp counselors. To collaborate and develop sustainable working relationships, with the broader community.
METHODS: Satisfaction questionnaires completed by the campers and parents were used to evaluate the program. Inhaler technique was observed and evaluated pre/post using the RNAO's Inhaler Device Assessment Tool.
RESULTS: Significant improvements were witnessed with inhaler techniques. The campers also learned how to recognize, document their symptoms and perform peak flow measurements. They learned strategies in preparing for exercise, enabling them to be actively involved in the various sporting activities offered at the camp. When the parents picked up their children of the day it allowed us the opportunity to discuss and reinforce their child's asthma management. Collaborating with the local community centre in this initiative opened the door for future endeavors.
CONCLUSIONS AND IMPLICATIONS: Although the number of campers was small, it allowed us the opportunity to focus on optimizing individual asthma management with each camper. We are currently in negotiation with the City of Mississauga, to offer this camp during the March Break and in the summer, as one of their reoccurring programs and using the initiative as a possible pilot project for other chronic diseases.
Financial Support: PRIISME an Initiative of GSK and Credit Valley ProResp

SUCCESS IN PULMONARY REHABILITATION: WHAT PATIENT FACTORS MATTER?

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PURPOSE: In chronic respiratory disease pulmonary rehabilitation provides benefits for some but not all participants. The aim of this study was to identify subjects who benefitted from out-patient pulmonary rehabilitation and determine what characteristics could explain differences between responders and non-responders.
METHODS: A chart review was performed on all candidates for out-patient pulmonary rehabilitation during 2000-2008. Patient data was collected for those who applied to the program, participated, declined, or were denied enrolment or who were lost to follow-up. Success was defined by clinically important changes in the St. George's respiratory questionnaire and/or in the 6-minute walk distance.
RESULTS: Of 525 patients evaluated for out-patient pulmonary rehabilitation, 227(43%) participated. Participants were primarily men (56 %) with a mean age of 69 (10) years. Of those who participated 137 (61%) were successful. Successful participants had greater forced expired volume in 1 second (FEV1) (1.3 vs 1.1 L) ($p < 0.05$) and body mass index (BMI) at baseline (30 vs 28) ($p< 0.05$). There was no relationship with age, gender, chronic hypoxemic respiratory failure or other chronic conditions such as stable heart disease. Successful participants were more likely to be adherent and experience fewer adverse events ($p\leq 0.001$). There was no correlation between BMI, FEV1 and adverse events or failure to complete the program.
CONCLUSIONS: This study reinforces that the majority of participants benefit from out-patient pulmonary rehabilitation and that few commonly measured baseline characteristics can predict success. However our study confirmed that many patients considered in need of pulmonary rehabilitation do not enter the program, suggesting that more effort should be made to encourage and facilitate participation.
Funded by: The Mount Sinai Hospital Research Fund

SMOKING CESSATION AND YOUTUBE: AN UNTAPPED RESOURCE FOR RESPIRATORY HEALTH PROMOTION

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RATIONALE: Smoking is a behavior most commonly tried and established in adolescence. Within Canada, the rate of current smoking for 15 to 19 year olds is 15%. Although many adolescents may be motivated to quit smoking,

few actually engage in a comprehensive quit strategy. Their reluctance to participate in traditional smoking cessation strategies may be related to the fact that many smoking cessation services made available to adolescents have not been adequately tailored to their needs and preferences. A way of addressing this is by developing youth-oriented smoking cessation strategies that can be delivered using socially oriented internet technology. One internet site that contains information on smoking cessation is the video sharing website YouTube (www.youtube.com). However, little is known about the smoking cessation messages being communicated there.

METHODS: This was a descriptive study to characterize video content related to smoking cessation available on YouTube.com. The top 100 videos, selected for relevance, were examined, as well as 20 randomly selected videos. A classification scheme was developed to categorize the types of videos.

RESULTS: Of the 120 videos, 82 were directly relevant to smoking cessation. Fifty-one were commercial productions, 10 of which were anti-smoking advertisements developed by public health agencies. The two other major types of commercial postings were for hypnosis (8 videos) and Nicoblock Fluid (17 videos). Thirty-one were personally produced, of which 9 detailed personal experiences with quitting smoking, 7 described the negative health effects of smoking, and 8 offered advice on how to quit.

CONCLUSION: YouTube has the potential to facilitate tobacco cessation, particularly among adolescent smokers. Although many people are accessing smoking cessation content on YouTube, the majority of the video content we viewed did not appear to be derived from evidence-based best practices. There is need for scientifically supported, professionally produced YouTube content that facilitates smoking cessation.

Financial support: Grant from the Interdisciplinary Capacity Enhancement Project.

PROMOTING EVIDENCE-BASED ASTHMA CARE THROUGH KNOWLEDGE TRANSLATION (PEACKT): DEVELOPMENT OF A REGIONAL ASTHMA CARE NETWORK

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RATIONALE: The gap between asthma guidelines and current practice suggests a need for knowledge translation initiatives. To promote evidence-based, integrated asthma care within the Southeast Local Health Integration Network (SELHIN), we envisioned creating a regional asthma care network and sought to determine local needs across the continuum of care.

METHODS: Asthma care providers, administrators and other stakeholders were invited to participate in one of two focus groups facilitated by a representative from the Queen's School of Business. Using an innovative electronic meeting system, stakeholders were asked to identify the strengths and weaknesses of asthma care, prioritize needs, strategize solutions, and describe attributes of an ideal asthma network.

RESULTS: Twenty-five of 59 invitees attended the focus groups. Participants included primary care physicians, pediatric and adult respirologists, allergists, pediatricians, nurses, respiratory therapists, Certified Asthma/Respiratory Educators, administrators, information technology and medical record experts, and a government representative. Existing strengths included: interdisciplinary collaboration (64%), access to asthma education (60%), and local expertise in asthma (56%) and asthma electronic records (40%). Identified weaknesses included: lack of an integrated electronic medical record (EMR) and standard data language (72%), low referral rates (68%), lack of asthma guideline implementation in primary care (64%), lack of a standardized charting tool (52%) and inequitable access to spirometry and other asthma services (36%). Proposed solutions included: development of a central automatic referral system (75%), a standardized asthma EMR (care plan and data definitions) (62%), an integrated regional asthma EMR (58%), creation of a formal multidisciplinary regional asthma network or collaborative (58%), increased funding and resources (50%), and a communication system to disseminate best practices (50%).

CONCLUSIONS: Development of a collaborative interdisciplinary regional asthma care network within the SELHIN, supported by electronic knowledge translation tools as part of the EMR, automated referrals and a communication system may promote evidence-based asthma care.

Financial support: Government of Ontario's Academic Health Sciences Centre Alternate Funding Plan (AHSC AFP) Innovation Fund

Pediatric / Pédiatrie

RECURRENT BLOODY PLEURAL EFFUSIONS AS A PRESENTATION OF LYMPHANGIOMATOSIS OF THE RIBS AND THORACIC VERTEBRAE

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INTRODUCTION: Lymphangiomatosis is a rare benign neoplasm characterized by abnormal lymph tissue at multiple sites. Presentation of lymphangiomatosis of the thoracic rib and vertebrae is uncommon.

CASE: An 11 year old female presented to the service with 3 episodes of unexplained 'hemothorax'. Each episode was preceded with (L) sided chest pain, hemoptysis and shortness of breath. She had a traumatic injury to her (L) chest prior to the first episode (fall from horse). At the time of her presentation to Respirology, the CXR was consistent with (L) pleural effusion and thin, spindle shaped posterior abnormalities of the (L) ribs # 3-5. A CT chest reflected the same findings, lung parenchyma appeared normal and an MRI added abnormalities of thoracic vertebrae T1. A thoracentesis revealed hemorrhagic fluid with a high lymphocyte count, normal gram stain, negative cultures and chemistry. Given her presentation, a diagnosis of lymphangiomatosis was tentatively made and she went for surgery. A talc pleurodesis was done along with biopsies of the lung, pleura and bone. Pathology (bone) was consistent with the clinical diagnosis.

Following surgery, the child improved and has had no further pleural effusions. Follow-up pulmonary function testing reveals a mild restrictive pattern,

DISCUSSION: Lymphangiomatosis is a rare benign neoplasm of the lymphatic system (believed to be a result of abnormal lymphatic system development in utero) with multiple differing presentations. Involvement of the mediastinum, lung, heart, pleura and pericardium has been described. Rib and thoracic vertebrae involvement is less commonly seen. Clinical presentation depends on the site of involvement and extent of lesions. The clinical diagnosis is confirmed by histology. Recurrent localized pleural effusions secondary to lymphangiomatosis are best treated by drainage and pleurodesis. Adjunctive therapy may be considered in refractory cases.

CONCLUSION: Lymphangiomatosis should be considered in any child who presents with unexplained recurrent pleural effusions.

Financial Support: None

CYSTIC FIBROSIS NEWBORN SCREENING: THE LONDON, ONTARIO EXPERIENCE

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RATIONALE: Cystic fibrosis newborn screening (CFNBS) has been practiced for over 20 years. Benefits of early diagnosis have been documented in nutritional status, cognitive function, lung imaging scores, hospital admissions and survival. In April 2008, the Ontario newborn screening program added cystic fibrosis (CF) to their panel using an IRT/DNA strategy. Our purpose is to document our regional experience with the program.

METHODS: We performed a retrospective analysis of the first 19 months of CFNBS program. Using IRT and a 39 + 3 mutation panel. Patients are then classified into three categories: "A" [IRT > 96th percentile + 2 Mutations]; "B" [IRT > 96th percentile + 1 CF Mutation]; and "C" [IRT > 99th percentile + No Mutations]. Positive screens are evaluated by our service by performing a sweat chloride test (SCT) using the Gibson-Cooke method, as well as repeat genetic testing for 70 + 6 panel. The patients diagnosed with CF are followed by their closest CF centre. The patients with borderline SCT are re-sweated, and based on their results, may be offered gene sequencing as well as a referral to tertiary care center for ancillary testing.
RESULTS: 114 patients have had a positive screen: 7 category "A" with SCT >60 mmol/L [6 homozygous dF508, 1 dF508/c.2789+5G>A], 2 borderline {30-60 mmol/L} [dF508/R117-H], and 1 negative {<30 mmol/L} [dF508/D1152-H]. The category "B" had 8 borderline SCT's, 3 became negative when repeated and the rest stayed the same or increased. Of the 15 category "C", 14 had a negative SCT and one was borderline. 6 of the 7 new CF diagnosis are followed at our center, and currently have a weight and length above 50%.
CONCLUSION: The CFNBS program has detected 12 new CF patients. Early interventions resulted in adequate weight and length percentiles. Close observation of the borderline group as well as ancillary testing will in time dictate the intensity of follow up of this population.

LUNG VOLUME RECRUITMENT BY BREATH STACKING MANEUVERS IN DUCHENNE MUSCULAR DYSTROPHY (DMD)

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RATIONALE: Progressive lung restriction develops during the course of DMD. Various methods for lung volume recruitment are being used to avoid atelectasis and improve airway clearance, e.g. breath stacking, supported insufflation, and cough inexufflation. We studied involuntary breath stacking (IBS) and, in a subgroup of patients, compared this with voluntary (VBS) and supported breath stacking (SBS).
METHODS: Eight male subjects with DMD were studied on 14 occasions (four subjects up to 3 times and up to 2 years apart). All were non-ambulatory and 6 were on nocturnal ventilation support (BiPAP) without supplemental oxygen. Their median age was 14 y (range 13-18) and weight 62 kg (47-117). Their median FVC was 34% predicted (14-61), FEV1 36% (13-61).
IBS was achieved with a one-way valve occluding expiration. The valve and a pneumotach for measurement of flows and volumes were attached to a facemask covering nose and mouth. In 3 subjects we also measured VBS, i.e. using glottic closure for stacking, and SBS, i.e. assisting with a Laerdal® bag during inspiration while stacking with a mask and one-way valve.
RESULTS: Using IBS, the median breath stacking efficiency (BSE), i.e. the number of average tidal volumes (Vt) stacked above end-inspiratory level, was 3.3 (1.6-6.0). The median Vt/kg was 4.8 mL (1.9-6.8). A median of 5.3 breaths were stacked during 15 sec of valve closure (2.7-13.0). Two subjects were unable to stack using IBS. Table 1 shows BSE with IBS, VBS and SBS in 3 subjects (CPF=cough peak flow in L/min) and the %change with SBS compared with IBS:

Subject	FVC	CPF	IBS	VBS	SBS	% change
A	19	160	1.6	1.6	2.9	+87
B	34	330	3.2	3.0	4.4	+37
C	61	275	3.0	2.9	3.0	+1

CONCLUSIONS: IBS requires less cooperation than VBS and is less complex than SBS. Most subjects used IBS successfully. SBS appears to be preferable as weakness progresses in DMD.
Financial Support: This study was supported by the Manitoba Institute of Child Health and the Health Sciences Centre Foundation.

NEW ANTISTATIC YOUTH VALVED HOLDING CHAMBER (VHC) CAN BE USED OUT-OF-PACKAGE AND DELIVER BETA2-AGONIST MEDICATION EFFECTIVELY

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RATIONALE: Adolescents are relatively self-conscious in relation to taking medication. We report in vitro data for a new valved holding chamber (VHC) family whose visual appearance has been enhanced to improve compliance by adolescent users (AC Girlz/Boyz*).
METHODS: VHCs (n=3 devices; 3 replicates/device) were evaluated out-of-package in accordance with manufacturer instructions delivering albuterol (Ventolin*, GSK plc; 100 g/actuation) as a representative beta2-agonist by pressurized metered-dose inhaler (pMDI). The assessment of fine particle mass (FPM <4.7μ m) likely to reach receptors in the airways given took place in accordance with the Canadian Standard for the evaluation of spacers and holding chambers (CAN/CSA/Z264.1-02:2008). This procedure involved a multi-stage cascade impactor operated at 28.3 L/min with the onset of sampling taking place with a 2-s delay following actuation. Recovered albuterol was quantitatively assayed by HPLC-UV spectrophotometry.
RESULTS: FPM <4.7 μm ex VHC (mean SD) was 37.7±3.4 μg/actuation (94.1±1.8% fine particle fraction) with delay. These data compare with 34.8±1.4 μg (45.3±1.4% fine particle fraction) for the pMDI alone.
CONCLUSION: The new VHC delivered a substantially comparable mass of the therapeutically beneficial portion of the aerosol to that from the pMDI alone from this widely prescribed 'rescue' medication when a short delay existed, as is likely with many pMDI users.
Financial Support: The authors are employees of Trudell Medical International who funded the study

THE AGREEMENT BETWEEN QUESTIONNAIRE REPORT OF ENVIRONMENTAL TOBACCO SMOKE EXPOSURE AND LEVELS OF SALIVARY COTININE

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RATIONALE: There has been limited report on the validation of using enzyme immunoassay (EIA) for saliva samples to quantify tobacco smoke exposure in studies of children. The purpose of this study was to assess the reliability and validity of using salivary cotinine to quantify the exposure to tobacco smoke exposure.
METHODS: We conducted a pilot study with 26 children to assess the reliability of EIA lab procedures to quantify salivary cotinine levels, a measure of tobacco smoke exposure. Each sample was run in triplicate on four separate plates. Within-plate and between-plate reliability was assessed by the coefficient of variation (CV) and Spearman's correlation, respectively. Next we completed a case-control study in the Humboldt, Saskatchewan area from 2005-2007 with 6-18 year olds where cases were children with asthma or wheeze (n=310). Interviewer-administered questionnaires which assessed tobacco smoke exposure (parental smoking, number of cigarettes in the home and active smoking) were completed by the parent and child independently. A saliva sample to measure cotinine was also collected from each subject with levels of cotinine being compared to the questionnaire report.
RESULTS: From the pilot study, the within-plate CV was low (<6%) and the correlation between plates was high (>0.59, $p<0.01$). From the case-control study, there were significantly ($p<0.05$) higher levels of cotinine when exposed to any tobacco smoke exposure based on the parental or the children's report by questionnaire. As the amount of smoking exposure in the home increased (0, 1-5, >5 cigarettes per day and neither parent, one parent, both parents), mean cotinine levels increased.
CONCLUSIONS: Cotinine levels as measured by EIA were consistent with responses from questionnaire report from both the parents and the children suggesting that this quick and inexpensive method may be an

appropriate objective method for quantifying tobacco smoke exposure in population-based studies of respiratory health.
Financial Support: Canadian Institutes of Health Research MOP-57907

CARESS: THE CANADIAN REGISTRY OF SYNAGIS (2006-2009)

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RATIONALE: The Canadian Registry Database. (CARESS) collects data on seasonality, risk factors, and outcomes of high risk infants given palivizumab for respiratory syncytial virus (RSV) prophylaxis. This data can be used to inform clinicians and policy makers on trends and outcomes of RSV prophylaxis.
METHODS:. A prospective, observational, registry of infants who received at least 1 dose of palivizumab during the 2006-2009 RSV seasons from 26 sites. Neonatal and demographic data were collected at enrolment. Data on palivizumab utilization, compliance, and outcomes were collected monthly.
RESULTS: 4926 infants aged 2 days to 47 months (mean=5.4 months) were enrolled. Participants were typically male (57.1%), Caucasian (71.5%) with an average gestational age (GA) of 32.2±5.4 completed weeks. 3480 (70.6%) infants received palivizumab for prematurity only (i.e. 35 completed weeks GA), 397 (8.1%) required oxygen, 468 (9.5%) had congenital heart disease and 572 (11.6%) had other risk factors such as CNS disorders, airway anomalies and cystic fibrosis. Patients received an average of 3.7±1.5 injections, with 17,909 doses given overall. 6.2% withdrew from the study. No directly, drug related serious adverse events were identified. 296 infants had 351 hospitalizations for respiratory tract infections, a hospitalization rate of 6.0%. There were significant differences between indications for palivizumab (chi-square=32.7, p<0.005). The overall incidence of RSV positive hospitalization was 1.1%. Hospitalization rates were highest in non-Caucasian infants of aboriginal descent (17.9%, p<0.005). Hospitalized infants had a lower percentage of compliant injections (61.1% vs 67.7%, p=0.026).
CONCLUSIONS: The RSV hospitalization rate in the 2006-2009 RSV seasons was lower than that in several published reports (range 1.3%-5.3%).The rates of RSV hospitalization may be decreasing for various reasons such as high compliance with palivizumab prophylaxis, variability in RSV epidemiology, hospital admission criteria and preventive education.
Financial Support: the study is funded by an unrestricted grant from Abbott Canada

RESPIRATORY SYNCYTIAL VIRUS PROPHYLAXIS IN SPECIAL POPULATIONS

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RATIONALE: Infants with underlying disorders are at high risk for morbidity and mortality from respiratory syncytial virus (RSV) infection. Position statements recommend palivizumab prophylaxis only for specific infants with cystic fibrosis, Down syndrome or are immunocompromised and deemed at risk. The Canadian Registry Database (CARESS) allows us to examine palivizumab utilization and compliance in infants with many pre-existing diseases.
METHODS: A prospective, observational, registry of infants who received at least 1 dose of palivizumab during the 2006-2009 RSV seasons from 26 sites. Neonatal and demographic data were collected at enrolment. Data on palivizumab utilization, compliance, and outcomes were collected monthly. Premature infants 35 completed weeks gestational age (GA) who met standard approval criteria (Group 1) were compared to those with other disorders (Group 2).
RESULTS: Data presented in Table.

	Group 1 (n=3376)	Group 2 (n=487)	P
Male	56.9%	55.2%	0.492
Enrollment age, mean (SD)	3.6 (3.4)	9.8 (8.7)	0.000
GA, mean (SD)	31.1 (4.6)	37.0 (4.4)	0.000
# injections, mean (SD)	3.7 (1.5)	3.8 (1.5)	0.198
Respiratory infection hosp. rate	4.0%	9.9%	0.000
RSV hosp. rate	1.0%	2.3%	0.019
Compliant injections (%)	69.5%	69.5%	0.999

**P<0.05 significant*

Group 2 infants: Down syndrome (n=117, 24.0%), airway anomalies (n=111, 22.8%), cystic fibrosis (n=62, 12.7%), neuromuscular impairment (n=51, 10.5%), pulmonary (n=38, 7.8%), multiple system disorders (n=31, 6.4%), cardiac (n=15, 3.1%), immunocompromise (n=8, 1.6%), and miscellaneous (n=54, 11.1%). From 2006-2009, the proportion of Group 2 infants receiving prophylaxis increased 2-fold from 6.0% (73/1224) to 12.1% (244/2016) overall. Group 2 infants were older at enrollment with more advanced GA and had significantly higher RI and RSV hospitalization rates. There were no serious adverse events directly related to palivizumab.
CONCLUSIONS: Despite limited recommendations from advisory bodies, clinicians prescribe RSV prophylaxis in a wide range of special populations.
Financial Support: the study is funded by an unrestricted grant from Abbott Canada

MECHANICAL INSUFFLATION EXSUFFLATION: PRACTICE PATTERNS AMONG RESPIRATORY THERAPISTS IN ONTARIO, CANADA

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BACKGROUND: The mechanical insufflator exsufflator (MIE) is effective in assisting cough and in helping to avoid unplanned hospitalizations, tracheostomy and long-term ventilation in patients with neuromuscular disease or spinal cord injury. In spite of this, the availability and usage of the device in Canada is not known.
OBJECTIVE: To investigate practice patterns and availability of the MIE in Ontario hospitals.
METHODS: A cross-sectional, self-administered mail survey was sent to a random sample of 400 respiratory therapists practicing within 96 Ontario hospitals.
RESULTS: A total of 114 (28%) completed surveys were returned from 62 (65%) hospitals. Twenty hospitals (32%) had a MIE. Predominantly the respiratory therapist was the health care provider using the MIE. The device was most commonly used in the intensive care unit and medical/surgical units in patients with neuromuscular diseases or spinal cord injuries. Optimal pressure spans of 35 cmH_2O to 40 cmH_2O were used by 54% of respondents. Fourteen of the 20 hospitals with a MIE had policies or guidelines in place and 4 of those hospitals had established staff competencies. Measurements of peak cough flow, maximal inspiratory/expiratory pressure and vital capacity were reported to be infrequently performed.
CONCLUSIONS: This study demonstrated the MIE device is not widely available in Ontario hospitals and there are variations in how the devices are applied possibly resulting in suboptimal therapy. A comprehensive educational program on MIE devices that incorporates best practices and a practical component is recommended for current providers as well as for inclusion in student curriculum.

EDUCATION IS THE KEY TO PROTECTING CHILDREN AGAINST SMOKING: PARENTS' PERSPECTIVE

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RATIONALE: Youth smoking continues to be an important public health concern. Increasingly, it has been acknowledged that interventions to curb youth smoking should take into account the varied influences. Yet, little has been done to engage parents in prevention efforts. An important first step is to determine the approaches that parents normally take with their children about the topic.

METHODS: The grounded theory method was used. The sample consisted of 29 parents of children in kindergarten to grade 6, recruited through elementary schools in rural communities. In-depth telephone interviews were conducted and qualitative data analysis techniques were used to identify themes.

RESULTS: All of the parents were aware of the serious health effects of smoking, had good knowledge of the nature of youth smoking and were hoping that their children would not take up the behaviour. To that end, most engaged in verbal interaction with their children about smoking by using one of three approaches (a) talking with their children about smoking, (b) passing an antismoking message along to their children, or (c) confirming the child's understanding of smoking. A few parents had not interacted verbally with their children; they were not dealing with the issue yet. The parents also engaged in one or both actions (a) leading by example, and (b) showing disapproval of the behavior.

CONCLUSION: Whether or not the parents actively addressed the topic with their children, they all believed that education is the key to protecting children against smoking. Most wanted to see more done on smoking prevention in schools. As well, most thought that parents could benefit from a resource that directed their attention to the issue and provided guidance on how to address the topic.

Financial support: Canadian Respiratory Health Professionals / Canadian Lung Association

A DOSE RESPONSE TRIAL OF INHALED MANNITOL IN PATIENTS WITH CYSTIC FIBROSIS

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RATIONALE: Cystic Fibrosis (CF) is characterised by impaired mucociliary clearance (MCC), chronic inflammation and infection, and progressively deteriorating lung function. Inhaled mannitol (Bronchitol) has been shown to increase MCC and cough clearance in CF patients, contributing to the better lung hygiene and consequently a slower decline in lung function. This study was designed to determine the dose relationship of mannitol treatment and improvement in FEV_1 and FVC as well as safety.

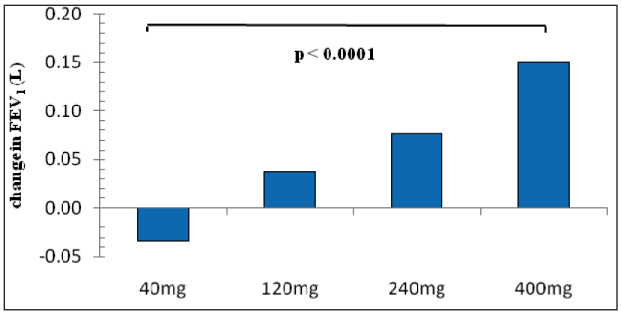
METHODS: This was a randomised, open label, dose response study. Following 2-week treatment with 400mg b.i.d., 48 CF patients (7 to 68 years of age) with a mean (SD) FEV_1 % predicted of 64 (13.2), were randomized to further 3 treatments with 40mg, 120mg or 240mg b.i.d. for 2 weeks each in random order.

RESULTS: The study demonstrated a dose dependent increase in FEV_1 and FVC. The 400mg dose showed the greatest improvement and the 40mg dose had no discernible effect. There was a statistically significant increase in FEV_1 for 400mg compared to 40mg (8.75% vs. –1.57%, respectively, $p<0.0001$). The probabilities for dose comparisons with the 400mg treatment arm were $p=0.0795$ for the 120mg (3.61%) and $p=0.1138$ for the 240mg (3.87%) treatment arms.

The mean % change in FVC was –0.90, 1.74, 3.07 and 8.14, for the 40mg, 120mg, 240mg and 400mg treatment arms with $p=0.0001$, $p=0.0037$ and $p=0.0304$, respectively. The highest tested dose of 400 mg had a similar safety profile to other doses tested.

CONCLUSION: Based on these results the 400mg b.i.d. dose has been further studied in Phase 3 trials.

Financial support: This study was sponsored by Pharmaxis Ltd



Asthma, Muscle/Exercise
Asthme, muscle/exercice

INTERVAL VERSUS CONTINUOUS TRAINING IN INDIVIDUALS WITH COPD - A SYSTEMATIC REVIEW

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RATIONALE: In patients with COPD, interval exercise has gained recent attention as a possible means of achieving greater physiologic training effects compared to continuous exercise. The primary aim of this systematic review was to compare the effects of interval versus continuous training on peak oxygen uptake (VO2peak), peak power (Ppeak), Six-Minute Walk Test (6MWT) distance and health-related quality of life in individuals with COPD.

METHODS: Randomized controlled trials (RCTs) comparing the effects of interval versus continuous training in patients with COPD were identified after searches of six databases and reference lists of appropriate studies in May 2009. Two reviewers independently assessed study quality. Weighted mean differences (WMD) with 95% confidence intervals (CI) were calculated using a random-effects model for measures of exercise capacity and health-related quality of life.

RESULTS: Eight RCTs, with a total of 388 COPD patients, met the inclusion criteria. No significant differences were found for Ppeak (WMD 1 W, 95% CI –1 to 3) or VO2peak (WMD –0.04 L/min, 95% CI –0.13 to 0.05) between interval and continuous training. The WMD for the Chronic Respiratory Questionnaire dyspnea score was –0.2 units (95% CI –0.5 to 0.0). There was no difference in 6MWT distance between groups (WMD 4 m, 95% CI –15 to 23).

CONCLUSIONS: Interval and continuous training modalities did not differ in their effect on measures of exercise capacity or health-related quality of life. Interval training may be considered as an alternative to continuous training in patients with varying degrees of COPD severity.

Financial Support: Marla Beauchamp is supported by the Ontario Respiratory Care Society, the Canadian Respiratory Health Professionals and the Canadian Institutes of Health Research. Dina Brooks is supported by a Canada Research Chair

THE EFFECT OF PULMONARY REHABILITATION ON BALANCE IN INDIVIDUALS WITH COPD

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RATIONALE: It has recently been shown that individuals with COPD exhibit deficits in balance control that are associated with an increased risk

of falling. While the effects of pulmonary rehabilitation (PR) on improving exercise capacity are well established in COPD, the effects of PR on standard clinical balance measures are unknown. Therefore, the primary aim of this study was to describe the within-subject effects of PR on balance in individuals with COPD.

METHODS: A single-arm longitudinal study design was used. Subjects with COPD admitted to PR attended a pre- and post-PR testing session. Balance was assessed using the Berg Balance Scale (BBS), Timed Up and Go Test (TUG) and the Activity-Specific Balance Confidence (ABC) Scale. One-year history of falls was collected using a self-report questionnaire.

RESULTS: 20 COPD subjects (mean age 71.4±10.8 years; mean FEV_1 44.7±21.9% predicted) completed the study. Subjects demonstrated statistically significant improvements in BBS scores (2.7±2.9 points; p = 0.001), TUG scores (1.5±2.6 seconds; p=0.02) and ABC scores (8.2±16.7 points; p=0.04). 10 patients reported at least one fall in the preceding year.

CONCLUSIONS: Standard PR contributes to small improvements in balance control in individuals with COPD. The clinical significance of these improvements remains to be determined. Further work is warranted to determine the optimal intervention for reducing risk of falls in this population.

Financial Support: Funding for this project was provided by the Ontario Respiratory Care Society. Marla Beauchamp is supported by the Ontario Respiratory Care Society, the Canadian Respiratory Health Professionals and the Canadian Institutes of Health Research. Dina Brooks is supported by a Canada Research Chair

COMBINED EXERCISE REHABILITATION FOR COPD AND CHRONIC HEART FAILURE: A RANDOMISED CONTROLLED TRIAL

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BACKGROUND: Patients with Chronic Heart Failure (CHF) develop similar symptoms of exertional breathlessness and fatigue as patients with COPD. Pulmonary rehabilitation (PR) is an integral part of the management of COPD, but patients with CHF may not have access to exercise rehabilitation. We investigated whether combined exercise rehabilitation for COPD and CHF was feasible and effective using the model developed for pulmonary rehabilitation.

METHODS: 57 patients with CHF were randomised 2:1 to 7 weeks of pulmonary rehabilitation (CHF-PR) or 7 weeks of normal care (CHF-NC). As a comparator 55 patients with COPD were simultaneously recruited to the same PR programme (COPD-PR). The primary outcome measure was the Incremental Shuttle Walk Test (ISWT) and the secondary outcome measures were the Endurance Shuttle Walk Test (ESWT), isometric quadriceps strength and health status.

RESULTS: 27 CHF and 44 COPD patients completed PR. 17 patients with CHF completed normal care. The CHF-PR group made significant improvements, compared to CHF-NC, in the mean (95%CI) ISWT distance; 62(35 to 89)m vs. –6(–11 to 33)m p<0.001. The CHF-PR group also made statistically significant improvements in all four domains of the Chronic Heart Questionnaire. The improvements in exercise performance and health status with PR were similar between CHF and COPD; 62 (35 to 89)m vs. 68 (50 to 85)m p=0.690.

CONCLUSION: Patients with CHF can make significant improvements in exercise performance and health status from pulmonary rehabilitation comparable to COPD. Combined training programmes for COPD and CHF are effective and feasible and service provision could be targeted around common disability rather than the primary organ disease.

Financial Support: UHL NHS trust research fellowship

SOCIOECONOMIC STATUS OF ADULT PATIENTS WITH ASTHMA UTILIZING EMERGENCY DEPARTMENTS IN ONTARIO, CANADA

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RATIONALE: Literature from the United States shows that socioeconomic status (SES) influences asthma-related resource utilization and asthma severity Canadian literature has been limited to small studies of individuals or large ecologic studies. Enhanced understanding of this relationship in Canada could lead to improved allocation of treatment and education resources. The purpose of this study is to identify differences in markers of SES between the geographically-matched general population and adults with asthma who visit the emergency department (ED).

METHODS: Using data from the Ontario Respiratory Outcomes Research Network Asthma Regional Variation Study (from March 1, 2001 to February 28, 2002; Lougheed et al., 2009) and Statistics Canada 2001 Census Data (20% sample, weighted), the following SES characteristics are described: age, sex, household income, single parent households, education, and employment status. Comparisons were made using Chi-Square and Mantel-Haenszel tests controlling for geographic location.

RESULTS: Adult patients with asthma visiting the ED were more frequently female (66.2% vs. 33.8%, p<0.001), were younger (53.3% vs. 40% 20-40yrs, 33.6 vs. 38.0% 40-60yrs, 13.1 vs. 21.9% >60yrs, p<0.001), had lower incomes (34.7% vs. 16.3% <$25,000, 38.7% vs. 23.4% $25,000 - $49,000, and 26.6% vs. 60.3% ≥ $50,000, p<0.001), were more frequently single (27.5% vs. 19.7% single, 55.2% vs. 65.0% married, p<0.001), were more frequently unemployed (15.4% vs. 4.3% unemployed, 67.4% vs. 63.9% employed, p<0.001, 17.2% vs. 31.8% not in labor force) and were less educated (20.0 vs. 26.4% without high school, 24.6% vs. 14.7% high school only, 39.2% vs. 33.3% some or completed trade or college, 16.2% vs. 25.6% some or completed university degrees, p<0.001.)

CONCLUSION: Markers of SES differ between adult asthma ED visitors and the general population in Ontario, therefore the influence of SES on health resource utilization should be examined using individual not ecologic data. Strategic population targeted education and preventative interventions may decrease morbidity and resource utilization.

Financial Support: None

ASTHMA DIAGNOSIS CRITERIA IN ADULT AND PEDIATRIC ASTHMA GUIDELINES: A SYSTEMATIC REVIEW

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RATIONALE: Making a diagnosis of asthma has important implications for both disease treatment and prognosis. Currently, there are a number of guidelines for the diagnosis of asthma in adults and in children. The objective of this paper is to conduct a systematic review of asthma diagnostic criteria from national and international consensus guidelines.

METHODS: A systematic search of the Medline and Embase databases was conducted for asthma guidelines with diagnostic criteria for adults and/or children. All guidelines included in the review were developed according to a defined consensus process, utilized a system of graded evidence, were peer reviewed, and were published in English in 1999 or later.

RESULTS: Of the guidelines reviewed, six contain recommendations for asthma diagnosis in adults and seven for diagnosis in children. Adult guidelines agree that an asthma diagnosis is dependent on recurrent and variable symptoms of wheeze, dyspnea, chest tightness, and cough. All adult guidelines recommend but not all require objective tests of lung function to document reversible airway obstruction. Pediatric guidelines have differing positions on the importance of lung function tests and the age groups to which they are relevant, but generally focus on the pattern of symptoms, the role of allergy, and trials of treatment in asthma diagnosis.

CONCLUSIONS: There is a consensus among adult guidelines that the diagnosis of asthma is dependent upon recurrent and variable symptoms; however, guidelines differ with respect to the necessity of objective lung function tests for an asthma diagnosis. Pediatric guidelines place a greater emphasis on the pattern of symptoms and recommend allergy investigations and trials of treatment in the diagnostic process. Future research is needed to provide evidence for the potential incorporation of airway inflammation markers in adult asthma diagnosis, as well as for the current practice of using trials of treatment in pediatric asthma diagnosis.

Financial Support: Financial support for this research was provided by the Ontario Thoracic Society and the University of Toronto Comprehensive Research Experience for Medical Students (CREMS) Summer Program

AIRWAY INFLAMMATORY RESPONSES FOLLOWING LABORATORY EXPOSURE TO OCCUPATIONAL AGENTS

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RATIONALE: Few studies have looked at airway inflammatory responses to various occupational agents in sensitized subjects with occupational asthma. Our objective was to assess the changes in sputum inflammatory cells following laboratory exposure to high (HMW) or low molecular weight (LMW) agents in workers with occupational asthma, and to compare those with pulmonary function changes.

METHODS: Induced sputum analysis was performed in workers sensitized to high (n=41) and low molecular weight agents (n=41) after an initial control day (sham exposure) and the last day of a positive specific inhalation challenge (SIC) (exposure to the offending agent). Differential cell counts were compared with falls in FEV_1 and changes in airway responsiveness to methacholine.

RESULTS: Compared with baseline, sputum eosinophil numbers were increased after SIC (mean ± SD: $0.1\pm0.2\times10^6$ cells/g before vs $0.9\pm1.7\times10^6$ cells/g after SIC, $p<0.0001$), regardless of the type of agent or response (early, late, dual). Neutrophil numbers were significantly increased after SIC in subjects exposed to LMW agents only ($1.5\pm2.0\times10^6$ cells/g before vs $3.6\pm4.9\times10^6$ cells/g after SIC, $p=0.006$). The change in sputum neutrophils during SIC was correlated with the change in PC_{20} in isolated early responses ($r=0.41$, $p=0.03$). No correlations were found between the change in eosinophils and the change in PC_{20} for any type of agent or response.

CONCLUSION: This study confirms that eosinophils are increased after SIC whatever the causal agent. However, LMW agents can induce neutrophilia in addition to eosinophilia, suggesting a different inflammatory patern than HMW agents. The implication of inflammatory cells, particularly neutrophils, in occupational asthma pathophysiology remains to be determined.

Funding: Local

DECLINE OF PULMONARY FUNCTION IN ASTHMATIC SUBJECTS WITH PERSISTENT AIRWAY NEUTROPHILIA

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RATIONALE: Bronchial neutrophilia has been associated with the development of airway obstruction in asthmatic subjects, but it remains to be documented if these patients have an accelerated decline of lung function. Our objective was to determine if asthmatic subjects with an airway neutrophilia have an accelerated rate of decline of pulmonary function and if this decline is correlated to the number of neutrophils in sputum.

METHODS: Sputum neutrophil counts and lung functions of 132 patients (mean age±SD: 53±15 years, 67 men and 65 women) were examined. Sputum neutrophils were compared with post–bronchodilator pulmonary functions. Declines of lung function in patients with a persistent neutrophilia (>64.4% neutrophils in sputum on at least two occasions, n=58) were compared with subjects without neutrophilia (n=74).

RESULTS: A weak but significant negative correlation was found between neutrophil percentages and FEV1 ($r = -0.24$, $p<0.0001$). Annual declines in FEV_1 and FVC were significantly higher in subjects with persistant neutrophilia than in subjects without neutrophilia (mean ± SD, FEV_1: 0.32±1.32 vs 0.43±1.49 L/y respectively, $p=0.0031$; FVC: 0.18±1.41 vs 0.46±1.59 L/y respectively, $p=0.02$).

CONCLUSION: Asthmatic subjects with an airway neutrophilia have an accelerated rate of decline of pulmonary function. The role of neutrophils in this decline still has to be determined.

Funding: Local

MEASUREMENT OF PERIPHERAL MUSCLE STRENGTH IN INDIVIDUALS WITH COPD: A SYSTEMATIC REVIEW

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RATIONALE: Reduced peripheral maximal muscle strength is an important contributor to exercise intolerance in patients with COPD. Therefore it is critical to accurately evaluate muscle strength, both to identify patients with muscle weakness and to prescribe adequate loads for resistance training programs in pulmonary rehabilitation.

Objective: To systematically evaluate the literature on the measurement of peripheral muscle strength in individuals with COPD and to make recommendations for strength testing in clinical and research settings.

Search Strategy: Literature search of electronic databases between 1999 and 2009 of all English language articles utilizing muscle strength measurements in COPD patients.

Main RESULTS: 178 articles were retrieved of which 112 were deemed relevant. After exclusion, 65 articles were reviewed. Muscle strength has been tested in COPD patients using isometric, isotonic or isokinetic tests. The most common modes of strength testing includes: hand grip strength (n=28); strain gauge (n=17) and computerised dynamometers (n=9). Strength measurements were mostly used as outcome for investigating the effectiveness of interventions. A number of methodological issues were identified are being important factors to consider when developing a strength testing protocol, such as positioning of the limb, number of trials, familiarization, test instructions, rest periods, instrumentation and muscle group tested.

CONCLUSION: Each method for strength testing presents advantages and disadvantages that need to be considered when choosing the most relevant measure. Selection of the methodology, standardization of the procedure, availability of reference values and reliability are important aspects to consider in both clinical and research settings.

EXERCISE TRAINING AFTER LUNG TRANSPLANTATION: A SYSTEMATIC REVIEW

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RATIONALE: Lung transplant recipients experience persistent impairments in exercise capacity and skeletal muscle function despite a vast improvement in lung function post-transplant. Exercise training may be beneficial in improving exercise capacity in lung transplant recipients. A systematic review was performed to examine the effects of exercise training on functional outcomes in lung transplant recipients.

METHODOLOGY: Studies were identified by searching electronic databases (Cochrane Central Registrar of Controlled Trials, MEDLINE, CINAHL, Physiotherapy Evidence Database (PEDro) and EMBASE) from

inception to May 2009. Types of studies included were: randomized controlled trials (RCTs), controlled trials and prospective cohorts. Study quality was assessed using the PEDro, Jadad and Down's scales.
RESULTS: Seven studies met the inclusion criteria. There were a variety of study designs, training protocols and outcome measures. The overall quality of studies was fair to moderate in assessing the impact of exercise training on maximal and functional exercise capacity, skeletal muscle function and lumbar bone mineral density. Significant improvements in these outcomes were found in every study. Due to the lack of randomization and/or a control group in some of the studies, it was not possible to separate the effects of training with the natural recovery process after transplant.
CONCLUSIONS: There is some evidence to support that exercise training can improve functional outcomes following lung transplantation. Further studies are needed to determine the potential for exercise training to optimize these functional outcomes, and to develop optimal guidelines for exercise prescription in the lung transplant population.
Financial Support: Ontario Respiratory Care Society and Canadian Respiratory Health Professionals

THE SIX-MINUTE WALK TEST: RESPONSES IN HEALTHY CANADIANS AGED 45 – 85 YEARS

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RATIONALE: The six-minute walk test (6MWT) is a common field-based test of exercise capacity. Previously published regression equations estimating a six minute walk distance (6MWD) in healthy Canadian adults have neither performed the test according to ATS guidelines nor described normal cardiorespiratory responses to the test. The aim of this study was to develop a regression equation to estimate a normal 6MWD and describe the normal cardiorespiratory responses during the 6MWT in healthy Canadians between 45-85 years.
METHODS: Three 6MWTs were conducted according to ATS guidelines. Cardiorespiratory variables were collected using a calibrated telemetric portable gas analysis system (Cosmed K4b^2).
RESULTS: Measurements were obtained from 23 men (age 64±20 yrs, 6MWD 655±114m) and 39 women (age 64±21 yrs, 6MWD 609±89m). A linear regression analysis was performed and a model developed to estimate 6MWD using variables of age, gender, height and weight (r=0.741). A significant increase in 6MWD was found between the first and second 6MWT ($p<0.001$), but not between the second and third test ($p=0.857$). There was no difference between genders in oxygen uptake (men 22.6±6.9ml/kg/min, women 21.4±6.7ml/kg/min) or heart rate response (men 129 ±25, women 137 ±36) during the last minute of the test.
CONCLUSIONS: This regression equation can be used to estimate 6MWD in healthy Canadians, and can facilitate the interpretation of 6MWT results in patient populations. Only one practice walk is needed for the 6MWT in healthy individuals.
Financial Support: ORCS

RELATIONSHIPS BETWEEN PEAK EXERCISE CAPACITY AND AVERAGE DAILY ACTIVITY IN PEOPLE WITH COPD

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RATIONALE: Greater levels of daily physical activity may confer health benefits in people with COPD and, therefore, increasing daily physical activity is an important therapeutic goal in this population. It has been suggested that people with COPD reduce their daily physical activity as a consequence of reduced peak exercise capacity. However, as peak aerobic capacity is often unchanged following interventions, increased daily physical activity would be dependent on the difference that exists between peak exercise capacity and average daily energy expenditure. The aim of this study was to examine the relationship between VO_{2peak} and average daily energy expenditure as well as the difference between them.
METHODS: Peak exercise capacity was measured via a ramp cycle ergometry protocol. A calibrated portable telemetric gas analysis system (Cosmed K4b^2) was used to measure physiologic variables. Average rate of oxygen consumption measured over the final 20 seconds of the test was defined as VO_{2peak} and expressed as metabolic equivalents (METS). Average daily energy expenditure was measured using a portable metabolic monitor (i.e. SenseWear Arm Band) during the waking hours of between 2 and 5 days.
RESULTS: 24 subjects (FEV_1 = 50±17; 15 males) completed the study. Peak exercise capacity was equal to 4.97±1.15 METS (63.8±16.3% predicted). Average daily energy expenditure was equal to 1.43±0.30 METS, which corresponded to 29.3±6.2% of peak exercise capacity.
CONCLUSIONS: Despite a large decrease in peak exercise capacity, the average daily energy expenditure in these individuals with COPD was approximately 30% of VO_{2peak}, suggesting that increased physical activity is an appropriate goal for therapies irrespective of whether or not improvements in peak exercise capacity are achieved.
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General Poster Session (Non-moderated) / Le Séance génerale de presentation d'affiches (sans modérateur)

2009 AEROBIC WALK

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RATIONALE: Respiratory rehabilitation is a necessary intervention in the non-pharmacologic treatment of patients with chronic respiratory disease; its fundamental tool is "physical exercise" that when applied according to the training principles triggers a series of adaptations that benefit patients physically, psychologically and socially. However, respiratory rehabilitation programs are not sufficiently developed in our country, and little is known about those in existence. Therefore we believe it is necessary to promote our experience.
METHODS: On Saturday, May 9th, 2009 we organized an aerobic walk at an open air site; a 120-meter oval circuit was set out; the purpose of this activity was to cover a total distance of 1200 meters (10 laps) within a maximum time limit of 30 minutes; chairs were placed every 30 meters, and patients carried their oxygen cylinder backpacks; medical assistance was provided on site. A total of 24 patients were invited by phone 15 days before the event. Over this total, 23 (95.8%) were COPD patients and 1 (4.16%) bronchiectasis; 16 patients (66.6%) were male, and 8 (33.3%) female; 5 patients (20.8%) were on chronic home oxygen therapy; 13 patients (54%) had completed or were attending a hospital program twice a week; 11 patients (45,8%) were on home therapy; mean age was 63 years; FEV_1 was 0.79 lt. Over the total number of patients invited, 14 lived more than 1 hour away from the site of the event.
RESULTS: Over a total of 24 patients, 12 (50%) attended the test, 7 (29,16%) failed to attend due to travel distance and 5 (20.8%) due to exacerbation. Over the 12 patients who did participate (50%), 7 (58.33%) completed the full 10 laps, 3 (25%) completed 11 laps, and 2 (16.66%) completed 7 laps. All of them covered the full distance within the 30-minute time frame. At the end of the event commemorative diplomas and medals were handed out, and an integration game was conducted.
CONCLUSION: Travel distances from rehabilitation activity sites continue to be a non-compliance factor. Exercise plans should be developed at locations close to these patients' homes and more tailored to their situations. Achievements obtained through rehabilitation programs can be relatively sustained if new short- and long-term goals are set that promote compliance with physical exercising.
Financial Support: Hospital A.Cetrángolo

COPD TOOLKIT© ONLINE COLLABORATION ACROSS THE COUNTRY

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Although pulmonary rehabilitation is a cornerstone of chronic obstructive pulmonary disease (COPD) management, less than 2% of Canadians affected by this devastating disease have access to it. Pulmonary rehabilitation can help minimize the number of COPD patients who resort to hospitalization for treatment, thus reducing the financial burden on the healthcare system. In order to support the development and expansion of COPD management programs, the Lung Association, in conjunction with the University of Saskatchewan and the Saskatoon Health Region, have developed a Canadian online repository where all healthcare professionals involved in COPD management can access, share, evaluate, develop and refine resources for COPD management programs. A preliminary Toolkit© of over 100 items has been uploaded onto the internet on a new web site www.copdtoolkit.ca. In addition, a preliminary Toolkit© on DVD was forwarded to 54 healthcare communities across Canada, representing over 100 sites. The Tools range from PowerPoint presentations for patient education to requisition forms for ordering COPD rehabilitation to flow sheets for COPD management. The Canadian Thoracic Society COPD Guidelines are followed in the program and are reflected in the COPD Toolkit©. Healthcare professionals who download the Tools will be asked to post a review of the Tool and suggestions for improvement. COPD Toolkit© users will also be asked to post any tools which they have developed for COPD management. Healthcare professionals will have no restrictions on which Tools may be used and are welcome to adapt the Tools to their local setting. There is also a template for developing and posting new Tools which will include a brief statement of the purpose of the Tool, the developer's name and institution, and the date of the latest revision. The evaluations submitted by COPD Toolkit© users will be compiled in early 2010 after 6 months of operation.

Sources of funding for the program/project: Lung Association of Saskatchewan; Zu.com Communications Inc; GlaxoSmithKline; Boehringer Ingelheim

PUBLIC HEALTH AND THE AGRICULTURAL RURAL ECOSYSTEM (PHARE) TRAINING PROGRAM. A CANADIAN INSTITUTES OF HEALTH RESEARCH – STRATEGIC TRAINING INITIATIVE IN HEALTH RESEARCH

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This training program funded by the Canadian Institutes of Health Research under the Strategic Training Initiatives in Health Research (STIHR) program, is open to graduate students and post doctoral fellows enrolled at a Canadian University who have a research project with a focus on the health of Canadians as it relates to agriculture, rural and/or ecosystem factors. As a result of intensification of agricultural production and profound changes in rural society and rural health services in Canada and worldwide have created public health and safety issues and community health challenges not in existence a decade ago. As the distances between the world's peoples shrink their interdependency across sectors continues to grow. One such interdependency is that which exists between the agricultural and economic system on one hand and the environmental/ecological system on the other. The relevance stems from the disconcerting observations that the health and safety of people that live and work in agricultural and rural sectors suffer disproportionately relative to those in other sectors. Moreover, activities within the agricultural/rural environment can have significant public health implications (e.g., Walkerton E. coli crisis, food shortages, prion diseases). New threats from emerging infections require rapid response across disciplines to provide strong scientific input for difficult policy decisions. However, in Canada and worldwide there is a distinct shortage of individuals with the research expertise necessary to address local issues and to guide policy development. The PHARE training program provides a co-ordinated and integrated approach to rural, agricultural, public and ecosystem health aimed at increasing and promoting the research capacity and infrastructure that is necessary to train leaders and effect individual action and public policy. It offers stipend support, networking opportunities and a distance-based curriculum that provides a transdisciplinary approach to PHARE related topics. Trainees will assist in addressing rural, agricultural, public and ecosystem health through such avenues as basic scientific research, health prevention programs, engineering and occupational hygiene, risk assessment, policy development, rural based industries and processes impacting agricultural and rural ecosystems such as agriculture, mining, wood and paper processing, petroleum and natural gas production, water quality, food safety, zoonoses, microbiology and immunology related to exposures, occupational health, rural health, rural health delivery methods and models, etc. This training program offers stipend support and a curriculum that provides a transdisciplinary approach to PHARE related topics.

This training program is funded by the Canadian Institutes of Health Research under the Strategic Training Initiatives in Health Research (STIHR) program

ASTHMA: OFFERING CARE WHILE WAITING FOR SPECIALIST CONSULTATION

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PURPOSE AND OBJECTIVES: Asthma is the most common chronic disease of childhood. Recent advances include availability of effective safe medications, recognition of the need to educate professionals, patients and families about asthma, and the realization that there needs to be a partnership between professionals and patients/families with Asthma.

Calgary has had a Paediatric Asthma clinic for over 30 years. Patients are seen by Physicians, Asthma Educators and Respiratory Therapists, and a psycho-social team. The waiting list is long despite other components of asthma care including family physicians, general pediatricians, the Calgary Paediatric Asthma Service (community educators), and Emergency Departments.

METHOD: Clinic referrals are triaged by an asthma educator, with 50% of referrals seen within 2-3 months. For those patients not triaged as urgent, spirometry and/or asthma education is arranged. The information is reviewed by a Respirologist whose interpretation and recommendations with copies of the education and spirometry documentation are faxed to the referring physician. The value of medication for the child prescribed by the primary care physician may be reaffirmed or alternatives suggested.

RESULTS: We have triaged 321 children into this program. 211 have had spirometry and asthma education. 18 have been seen urgently because of abnormal spirometry. 28 have had asthma education. All children will be given an appointment in the clinic, but the referring physician may cancel this if the advice and education have led to resolution of the problem.

CONCLUSION: An ongoing survey concludes family satisfaction and that families and children are better able to manage the child's asthma, leading to better controlled asthma.

This process allows children with asthma to be offered education and assessment which allows the primary care physician to start or continue effective prophylactic treatment while the patients are on a waiting list.

DEVELOPMENT OF THE CANADIAN SEVERE ASTHMA NETWORK (CSAN)

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BACKGROUND: Most asthmatics can be successfully managed through well established guidelines. Despite this, the burden of the disease to the

Canadian health care system remains high. Some patients develop severe asthma (SA) de novo in adulthood, and others progress to this form of disease after a period of having milder asthma for a few years, sometimes from childhood. Currently available therapies do not effectively address the needs of this group of patients. Consequently it is understandable that SA patients account for the majority of the cost for asthma care in Canada. Canadian asthma specialists interested in networking participated in teleconferences, videoconferences and 2 workshops over the past 4 years to develop common ground in determining clinical and research focus around SA in Canada.

PURPOSE: An environmental scan of SA Centers participating in our initial workshop (Montreal, June 2008) was performed to determine current health resources at existing SA Centers.

METHODS: Over the past 4 years, a group of asthma specialists across Canada have come together to discuss challenges with management of SA within the Canadian health care system. We present the results of an environmental scan performed at the first workshop (Montreal, June 2008).

RESULTS: A total of 13 Center Directors participated. Five SA Centres obtain referrals from more than one province. Nine Centers currently have access to induced sputum analysis, some only through research dollars (as opposed to health service funding). In 2008, health human resourcing showed that 11 had health region funded Certified Asthma Educators (85%), 10 had asthma clinic nurses / nurse practitioners (77%), 4 had clinic access to social work(31%), 3 had pharmacists (23%), and only 2 had psychology services (15%).

CONCLUSION: This early environmental scan underscores the need clinicians and researchers interested in asthma care to work closely with existing health region administration to develop common platforms for care delivery within existing SA Centers, to more effectively and efficiently deliver better care to the patients we serve. This need has resulted in the formation of the Canadian Severe Asthma Network (CSAN) as a national programming initiative, which has incorporated existing SA Centres of Excellence. This initiative has since expanded to involve 18 Centers across 7 provinces.

***Participating CSAN Centers:** Tony Bai [University of British Columbia/ St. Paul's Hospital], Celine Bergeron [University of Montreal/ Centre Hospitalier de l'Universite de Montreal], Birubi Biman [Northern Ontario School of Medicine/ Thunder Bay Regional Health Sciences Centre], Dennis Bowie [Dalhousie University/Queen Elizabeth II Health Sciences Centre], Donald Cockcroft [University of Saskatchewan/Royal University Hospital], Warren Davidson [University of Calgary/Rocky View Hospital], Pierre Ernst [Jewish General Hospital/ McGill University], Michel Laviolette [Universite de Laval/L'Hopital de Laval], Catherine Lemiere [Universite de Montreal/ L'Hôpital du Sacré-Coeur de Montréal], Clare Ramsey [University of Manitoba/Health Sciences Center]

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