TSANZ20 POSTERS ABSTRACTS

24 MONTH FOLLOW-UP OF THE 2016 MELBOURNE EPIDEMIC THUNDERSTORM ASTHMA PATIENTS

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Introduction/Aim. Thunderstorm asthma occurs due to a complex interaction of environmental and individual susceptibility factors. In November 2016, Melbourne was affected by the largest known epidemic thunderstorm asthma (ETSA). There is limited literature on the natural history and long term progress of individuals affected by ETSA. This is a 24-month follow-up study of Eastern Health ETSA patients assessing their symptomatology, adherence and healthcare utilisation.

Methods. A standardised telephone questionnaire was developed and utilised during December 2018 to individuals affected by the 2016 ETSA. The questionnaire assessed asthma symptoms, preventer prescription and adherence, asthma action plan ownership and usage and health care utilisation.

Results. 75% (n = 175) of ETSA patients responded to the questionnaire. 44%(n = 78) of respondents had a prior diagnosis of asthma with only 16%(n = 28) of respondents having been prescribed inhalers prior to November 2016. 64%(n = 50) of patients were prescribed inhalers since ETSA. 50% of patients who were prescribed inhalers reported compliance with inhaler use ('5 or more days per week'). 22%(n = 15) reported not using their inhalers at all in a week.

30%(n = 53) of ETSA patients reported frequent asthma symptoms (>1-3 times per month). Of this group 37% (n = 20) were not utilising a preventer in the month preceding November 2018. 18%(n = 31) of ETSA patients utilised healthcare services (urgent visit to GP, ED presentations or hospitalization) during the follow-up period

Conclusion. A significant number of patients affected by 2016 ETSA had ongoing symptoms on follow-up. Patients with persistent symptoms had suboptimal preventer use and adherence. 18% of all patients required urgent healthcare review in the follow-up period. Optimisation of preventer usage and action plan ownership may improve asthma control and healthcare utilisation in patients with ETSA

SWITCHING BIOLOGICAL AGENTS IN TYPE-2 ASTHMA: EXPERIENCE IN A SEVERE ASTHMA PROGRAMME

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Introduction/Aim. Biological treatments are effective to treat severe type-2 asthma. Three biological compounds (omalizumab, mepolizumab and benralizumab) have now been approved for PBS subsidy in Australia based on specific restrictions predictive of response. As new biological agents were introduced via early access programmes, patients could be transferred to an alternative agent. We examined the characteristics and outcomes of patients who were switched from one biological to another biological compound.

Methods. Existing data from the Monash severe asthma programme were reviewed and patients switched from one biological to another agent were identified. Reasons for switching were noted. ACQ-5 scores, FEV_1 measurements and number of exacerbations before and after switching were compared.

Results. The study evaluated 16 patients, 8 were female and most patients were switched without a washout period. Seven patients had been switched from omalizumab to benralizumab, seven patients from mepolizumab to benralizumab and two patients were switched from omalizumab to mepolizumab. Reasons were suboptimal response to the first agent (n = 12), patient convenience (n = 3), and side effects (n = 1). After switching, overall ACQ-5 scores were reduced indicating better control (ACQ-5 pre-switch (n = 15): median 2.4 (IQR 0.8-3.4) and ACQ-5 after switch (n = 11): median 0.6 (IQR 0.4-0.8); $P = 0.023$). FEV_1 (% predicted) was improved (FEV_1 pre-switch (n = 16): median 60 (IQR 49-70) and FEV_1 after switch (n = 16): median 69 (IQR 56-84); $P = 0.001$). The proportion of patients with no exacerbations increased after monoclonal antibody switching (7/16 vs 12/16, $P = 0.045$).

Conclusion. Our findings detail switching of biological agents in severe asthma. Chief reasons for switching were lack of efficacy of the first agent and a more convenient treatment schedule. Preliminary evidence of benefit after switching the initial biological treatment to another agent was demonstrated that requires confirmation in prospective studies.

FORCED OSCILLATION TECHNIQUE DOES NOT PREDICT FUTURE EXACERBATIONS IN PAEDIATRIC WHEEZE AND ASTHMA

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Introduction/Aim. Asthma is thought to constitute a group of different diseases. Most preschool-aged children with recurrent wheeze will be asymptomatic by school age. The forced oscillation technique (FOT) measures mechanical properties of the respiratory system and may provide insights into asthma pathophysiology. We aimed to: 1) compare FOT characteristics between healthy children and children with different wheeze/asthma phenotypes 2) investigate if FOT can be predictive of wheeze/asthma exacerbations occurring within 90 days.

Methods. 87 children with a history of recurrent wheeze (2-4 years), 56 children with asthma (6-10 years) and 68 healthy children (aged 2-10 years) were recruited and followed over 15-months. Independent samples t-tests were used to: evaluate FOT variables (R_5, X_5, AX, Fres) mean Z-scores for recurrent wheeze or asthma vs. healthy children; assess those FOT variables against atopy, asthma medication use and return for a wheeze/asthma exacerbation within 90 days.

Results. Measures of FOT were obtained in 117 children (healthy, n = 53). Fres was higher in children 2-4y with recurrent wheeze compared to healthy controls (mean difference (95% CI): zFres: 0.85 [0.08-1.62]). Similarly, Fres was higher in 6-10yo children with asthma compared to healthy controls (mean difference (95% CI): zFres: 1.36 [0.52-2.21]). No other FOT variable was different between children and children with wheeze/asthma. No difference in FOT was found between atopic and non-atopic groups with asthma or wheeze. Similarly, no significant differences in FOT measures were observed in children with recurrent wheeze or asthma who were prescribed asthma medication vs. not. Fifty-five children were seen during exacerbations within 90 days from their baseline visit. No FOT measurement was predictive of wheeze/asthma exacerbations.

Conclusion. FOT may have potential to differentiate between healthy and recurrent wheeze or asthma but FOT does not appear to be predictive of wheeze/asthma exacerbations.

GALECTIN-3 AS A NEW TREATMENT FOR NEUTROPHILIC ALLERGIC AIRWAYS DISEASE

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Introduction. Approximately 50% of asthmatic patients have non-eosinophilic asthma, with 40% presenting with a neutrophil-enriched phenotype. Neutrophilic asthmatics are more likely to be on higher doses of inhaled corticosteroids and have more severe disease. Galectin-3 (gal3) is a β-galactoside binding lectin with known roles in the recruitment, activation and efferocytosis of neutrophils. Defective efferocytosis can lead to an accumulation of apoptotic cells in the airways, promoting pro-inflammatory pathways. Significantly, neutrophilic asthmatics have decreased sputum gal3 compared to eosinophilic asthmatics. The functional role of decreased gal3 in neutrophilic asthma and the effects of restoration of gal3 responses are yet to be assessed.

Methods. Airway gal-3 levels and cellular source were assessed in murine models of steroid-sensitive, eosinophil-enriched allergic airways disease (AAD) and steroid-insensitive, neutrophil-enriched AAD by ELISA and flow cytometry. The effect of intranasal gal3 treatment during exacerbation of both phenotypes of AAD was assessed.

Results. We show that gal3 is decreased in the bronchoalveolar lavage fluid (BALF) in neutrophil-enriched AAD compared to eosinophil-enriched AAD. This is not surprising given that we show that eosinophils, as well as macrophages, are the main cellular source of gal3 in AAD. Significantly, we show that restoration of deficient gal3 is capable of suppressing steroid-insensitive, neutrophilic inflammation and airways hyper-responsiveness (AHR) in neutrophil-enriched AAD. Surprisingly, we show that gal3 treatment has unique effects in steroid-sensitive, eosinophil-enriched AAD. Specifically, we show that, whilst treatment suppresses eosinophil and lymphocyte numbers in BALF, it has no effect on neutrophil or macrophage numbers. Interestingly, gal3 treatment as no effect on AHR in eosinophil-enriched AAD.

Conclusion. We show that gal3 plays an important role in influencing inflammatory phenotype in experimental asthma. Importantly, our findings suggest supplementing airway gal3 levels to correct gal3 deficiency in neutrophilic asthma may represent a new effective therapy for this form of asthma.

COMBINED ASTHMA SELF-MANAGEMENT EDUCATION, SELF-MONITORING, AND WRITTEN ACTION PLANS REDUCE HEALTH SERVICE UTILISATION AMONG ADULTS WITH ASTHMA: A COCHRANE META-ANALYSIS

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Introduction/Aim. Many controlled trials have examined the effectiveness of self-management education and self-monitoring with a combination of either regular medical review, individualised written action plans or both. However, the influence of different program characteristics on health outcomes has not been delineated. This meta-analysis aims to quantify efficacy among these intervention components.

Methods. The Cochrane Airways Group Specialised register, electronic databases and bibliographies of included studies were searched until September 2019. Randomised controlled trials among adults ($\geq$ 16 years) diagnosed with asthma evaluating the effectiveness of self-management education, self-monitoring and either regular review, written action plans or both were included. Screening and data extraction were undertaken by two independent authors into pilot tested extraction templates. Data was analysed according to standard Cochrane methodology and entered into Review Manager Software version 5.3.

Results. From 3,602 records, 32 studies were identified for inclusion. Five studies using all four intervention components were included in the meta-analysis for hospital utilisation with no evidence of an effect in reducing hospitalisation or emergency department (ED) visits. Interventions with education, self-monitoring and written action plans significantly reduced both hospitalisations (Odds Ratio (OR) 0.59; 95%CI 0.38-0.90; $P = 0.01$; five studies; n = 913 participants) and ED visits (OR 0.63; 95% CI 0.46-0.85; $P = 0.003$; four studies; n = 839 participants) compared to controls. However, interventions with education, self-monitoring and regular review showed no evidence of an effect.

Conclusion. Incomplete and inconsistent reporting of data reduced the number of studies able to be pooled in meta-analyses and therefore negatively impacted the ability to form reliable conclusions. The available data suggest that a combination of asthma self-management education, self-monitoring and an individualised written action plan is superior to other combinations of clinical care at reducing health service utilisation, with especially no benefit from regular reviews.

COMMUNITY-BASED PAEDIATRIC ASTHMA MANAGEMENT PATHWAYS: A SYSTEMATIC REVIEW

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Introduction/Aim. Asthma is a chronic illness which can be controlled through ongoing proactive planned care and access to community-based health care services. We conducted a systematic review, to determine the effectiveness of different community-based approaches in management of paediatric asthma.

Methods. A systematic search of PubMed, CINAHL, EMBASE, Cochrane Library and hand search of reference collections were conducted to identify any research articles published in English between January 2010 and March 2019. All studies reporting the effectiveness/ impact of community-based interventions in managing paediatric asthma (children aged <18) were included.

Results. Of the 3,102 studies identified, 40 studies were included in the final analysis:17 randomized controlled trials (RCTs), 22 pre-post intervention and one case-control studies. They consisted of 17 school-based, 14 multicomponent community-based (i.e. those carried out primarily at the community centers/clinics with or without home visits, and often, involved broader services e.g. care coordination, counselling, education etc.), 5 home-based environmental (i.e. involving home visits only, with environmental remediation supplies provided), 2 pharmacy- and 2 general practice (GP)-based studies.

Overall, most (about 80%-90%) community-based programs with multicomponent interventions reported positive impact on reducing need for acute care services (45%-85%), decreasing asthma symptoms (67%-73%), fewer school absences (41%-57%), improving quality of life (19%-25%) and asthma knowledge (31%-55%) in children with asthma after interventions. Findings of school-based interventions were less consistent, with most prominent improvement observed in school absenteeism (10%-60% lower among intervention vs control groups) and Asthma Control Test scores (7%-33% post-intervention improvement). Home-based environmental interventions were effective in reducing potential home asthma triggers. However, their impacts on asthma-related health outcomes remained modest. Evidences supporting pharmacy- and GP-based interventions for asthma control in children were weak and insufficient.

Conclusion. Multicomponent community-based and school-based interventions may improve ongoing management of childhood asthma.

TP 012

LUNG FUNCTION NORMALIZATION WITH INDACATEROL/ GLYCOPYRRONIUM/MOMETASONE FUROATE IN PATIENTS WITH ASTHMA

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Introduction. Indacaterol (IND, a long acting β_2-agonist [LABA]), glycopyrronium (GLY, a long acting muscarinic antagonist [LAMA]) and mometasone furoate (MF, an inhaled corticosteroid [ICS]) have been formulated as a once-daily (o.d.) fixed-dose combination therapy (IND/GLY/ MF) delivered via the Breezhaler® device for the treatment of asthma. We report data from two Phase II studies (B2208 and B2209).

Methods. Both studies had a randomized, double-blind, 3-period crossover design. B2208 included 116 adult patients with moderate-to-severe asthma (on LABA/ICS, FEV_1 %predicted <80%), comparing IND/GLY/MF o.d. 150/50/160 μg (high-dose ICS) and 150/50/80 μg (medium-dose ICS) with twice-daily high-dose salmeterol/fluticasone (S/F [LABA/ICS], 50/500 μg) over 21 days. B2209 included 37 adult patients with mild-to-moderate asthma (on low- or medium-dose ICS, FEV_1 % predicted ≥60 to <100%), comparing medium-dose IND/GLY/MF with placebo over 14 days.

Results. In B2208, 44.6% and 47.3% of patients on high- or medium-dose IND/GLY/MF, respectively, achieved near-normal lung function (FEV_1 [AUC_{0-24h}] ≥80% of predicted normal) compared with 34.4% with S/F ($P < 0.05$ for both comparisons). In B2209, 48.4% of patients on medium-dose IND/GLY/MF achieved normal lung function (FEV_1 [AUC_{0-24h}] ≥90% of predicted normal) vs 6.7% on placebo. The odds ratio (OR) (95% CI) of being rescue medication free was 1.87 (1.03, 3.41) and 1.44 (0.80, 2.59) when treated with high- or medium-dose IND/GLY/MF, respectively, compared with S/F (B2208). The OR (95% CI) was 11.51 (3.77, 35.14) for medium-dose IND/GLY/MF vs placebo (B2209).

Conclusion: Patients with asthma are more likely to achieve normal or near-normal lung function and to remain rescue medication free with IND/GLY/MF compared with high-dose S/F or placebo.

TP 013

INDACATEROL/GLYCOPYRRONIUM/MOMETASONE FUROATE COMBINATION CONSISTENTLY SHOWS LUNG FUNCTION BENEFITS IN PATIENTS WITH ASTHMA

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Introduction. Indacaterol (IND, a long acting β_2-agonist [LABA]), glycopyrronium (GLY, a long acting muscarinic antagonist [LAMA]) and mometasone furoate (MF, an inhaled corticosteroid [ICS]) have been formulated as a once-daily (o.d.) fixed-dose combination therapy (IND/GLY/ MF) delivered via the Breezhaler® device for treatment of asthma. We report data from an active-comparator controlled (B2208) and a placebo-controlled (B2209) study.

Methods. Both studies had a randomized, double-blind, 3-period crossover design. B2208 included 116 adult patients with moderate-to-severe asthma (on LABA and medium- or high-dose ICS, FEV_1 % predicted <80%), comparing IND/GLY/MF o.d. 150/50/160 μg (high-dose ICS) and 150/50/80 μg (medium-dose ICS) with twice-daily (b.i.d.) high-dose salmeterol/fluticasone (S/F [LABA/ICS], 50/500 μg) over 21 days. B2209 included 37 adult patients with mild-to-moderate asthma (on low- or medium-dose ICS, FEV_1 %predicted ≥60 to <100%), comparing medium-dose IND/GLY/MF with placebo over 14 days.

Results. In B2208, both high- and medium-dose IND/GLY/MF showed superior treatment effect (mean difference) vs S/F on trough FEV_1 (124 mL [95%CI: 86, 161] and 105 mL [95% CI: 67, 143], respectively) and FVC (AUC_{0-24h}) (104 mL [95%CI: 66, 142] and 86 mL [95% CI: 48, 125], respectively [all $P < 0.0001$]). In B2209, mean improvement in trough FEV_1 by IND/GLY/MF was 544 mL vs. placebo (95% CI: 460, 628 mL; $P < 0.0001$), with a mean increase of 304 mL in FVC (AUC_{0-24h}) vs. placebo (95% CI: 243, 364 mL; $P < 0.0001$).

Conclusion. Once-daily IND/GLY/MF consistently showed clinically relevant and statistically

significant improvements in lung function compared with high–dose salmeterol/fluticasone bid and placebo in patients with asthma across all severities in two separate Phase II studies.

PATTERNS OF MANAGEMENT OF EXACERBATIONS AMONG PATIENTS WITH SEVERE ASTHMA

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Introduction/Aim. Asthma exacerbations are commonly experienced by patients with severe asthma, and society guidelines make clear recommendations in regard to the optimum management. The aim of this study is to evaluate the management of exacerbations as part of a prospective study in controlled conditions.

Methods. Patients were recruited and followed for 12 month, with monthly measurements of asthma control, biomarkers for T2 inflammation, and regular clinical optimisation. All patients were provided with a written action plan (WAP) at the commencement of the study. Exacerbations were managed via the patient's usual cycle of care during the study, the details of which were recorded at the following visit.

Results. 95 exacerbations were experienced by 18 patients. The mean (SD) duration of exacerbation was 13.4 (12.6) days. 30 (31%) exacerbations resulted in unplanned medical presentations, whereas 65 (68%) were entirely self-managed. 49 (52%) of exacerbations were treated with oral corticosteroids (OCS) for 3 or more days, for a mean (SD) duration of 12.6 (8.9) days. For the exacerbations where details were available, 14 (35%) received a tapering course of OCS, and this was significantly more likely to occur when the patient was managed by a medical officer rather than self-managing ($P = 0.005$). Only 19 (20%) of exacerbations incorporated an increase in inhaled corticosteroid (ICS) preventer dose as part of management. 26 (27%) were treated with antibiotics, which was significantly more likely to occur when managed by a medical officer ($P = <0.001$). WAP was triggered as part of the management of 49 (51%) exacerbations, and was followed correctly in 30 (61%) of these instances.

Conclusion. The majority of asthma exacerbations were self-managed by the patient. Management strategies that are inconsistent with guideline recommendations, including antibiotics or longer weaning courses of OCS, were more likely to occur if the patient was treated by a medical officer rather than self-managing

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EXCESSIVE DYNAMIC AIRWAY COLLAPSE - AN ASTHMA COPD MIMIC

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Introduction/Aim. Excessive Dynamic Airway Collapse (EDAC) a clinical entity characterised by excessive inward bulging of the posterior tracheo-bronchial membrane. Symptomatic patients with EDAC can present with symptoms and signs that may mimic chronic airway disease such as COPD and Asthma.

Methods. We describe 4 female patients who presented with chronic respiratory symptoms earlier diagnosed to have chronic airway disease such as either Asthma or COPD without any symptomatic benefit on conventional therapy directed to airway disease and were subsequently diagnosed to have EDAC on dynamic CT scan and bronchoscopy.

Results. Patient 1: A 64 year's old obese ex-smoking female presented with chronic intractable cough and shortness of breath She was treated for presumed Asthma/COPD for few years without any significant symptomatic benefit. Impulse oscillometry features of expiratory dominant airway obstruction, greatly exceeding that seen on conventional lung function. A dynamic CT Chest and bronchoscopy demonstrated 80% collapse of the tracheo-bronchial tree establishing the diagnosis of EDAC and subsequently managed with Positive airway pressure airway therapy (PAP) and weight loss strategies with good symptomatic and quality of life benefit.

Patient 2,3 and 4 were 45,49 and 59 years old presented with chronic intractable cough and shortness of breath. Patient 3 did not have smoking history. All the above patients had received intermittent treatment for exacerbation of airway disease for few years prior to the diagnosis of EDAC. Patient 2 and 3 were managed with PAP therapy and positive expiratory pressure (PEP) breathing techniques.

Conclusion. In patients presenting with symptoms of chronic airway disease not responding to conventional airway therapy, the possibility of EDAC should be considered in the appropriate clinical context.

Grant Support. Nil

TPL 001

SHORT-TERM EXPOSURE TO GRASS POLLEN IS ASSOCIATED WITH LOWER LUNG FUNCTION AND AIRWAY INFLAMMATION

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Introduction/Aim. Little research has explored the effects of grass pollen on airway inflammation and lung function and potential effect modifiers of these associations. We aimed to determine whether short-term exposures to grass pollen impacted lung function and airway inflammation, and whether these associations were modified by current asthma, hay fever, pollen sensitisation, age and/or ambient fungi levels.

Methods. Cross-sectional analysis of the Melbourne Atopy Cohort Study participants (n = 936) at the 18-year follow-up, including probands (median age 18), parents (median age 50) and siblings (median age 16). Lung function was assessed using spirometry. Airway inflammation was assessed using (1) fractional exhaled nitric oxide (FeNO) and (2) airway acidity (pH) and nitrogen oxides (NOx) in exhaled breath condensate. We used linear regression to investigate associations between daily pollen counts (on the day of testing and lagged up to three days before [lag 3]) and lung function and airway inflammation. We investigated modifications of these associations for current asthma, allergic rhinitis, pollen sensitisation, age, and fungi.

Results. Higher ambient levels of grass pollen (i.e. per increase in grains from 7 to 36 grains/m^3) were associated with lower forced mid-expiratory flow (FEF$_{25-75\%}$) at lag 2 (Coef. [95% CI]: -119 [-226, -11] mL/s) and lag 3 (Coef. [95% CI: -122 [-225, -20] mL/s) and increased FeNO at lag 1 (Coef. [95% CI]: 4.35 [-0.1, 8.7] ppb) and lag 2 (Coef. [95% CI]: 4.35 [-0.001, 8.7] ppb). Adverse impacts of pollen on multiple outcomes was stronger in individuals with current asthma, hay fever, pollen-sensitisation, and in adults aged 18 and above.

Conclusion. Grass pollen exposure in the preceding three days is associated with reduced lung function and increased airway inflammation. Individuals with current asthma, hay fever, pollen-sensitisation and adults should be targeted for interventions to reduce this impact prior, during and following high pollen days.

TP 018

IMPACT OF SEVERE EXACERBATIONS AMONG PATIENTS WITH ASTHMA: FOCUS ON ASTHMA CONTROL AND FUNCTIONAL STATUS

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Introduction/Aim. Asthma exacerbations can cause a significant impact to patients in clinical practice. We aim to assess their impact in a prospective trial setting.

Methods. Patients were recruited and followed with sequential measurements of Asthma Control Questionnaire-6 (ACQ6), and spirometry for 12 months. Patients were asked to record the duration of symptoms and the functional impact of asthma exacerbations that occurred during the study

Results. 49 severe exacerbations and 46 non-severe exacerbations were experienced by 18 patients. The mean (SD) duration of severe exacerbation was 16.4 ± 11.6 days, compared to 10.2 ± 12.9 days for non-severe exacerbations (P = <0.001). 25 (51%) severe exacerbations resulted in unplanned medical presentations, compared to 7 (15.2%) for non-severe exacerbations (P = 0.01). 12 (24.4%) severe exacerbations resulted in time off work, with a mean duration of 19.6 days, compared with zero non-severe exacerbations (<0.001). 31 (63.2%) of severe exacerbations subsequently resulted in time spent unable to carry out normal activities, with a mean (SD) duration of 8 ± 10.7 days, compared to 14 (30.4%) of non-severe exacerbations, with mean (SD) duration 1.2 ± 3.2 days (P = 0.001). The mean ACQ6 score following an exacerbation was significantly higher than mean baseline ACQ (P = 0.04), though the mean increase in ACQ6 was less than the minimal important difference. A significant (>0.5 point) increase in ACQ6 score was recorded after 20 (40%) exacerbations. There was no significant change in mean FEV1 after exacerbations compared to baseline (P = 0.79). The mean (SD) change in FEV1 following an exacerbation was -0.6 ± 13.7%. A significant decrease in FEV1 of 15% was recorded following 7 (18%) exacerbations.

Conclusion. Severe exacerbations were longer and more likely than non-severe exacerbations to result in an unplanned medical presentations, and time unable to work or carry out normal activities. The majority of patients didn't demonstrate persistent loss of asthma control following a severe exacerbation.

SYDNEY SMOKE SURVEY 2019

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Introduction/Aim. Asthma Australia conducted a survey in May 2019, following five days of hazardous air quality in Sydney due to hazard reduction burns in the region. This was similar to a period in May 2018, after which Asthma Australia surveyed consumers to understand the health outcomes and actions taken. This survey incorporated the wider health and wellbeing impacts of smoke.

Methods. The survey used a mixed methods approach including 8 multiple choice questions and 1 open-ended response using an online tool *Survey Monkey*. It was sent via email to a convenience sample of more than 25,000 consumers with Sydney postcodes, who had consented to being contacted by Asthma Australia.

Results. 554 people completed the survey; most respondents (78%) were people with asthma. Poor air quality not only impacts immediate health, including 104 people who experienced an asthma emergency, but causes wider disruption to wellbeing. 21% of respondents were sick for longer than a week and 22% experienced unexpected financial costs due to medication or equipment needs.

Wider impacts of smoke
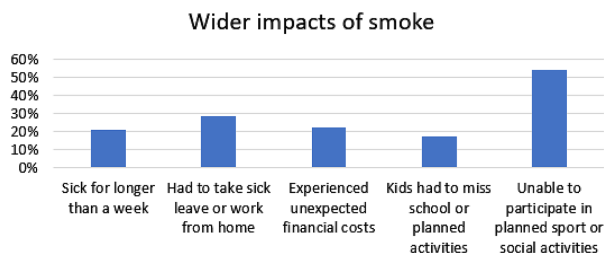
Consumers continue to lack timely warning of smoke and report there is poor community understanding, particularly in the workforce, of the detrimental impacts from smoke. Early warning systems are not widely used or effective. 13% of respondents reported registering for air quality warning systems, and only 3% first found out about smoke this way. Respondents told us of the frustration when smoke impacts them, with little to no warning and minimal opportunity to minimise harm once smoke is present.

Conclusion. Asthma Australia believes effective bushfire management can happen without hazard reduction burn smoke putting the lives and wellbeing of vulnerable people in the community at risk. Asthma Australia is continuing to work with relevant organisations to reduce the impact the hazard reduction burning season has on people with asthma.

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VOCAL CORD DYSFUNCTION. FOLLOW-UP DATA IN A NOVEL MULTIDISCIPLINARY TEAM (MDT) CLINIC

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Introduction/Aim. Vocal cord dysfunction (VCD) is characterised by excessive inspiratory vocal cord adduction and can be present in health and in asthmatics. Treatment is complex and requires multidisciplinary strategies. We implemented a Multidisciplinary team (MDT) clinic for VCD at Monash and the purpose of the current study was to report further experience with this approach.

Methods. A prospective observational cohort study in a VCD MDT clinic was conducted in patients with suspected VCD. All patients were referred to the VCD MDT clinic after review by respiratory specialists. We used dynamic computerized tomography (CT) larynx and/or laryngoscopy to definitively diagnose VCD. Relevant questionnaires, medical history, physical examination, and spirometry were conducted. Patients were then allocated to treatment pathways. Speech pathology intervention with laryngeal retraining (LR) was offered and if LR therapy failed, botulinum toxin (BT) injection was offered to patients who were suitable. Patients with resistant VCD was offered CPAP. Outcomes after LR, BT injection and CPAP were assessed using both patient- and clinician-based parameters.

Results. Overall, 69 additional patients were reviewed at the VCD/MDT clinic since the previous report. A definitive or presumptive diagnosis of VCD was made in 49/69 (71%) patients. LR was offered and utilised by 47 patients with success in 15/47 cases (32%). BT injections were administered in 9 patients unresponsive to LR therapy with success in 5/9 cases (55.6%). CPAP therapy were used in 3/4 patients with VCD resistant to LR and BT and was judged to be effective in all 3 cases.

Conclusion. A multidisciplinary approach to VCD is beneficial to diagnose VCD, to allocate individual patients to appropriate treatment and to monitor treatment responses. Further studies are needed to confirm the individual benefits of LR, BT injection and CPAP as therapies for VCD.

Grant Support:

RANDOMISED CONTROLLED TRIAL OF YOGA AND MINDFULNESS FOR SEVERE ASTHMA

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Introduction/Aim. New approaches are needed to address health burdens of importance to patients with severe asthma. The aim of this parallel-group randomised controlled trial was to examine whether yoga and mindfulness improved health-related quality of life (HRQoL) compared with a minimal active control group. We hypothesised greater HRQoL improvement in the yoga group.

Methods. From 16/11/2018-8/2/2019, adults (≥18 years) with severe asthma were recruited from outpatient clinics, research databases and media. Participants were randomised 2:1 to yoga or control by independent statistician (sex-stratified computer-generated sequence; concealed allocation). Participants were not blinded to allocation. All patients received a FitBit/pedometer. The patient-tailored yoga and mindfulness programme involved group classes twice a week for 16-weeks with a qualified instructor. The control group received written information about physical activity, mindfulness and goal-setting; set activity goals with a research officer via telephone; then received eight follow-up progress calls (≤10-minutes/call). Patients were assessed before randomisation and at 16-weeks. Linear mixed models were used for primary outcome analysis (St George's Respiratory Questionnaire [SGRQ]). Secondary outcomes included asthma control, physical activity, breathlessness, and inflammation.

Results. Patients were randomised to yoga (N = 15; mean ± SD age 66.9 ± 9.3 years; 60% female) or control (N = 9; 67.6 ± 7.8 years; 56% female). Although there was no significant interaction between time and intervention group, due to low power, planned comparisons indicated yoga participants had greater SGRQ improvement (marginal mean ± SE) (-9.4 ± 4.4,$P = 0.03$), than the active control group (-2.5 ± 5.5,$P = 0.65$). There was little change in secondary outcomes. Moderate-vigorous activity (minutes/day) increased in yoga (median[IQR] 14.4[7.8,27.5] to 16.7 [8.9,19.6],$P = 0.75$) and control groups (13.9[8.8,48.3] to 44.5[22.4,67.1], $P = 0.09$). Intervention-related adverse events were shoulder impingement (control), vomiting/nausea/hypertension (yoga), groin injury (yoga).

Conclusion. A yoga and mindfulness intervention was feasible and improved HRQoL in severe asthma. Studies to improve physical activity are needed, and this study is important in informing the design of future research.

CHILDREN WITH ASTHMA HAVE IMPAIRED INNATE IMMUNE RESPONSES COMPARED WITH HEALTHY CONTROLS

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Introduction/Aim. Patients with asthma are more susceptible to a broad range of common viral respiratory infections; however, little is known regarding the effects of asthma on immune responses to viral and bacterial stimulants in children. The present study aimed to examine the differences in cytokine responses of peripheral blood mononuclear cells (PBMCs) in children (3-11 years) with and without asthma.

Methods. PBMCs were isolated from whole blood of children with asthma (n = 48) and age-matched healthy controls (n = 14) and were stimulated with rhinovirus-1B (RV1B), house dust mite (HDM) and lipopolysaccharide (LPS) for 48 h. Levels of interferon (IFN)-γ, IFN-λ, IL-1β and IL-6 were measured in cell culture supernatants by immunoassay.

Results. Children with asthma had deficient IFN-γ production in response to both RV1B and LPS infection compared with healthy age-matched controls ($P < 0.01$ and $P < 0.001$, respectively). RV1B-induced IL-1β response was also higher in asthmatics than controls ($P < 0.05$). In contrast, both IL-1β and IL-6 were significantly reduced in response to HDM and LPS in children with asthma compared to controls ($P < 0.001$ and $P < 0.05$, respectively).

Conclusion. In summary, our study indicates that children with asthma have impaired innate immune responses. Understanding the differences in innate immunity between children with asthma and healthy individuals may facilitate the development of new treatments for childhood asthma.

TP 023

AN ASTHMA CARE TEAM TRANSITIONING PATIENTS FROM HOSPITAL TO HOME IMPROVES ASTHMA CONTROL

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Introduction. Recurrent asthma admissions are frequent in our patients at Western Health and commonly related to poor health literacy and medication adherence. A need exists to improve these asthma self-management skills within our current model of care, especially during the vulnerable post discharge period. We hypothesised that early nurse led asthma education with reinforcement of medication compliance would improve asthma control in the 3 months following admission.

Aim. To examine if the addition of an Asthma Care Transition Team (ACTT) compared with usual care alone (UC) (1)improves asthma control at 12 weeks post hospital discharge; (2) the number of patients using a WAP, compliance with inhaler therapy at 12 weeks, and readmission rates at 6 months.

Methods. Prospective, assessor blind, randomised, controlled study. Adults admitted with asthma were randomised to either: *UC*: involving review of asthma medication and self- management skills by the ward team prior to discharge; a standard 6 week post discharge clinic visit and a 12 week study visit where an independent assessor assessed outcomes. *ACTT*: In addition to UC, involved ACTT nurse led review at 1 week and 6 weeks s. Key aspects included a predefined, structured review reinforcing education and self- management skills, and telephone support during working hours.

Result. 60 participants (UC and ACTT) had similar baseline characteristics: Female Gender 56 vs 44% age: 41 vs 38 years, asthma duration: 20 vs 18 years, baseline ACQ 3.1 vs 3.4. At 12 weeks ACQ improved significantly in both groups (to1.9 vs 0.88) but more so with ACTT; ACTT group had a higher uptake of WAP (72 vs 33 %) and a trend to reduced re admissions (3.3 vs 16%, *P* = 0.07).

Conclusion. ACTT improves asthma control and self- management skills post discharge and may lead to fewer readmissions.

Key words. asthma, nurse led programme, asthma self- management skills, action plan

ACQ: Asthma Control Questionnaire

TP 025

TIME COURSE OF OBJECTIVE MARKERS AND PREDICTING ABOLISHMENT OF AIRWAY HYPERRESPONSIVENESS (AHR) FOLLOWING INHALED CORTICOSTEROIDS (ICS) IN ASTHMATICS WITH AHR TO MANNITOL

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Introduction. Asthma symptoms, airway calibre and fraction of exhaled nitric oxide (FeNO) improve rapidly in early stages of ICS therapy, while markers like AHR can take longer to improve.

Aim. A. Investigate changes in objective markers of asthma with improvements in asthma control in active asthmatics over 18 weeks of ICS treatment.

B. If abolition of AHR to mannitol could be determined from baseline characteristics.

Methods. Uncontrolled asthmatics with AHR to mannitol were prescribed ICS and monitored over 18 wks treatment. At the beginning and end of treatment, ACQ, FeNO, Spirometry (FEV_1, $FEF_{25-75\%}$) and IOS were performed before a mannitol challenge. AHR was defined as the provoking dose of mannitol to cause a 15% fall in FEV_1 (PD_{15}).

Results. 40 asthmatics (18F, 39 yrs) had moderate AHR (Geomean PD_{15} 5 mg, 95%CI 55,146), uncontrolled asthma (ACQ 1.84 ± 0.8), elevated FeNO (40 ± 30 ppb) and normal spirometry (FEV_1 $90 \pm 14\%$) with the expected improvements in most outcomes following ICS, except for IOS parameters (data not shown). At wk18, 42% of subjects still had AHR compared to 58% who had lost AHR (no PD15). There were no significant differences between groups.

Week 18	Geomean PD_{15} (95% CI)	ACQ	FeNO ppb*	FEV_1 %pred	$FEF_{25-75\%}$ %pred	IOS *R @ 5 Hz	IOS *R @ 5-20 Hz
PD_{15} remained (n = 17)	242 mg (142,411)	0.76 (0.46)	15 (9)	94 (18)	64 (25)	0.49 (0.17)	0.11 (0.10)
PD_{15} abolished (n = 23)	**700	0.89 (0.74)	16 (9)	99 (14)	78 (23)	0.45 (0.13)	0.07 (0.08)
P		0.52	0.69	0.35	0.0624	0.45	0.17

Table 1 Week 18 measurements comparing those with AHR at week 18 to AHR abolished. Data is expressed as mean (SD) unless otherwise mentioned. *FeNO & IOS obtained in 24 & 30 subjects, respectively **A PD_{15} 700 mg used for calculations for those whose PD_{15} was abolished

Conclusion. The difference, in commonly reported ICS sensitive parameters, was minimal between subjects with sustained AHR to mannitol and those whose AHR was abolished after 18wks of ICS. These findings suggest that measurements of asthma control, airway calibre and FeNO are not adequate to confirm optimal ICS therapy and the measurement of AHR to mannitol is a more useful guide to treatment with ICS.

SUBOPTIMAL INHALER ASSESSMENTS AND PRESCRIPTIONS IN PATIENTS WITH ASTHMA OR COPD EXACERBATIONS

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Introduction/Aim. Suboptimal controller inhaler use in patients with asthma or COPD is associated with adverse outcomes. COPD or asthma exacerbations requiring admission potentially represents opportunistic assessment and optimisation of controller inhalers. This study aims to understand the current practice in inhaler assessments and prescriptions within the hospital.

Methods. This is a retrospective audit of consecutive adults admitted for asthma or COPD exacerbations between March and September 2017. Information on inhaler adherence and/or technique assessments, and changes in controller inhalers during admission were collected. Changes in controller inhalers were compared with recommendations from GINA and GOLD.

Results. 170 patients (mean age 67 years, 63% female) were included, 115(68%) and 55 (32%) were treated for COPD and asthma attacks respectively. Overall, only 23% had documentation of adherence assessment, higher for those reviewed by a respiratory team (47%) compared to other medical teams (14-17%) ($P < 0.03$). Non-adherence was noted in 31% of patients previously prescribed ICS, LABA and/or LAMA. Documentation of inhaler technique was 10%, higher for respiratory (42%) compared to <5% by other medical teams ($P < 0.01$). Controller inhalers were changed in 55 patients (33%). Of these, 19 were on recommendation of the respiratory team and 36 were initiated by non-respiratory physicians. The prescriptions were out of alignment with recommendations from international guidelines in 34 instances (5 vs 29, respiratory vs other medical teams respectively). A small proportion was "double step-up" treatments e.g. combined ICS/LABA for treatment-naïve asthma or COPD patients. The great majority of changes were unpredictable, and difficult to justify in retrospect.

Conclusion. Formal assessment of inhaler use in patients with asthma or COPD is poor in the hospital setting. Changes in inhalers during inpatient stay may not be appropriate and should be carefully considered with guideline-recommended treatment, supported by appropriate education and documentations.

INTERVENTION EFFECTIVENESS FOR VOCAL CORD DYSFUNCTION: A SYSTEMATIC REVIEW

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Introduction/Aim. Vocal Cord Dysfunction (VCD) is a condition in which the vocal folds intermittently adduct during breathing resulting in dyspnoea, cough, dysphonia and throat irritation. A range of interventions have been reported for adults and adolescents with a primary diagnosis of VCD. Interventions include respiratory retraining and laryngeal deconstriction, inspiratory muscle strength training, psychological therapies and the use of medications. This review aims to examine the evidence for the use of these interventions and determine if effectiveness can be established.

Methods. Ten electronic databases, two clinical trial registries and grey literature were searched from inception to June 2018 for articles on VCD intervention or equivalent terms. Articles were included based on an a-priori eligibility criteria addressing study design, diagnostic procedures, patient characteristics and outcome measures and appraised by two independent reviewers.

Results. The search yielded 13 quasi-experimental studies demonstrating an association between the interventions of respiratory retraining, botulinum toxin, inspiratory muscle strength training and amitriptyline and VCD symptoms. In addition, 1 within subject withdrawal design study demonstrated the effectiveness of inspiratory muscle strength training and breathing exercises on the perception of exertional dyspnoea in a single subject with exercise induced VCD. No randomised controlled trials met the eligibility criteria.

Conclusion. Literature reporting on intervention for VCD is an emerging field. Symptom reduction has been associated with respiratory retraining, inspiratory muscle strength training, amitriptyline and botulinum toxin. Further studies designed to determine intervention effectiveness are required.

NATIONAL ASTHMA INDICATORS: AN INTERACTIVE OVERVIEW

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Introduction/Aim. This paper presents the 10 national asthma indicators identified for monitoring in the National Asthma Strategy 2018 (the Strategy; National Asthma Council Australia 2018). The indicators are:

1. Prevalence of asthma
2. Deaths (all ages)
3. Deaths (5 to 34, 35 to 54 and 55+ years age groups)
4. Hospital visits
5. Asthma control
6. General practice encounters
7. Asthma Action Plans
8. Quality of life
9. Preventer use
10. Costs of asthma

Methods: Data for each indicator has been sourced from a number of datasets, including the National Health Survey, Medicare Benefits Schedule, National Hospital Morbidity and Mortality Databases. Interactive visualisations have been produced for each indicator and are presented in a web-based product.

Results. Key findings

- 1 in 9 Australians (11%) have asthma – that is 2.7 million people.
- The Primary Health Network area with the highest potentially preventable hospitalisation rates for asthma was Murrumbidgee (240 per 100,000 population).
- In 2015–16, asthma cost the Australian health system an estimated $770 million.

Results will also include hospitalisation rates, psychological distress experienced by people with asthma, and interference of asthma on daily activities.

Conclusion. Reporting on these indicators will assist in monitoring progress in achieving the goals and objectives of the Strategy—to reduce the health, social and economic impacts of asthma.

FEVIPIPRANT INHIBITS EOSINOPHIL ACTIVATION INDUCED BY MULTIPLE METABOLITES OF PROSTAGLANDIN D2

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Introduction/Aim. Fevipiprant is a selective prostaglandin D_2 receptor 2 (DP_2) antagonist which reduces eosinophilic airway inflammation in patients with persistent asthma and raised sputum eosinophil counts. The DP_2 receptor is activated by prostaglandin D_2 (PGD_2), together with multiple PGD_2 metabolites which persist longer *in vivo* than the parent, thereby prolonging DP_2 mediated duration of inflammation. This study characterised the inhibitory effect of fevipiprant on DP_2 pathway-mediated eosinophil activation as measured by shape change induced by a panel of PGD_2 metabolites.

Methods. Eosinophils were isolated from peripheral blood of allergic donors (n = 8) with a range of asthma severities up to GINA 4. The shape change responses to PGD_2 and a panel of the reported major PGD_2 metabolites (including $\Delta^{12}PGJ_2$) were determined by flow cytometry. Using the agonist effective concentrations (EC_{70}), the inhibitory potencies of fevipiprant were measured for each metabolite.

Results. Shape change stimulatory responses were confirmed for each metabolite, and fevipiprant showed similar sub-nM inhibitory potencies (Table) against PGD_2 and six metabolites.

Conclusion. Fevipiprant inhibits eosinophil shape change induced by the major metabolites of PGD_2, which are known to be associated with the extended duration of DP_2-mediated inflammation. The findings align with the demonstrated benefit of reduced sputum and tissue eosinophilia and support the mechanism of action of fevipiprant in patients with asthma.

	PGD_2	13,14-dihydro-15-keto-PGD_2	PGJ_2	$\Delta^{12}PGJ_2$	$\Delta^{12}PGD_2$	15-deoxy-$\Delta^{12,14}PGD_2$	$9\alpha,11\beta$-PGF_2
IC_{50} (nM)	0.87	0.10	0.53	0.56	0.08	0.45	0.87

FEVIPIPRANT IS SUPERIOR TO MONTELUKAST IN SUPPRESSING TYPE 2 CYTOKINE PRODUCTION FROM MAST CELL STIMULATED HUMAN TH2 CELLS

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Introduction/Aim. Fevipiprant is a selective prostaglandin D_2 receptor 2 (DP_2) antagonist which reduces eosinophilic airway inflammation in patients with persistent asthma and elevated sputum eosinophil counts. CD4+ Th2 cells are a source of type 2 cytokines in asthma, via both DP_2 and leukotriene (LT) pathway activation. This study compared fevipiprant with montelukast for suppression of type 2 cytokine and other inflammatory mediator production from human Th2 cells in the presence of endogenous stimuli of the DP_2 and LT pathways from activated human mast cell (MC) supernatants.

Methods. CD4+ T cells were isolated from healthy volunteers (HV), differentiated with interleukin

[IL]-2/IL-4, sorted for DP_2 expression and then stimulated with MC supernatants in presence or absence of fevipiprant (1 μM) or montelukast (1 μM). mRNA was isolated and reverse transcription polymerase chain reaction (RT-PCR) conducted on cytokines. The MCs were CD34+ precursor cells from HV, differentiated and then stimulated with IgE/anti-IgE in the presence or absence of cytosolic phospholipase A2 (cPLA2) inhibitor (20 μM) as positive control.

Results. The MC supernatants induced substantial activation of human DP_2^+ Th2 cells as suggested by increases in mRNA expression of IL-5 and IL-13. These increases were fully suppressed by fevipiprant, but not by montelukast, which only gave partial (~40%) reduction of the IL-5 and IL-13 responses. Similar differences between drugs were found for suppression of increases in IL-3, IL-4, IL-8, macrophage colony-stimulating factor (M-CSF) and granulocyte macrophage-colony stimulating factor (GM-CSF) mRNA expression.

Conclusion. Consistent with the greater amplitude of inflammation induced by the DP_2 pathway compared to the LT pathway, fevipiprant is superior to montelukast in suppressing type 2 and other inflammatory cytokine production in human MC-stimulated Th2 cells.

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FEVIPIPRANT ANTAGONIZES PROSTAGLANDIN D2-INDUCED ACTIVATION OF TYPE-2 CD8+ T CELLS (TC2)

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Introduction/Aim. Fevipiprant is a potent and selective prostaglandin D_2 (PGD_2) receptor 2 (DP_2) antagonist showing clinical benefit in uncontrolled asthma in clinical trials. $CD8^+DP_2^+$ type 2 cytotoxic T (Tc2) cells are elevated in patients with severe eosinophilic asthma. The aim of this study is to investigate the effect of fevipiprant on PGD_2/DP_2-mediated Tc2 activities.

Methods. $CD3^+CD8^+DP_2^+$ Tc2 cells were isolated from human blood and cultured. The cell migration, cytokine production, apoptosis in response to PGD_2 in the presence of various concentrations of fevipiprant were examined *in vitro* with chemotaxis, ELISA, quantitative polymerase chain reaction (qPCR) and apoptosis assays. PGD_2 receptor 1 (DP_1) agonist (BW245C), DP_1 antagonist (BW868A) and DP_2 antagonist (TM30089) were used as controls to justify the DP_2 specificity of fevipiprant. Autocrine production of PGD_2 from Tc2 cells stimulated by a DP_2 agonist (DK-PGD_2) was also examined. Intracellular staining (ICS) for type-2 cytokines was used to measure the effect of fevipiprant on activation of Tc2 cells *ex vivo* induced by PGD_2 in the blood from severe eosinophilic asthma.(Ethical approval: South Central-Oxford B Research Ethics Committee, UK 18/SC/0361)

Results. Fevipiprant potently and specifically inhibited PGD_2-induced Tc2 migration (IC_{50} = 9.9 nM), cytokines production (IC_{50} for interleukin [IL]-4, IL-5 and IL-13 = 3.5–17.8 nM) and apoptosis suppression *in vitro*, as well as autocrine PGD_2 production. Fevipiprant also inhibited type-2 cytokine production from Tc2 cells *ex vivo* in the blood from severe eosinophilic asthma.

Conclusion. Fevipiprant is a potent inhibitor of DP_2-mediated Tc2 activation. Given the role of Tc2 in severe eosinophilic asthma, these data support further development of fevipiprant as a novel therapy for uncontrolled asthma, targeting Tc2 cells in addition to other established type-2 immune cells including Th2, type 2 innate lymphoid cells (ILC2) and eosinophils.

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TP 032

ORAL CORTICOSTEROID EXPOSURE IN PATIENTS WITH SEVERE EOSINOPHILIC ASTHMA: DATA FROM THE AUSTRALIAN MEPOLIZUMAB REGISTRY

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Introduction/Aim. The health risks associated with oral corticosteroids (OCS) start at a cumulative lifetime dose of 1gm.[1] Mepolizumab, an anti-interleukin-5 monoclonal antibody, has OCS sparing effects.[2] This study using data from the Australian Mepolizumab Registry (AMR) aims to describe;

  a) patient characteristics based on OCS exposure and

  b) the effect of mepolizumab treatment on OCS exposure.

Methods. 309 Australian patients enrolled between January2017 and April2019 were categorised and compared based on cumulative OCS exposure during the 12 months prior to baseline (low:<1gm; high:≥1gm). After 12 months treatment with mepolizumab, OCS use was measured.

Results. Patients (median[Q1,Q3] age 60[50,68] years, female 58%) had a median(Q1,Q3) asthma duration of 28(13,46) years and ACQ score of 3.4(3,4.2). In the previous year, 95% used at least one OCS dose (including both maintenance and short-course) and 68% crossed the 1gm toxicity level.

Compared to low-exposure (n = 90), the high-exposure (n = 210) category had less atopy (64% vs 85%, $P = 0.004$), shorter duration of asthma (26.4[12.4,42.8] vs 33.5[18.8,50.6] years, $P = 0.010$), more morning symptoms and reliever use. They had required a median of 4(3,7) vs 2 (1,3) OCS courses in the previous year and 63% were taking daily maintenance OCS (13% in low-exposure category). A larger proportion of patients with high-exposure had been previously prescribed omalizumab (19% vs 8%, $P = 0.015$). Health-status was poorer in the high-exposure category (mean[SD] AQLQ score 3.6[1.13] vs 4.2[1.7], $P = 0.001$).

Compared to baseline, at 12 months mepolizumab significantly reduced the proportion of patients requiring maintenance OCS therapy (46% vs 23%, $P < 0.001$) and reduced the median[Q1,Q3] maintenance OCS dose (10[5,12.5] vs 6.1[5,10], $P = 0.026$).

Conclusion. Although the majority of patients with severe eosinophilic asthma have a high cumulative OCS exposure, their asthma control and health-status remains poor. Two-thirds crossed 1gm toxicity kevel in 12 months. Mepolizumab treatment effectively reduced daily OCS exposure in these patients.

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References:

1. Price et al. Adverse outcomes from initiation of systemic corticosteroids for asthma: long-term observational study. *J Asthma Allergy*, 2018, 11, 193-204.
2. Bel et al. Oral glucocorticoid-sparing effect of mepolizumab in eosinophilic asthma. N Engl J Med., 2014, 371, 1189-97.

TP 033

A QUALITATIVE STUDY EXPLORING LIVED EXPERIENCES AND PERSPECTIVES OF ASTHMA CARE AND MANAGEMENT IN THE COMMUNITY

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Introduction/Aim. To identify perceived and actual barriers and facilitators to improving the management and health outcomes for people with asthma.

Method. Semi-structured interviews were conducted in metropolitan and regional South Australia with participants diagnosed with asthma and through the parent or guardian for participants under the age of 18. Purposive and snowball sampling were used to recruit participants until data saturation was achieved. Interviews followed a standardised moderator guide and were transcribed verbatim, then validated by participants. A questionnaire that included demographic questions, Asthma Control Questionnaire (ACQ) and nine, seven-point Likert scales was completed to facilitate data triangulation. Deductive thematic analysis was performed by multiple coders under guiding principles of the Theoretical Domains Framework using NVivo software.

Results. Data saturation was reached with recruitment of n = 12 participants. Unexpected asthma-related hospital utilisation in the last 12 months was reported in half. Overall, participants had a mean ACQ score of 14.64 ± 2.95 indicating less than well-controlled asthma. Participants indicated awareness of the disease and available treatment but were more driven in self-management and improving health outcomes with increasing impact on quality of life. A good relationship with health care professionals, self-education and self-confidence were considered enablers for improving asthma outcomes in both adults and children. Promoting asthma awareness in the general population was prioritised by many who felt that asthma as a disease was downgraded in importance when compared to other more well-recognised health issues and contributes to feelings of helplessness and frustration in receiving appropriate health care and government resources.

Conclusion. Efforts to improve asthma management in the community should focus on empowering patients to be the main driver of their health through education and effective resource linkage. Such efforts should be in parallel with redefining inaccurate perceptions of asthma amongst health professionals and the general population.

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INVESTIGATING FACTORS ASSOCIATED WITH USE OF ASTHMA ACTION PLANS IN CHILDREN AND THEIR PARENTS IN PERTH

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Introduction/Aim. Asthma action plans are critical tools for recognising and managing asthma exacerbations. Despite the importance of action plans, little is known about their use in Western Australia. This project forms part of the Global Asthma Network (GAN) Surveillance Project aiming to determine the uptake of asthma action plans in Perth and identify factors associated with their use.

Methods. Children (6-7 yrs) and adolescents (13-14 yrs) attending schools in the Perth metropolitan area, together with their parents, were invited to complete detailed questionnaires developed from GAN Phase I. We assessed responses to questions that included asthma diagnosis, use of asthma action plans, asthma medication use and requiring medical attention for breathing problems. Chi-square tests were used to determine associations between use of asthma action plans and factors related to asthma severity.

Results. To date, 840 questionnaires have been completed (517 adults; 169 adolescents; 154 children) between November 2018 to September 2019. Preliminary data suggests an asthma prevalence (adults = 29%; children = 16%; adolescents = 30%) above national reporting of 11.2%. Of those identifying as asthmatic, 23% of adults,48% of children and 41% of adolescents had an asthma action plan. Having an action plan was significantly associated with use of asthma medications in the last 12 months in adults (RR 1.84, $P < 0.001$) and students (RR 2.15, $P < 0.0001$). There were associations between parents who had an asthma attack (RR 2.61, $P < 0.001$), required medical attention (RR 4.69, $P < 0.001$) and visited an emergency department (RR 10.06, $P = 0.04$) for breathing problems in the last 12 months with increased uptake of asthma action plans.

Conclusion. These preliminary results highlight that although written asthma action plans are a core component of asthma management, there is a deficit in participants with an action plan. Participants with more severe asthma may be more likely to use an action plan.

THE ROLE OF TRANSFORMING GROWTH FACTOR ß1 (TGFß1) IN THE RESPONSE TO INFLUENZA A VIRAL INFECTION

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Introduction & Aims. Elevated TGFβ levels in lung diseases are implicated in airway structural changes, but the role of this pro-fibrotic cytokine in regulating immune responses to infection is unclear. The aim of this study was to use a mouse model of TGFβ overexpression to examine the potential interplay between TGFβ and infection with influenza A virus (IAV).

Methods. Four groups of mice (control, TGFβ, IAV, IAV + TGFβ, n = 4-6) were randomized to receive water or doxycycline (DOX, inducing TGFβ-overexpression) for 8 wks, then i.n. saline or IAV (1×10^2 PFU HKx31 mouse strain) and monitored for 3 more days. Fibrosis was assessed in Masson's trichrome sections. Inflammatory and immune responses were measured in bronchoalveolar lavage (BAL) and lung homogenates via cell counts, cytokine ELISAs or bead array, and RT-PCR.

Results. BAL TGFβ was similar in TGFβ and IAV + TGFβ groups. However, airway fibrosis evident after 8 weeks DOX (subepithelial thickness (μm): control 5.1 ± 1.1; TGFβ 16.5 ± 0.9 μm, $P < 0.001$), was further increased 3-fold following infection ($P < 0.001$). Total BAL cells from IAV + TGFβ mice were 60% higher than IAV alone ($P < 0.01$). BAL and/or lung MCP-1, IL-6 and IL-8 also followed this pattern. IFNα and interferon-induced genes (IFIT1, IFIT2) elevated by IAV were not attenuated by TGFβ.

Conclusion. IAV exacerbated TGFβ-induced fibrosis. TGFβ enhanced IAV-induced increases in chemokines and IL-6 levels which were consistent with elevated inflammatory cell influx and worse disease severity. It remains to be elucidated if TGFβ influences viral load, and if the influence of TGFβ on the viral response is sensitive to therapies that limit fibrosis in chronic lung diseases.

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Abstracts

TP 036

RESPONSES TO HUMAN RHINOVIRUS DO NOT DIFFER BETWEEN TERM AND PRETERM AIRWAY EPITHELIAL CELLS

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Introduction/Aim. Acute respiratory infection is a leading cause of hospitalisation in children born prematurely. The first line of defence against viral infection is the airway epithelium, however, preterm birth disrupts normal epithelial development and exposes it to injurious treatments necessary for maintaining life. It is therefore hypothesized that epithelial abnormalities contribute to the increased susceptibility and severity of viral infections observed in the preterm population. This study aimed to determine if nasal epithelial cells from preterm infants would display a defective response to human rhinovirus (HRV) infection compared to term infants.

Methods. Nasal epithelial cells (NEC) were studied from term (>37 weeks GA; n = 8, 62.5% male, 2.09-2.60 years) and preterm (<32 weeks GA; n = 8, 62.5% male, 1.08-1.84 corrected years) infants. Primary monolayer cultures were infected with HRV1b over time (6-96 hours) and at various multiplicity of infections (MOI 0.025-10). Collected supernatant and RNA was analysed via ELISA and qPCR, for the characterisation of apoptotic, innate immune and inflammatory responses to HRV1b infection.

Results. Cell viability, cell lysis, receptor expression and viral replication did not differ significantly between term and preterm cohorts. Likewise, term and preterm NEC showed similar expression of the apoptotic associate genes, *CASP8*, *CASP3* and *CASP7* in response to viral infection. Inflammatory cytokine production following infection also did not differ between term and preterm, however baseline concentrations of IL-8 and RANTES were significantly elevated in preterm samples (IL-8: 5908 pg/mL vs 4242 pg/mL, P = 0.03; RANTES: 37.04 pg/mL vs 32.00 pg/mL, P = 0.003).

Conclusion. Preliminary data shows that airway epithelial responses to HRV infection do not differ between term and preterm children. Future studies will explore airway responses to other important early life viruses including respiratory syncytial virus (RSV). Underlying inflammation appears pre-existing in preterm airways which may contribute to the more severe infection phenotype.

Grant Support:

TP 037

EPIGENETIC AND TRANSCRIPTOMIC CHANGES DURING CORTICOSTEROID TREATMENT IN COPD PATIENTS

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Introduction/Aim. Chronic obstructive pulmonary disease (COPD) is a complex progressive inflammatory disease resulting in accelerated lung function decline. COPD affects approximately 20% of people globally. The major cause of COPD is smoking, but also genetics and epigenetics. Inhaled corticosteroids (ICS) have been shown to reduce the decline of FEV1 in a subset of COPD patients. However, there is heterogeneity of response, therefore it is important to perform studies on therapy response in COPD. The aim of this project is to investigate the effects of ICS on methylation DNA methylation and gene expression in COPD patients.

Methods. Bronchial biopsies of COPD patients were previously obtained at baseline and 6 months post treatment with ICS (n = 42). Samples were analysed for changes in methylation and mRNA expression. We used a linear model to identify alterations after treatment with ICS. We correlated the identified methylation sites to gene expression and performed pathway analysis. Finally, we used GR Chip-seq analysis of A549 in response to Dexamethasone 100 nM to identify methylation sites close to Glucocorticoid Receptor (GR) binding sites.

Results. When comparing methylation after 6 months of exposure to ICS to baseline we found 990 significant alterations. We found 1925 correlations between the identified methylation sites altered by ICS and gene expression. Genes correlated to the identified methylation sites were associated to inflammation. Chip-seq analysis of the GR receptor in A549 cells identified 78 methylation in close proximately to GR binding sites including Aldehyde Dehydrogenase 3 Family Member B1 (ALDH3B1).

Conclusion. ICS treatment alters DNA methylation, which influences gene expression in part by being positioned in GR binding site regions.

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FC GAMMA RECEPTOR (FCΓR) I EXPRESSION IS INCREASED IN SEVERE ASTHMA PARTICULARLY IN PARTICIPANTS WITH NON-EOSINOPHILIC AIRWAY INFLAMMATION

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Introduction/Aim. Phagocytosis by alveolar macrophages is impaired in asthma, specifically in those with severe disease. FcγRs are expressed on the surface of phagocytic cells and are crucial in humoral and cellular protection against infection through phagocytosis of immune complexes. Previous studies show increased expression of FcγRs in inflammatory diseases such as rheumatoid arthritis, however, the expression in asthma is unknown. The aim of this study was to characterise the expression of FcγRI (CD64), FcγRII (CD32) and FcγRIII (CD16) in patients with severe asthma and healthy controls.

Methods. Participants with severe asthma (n = 15) and healthy controls (n = 10) underwent clinical assessment, blood collection, and sputum induction. Eosinophilic asthma was defined as a sputum eosinophil >3%. Surface expression of FcγRI, FcγRII and FcγRIII on monocytes were evaluated using flow cytometry (Fortessa X20) together with FlowJo (version 10). Monocytes were defined as CD14 + CD16+ cells.

Results. Asthma participants were older mean age (years) 60.73 (SD $\pm$ 18.98) and mostly female (66.66 %) with poor asthma control (mean ACQ6 of 1.89). Most participants with asthma were non-eosinophilic (n = 10, 77%). FcγRI expression was significantly increased in participants with severe asthma (mean fluorescence intensity [MFI] =4764, SD $\pm$ 1198) compared with healthy controls (MFI = 3833, SD $\pm$ 718.5) ($P < 0.05$). There was no significant difference in the expression of FcγRIIA and FcγRIII between healthy and severe asthma participants. Increased FcγRI expression was observed in non-eosinophilic (n = 10, mean MFI = 5092, SD $\pm$ 1037) but not in eosinophilic (n = 3, mean MFI = 4455, SD $\pm$ 1666) severe asthma participants compared to healthy controls (n = 9; mean MFI = 3833, SD $\pm$ 718.5) ($P < 0.05$). FcγRIIA expression negatively correlated with FEV_1 (r = - 0.55, $P < 0.05$, n = 15) in patients with severe asthma.

Conclusion. FcγRI expression on blood monocytes is significantly increased in severe asthma, particularly in non-eosinophilic asthma. Greater understanding of the consequences of upregulated FcγRI in the phagocytosis process is further required in severe asthma.

A PILOT STUDY ON THE EFFECT OF ELECTRONIC-CIGARETTES USING DIFFERENTIATED PRIMARY AIRWAY EPITHELIUM

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Introduction/Aim. Electronic-cigarettes are currently marketed as a 'safer' alternative to cigarette smoking. These devices heat a mixture of liquids or 'e-juices' including nicotine, propylene glycol and flavouring agents, that produce a vapour which is inhaled into the lungs. Currently, little is known about the effects of these vapours on the airway. Our study explored the effects of E-cigarettes on airway epithelial cells (AEC) barrier integrity, cytotoxicity and inflammation.

Methods. AECs (n = 6; 1 males; 2.72 $\pm$ 0.369 years) were grown at air liquid interface (ALI) (Martinovich et al., 2017, Sci Reports, 7:17971). Primary ALI cultures were exposed to air as a control, pure e-juice with nicotine, flavoured e-juice with nicotine or cigarette smoke (CS) at a vapour or smoke rate of 1 puff per minute for 2 hours. At 2 and 24 hours post exposure, barrier permeability, inflammatory cytokine production (ELISA) and cytotoxic response (LDH) assays were performed for each exposure.

Results. Barrier integrity was affected in pure e-juice with nicotine and CS exposures compared to control at 2 hours with an increase of ~4.0 and 10.2-fold respectively. However, 24 hours, CS exposure also became significantly leaky (39-fold; $P < 0.05$). An elevation in IL-8 was evident for pure and favoured e-juice with nicotine and CS at both timepoints compared to control on both the basolateral (2 h = 6.5, 4.8 and 5.2, 24 h = 4.6,3.4 and 3.5-fold change respectively) and apical surface (2 h = 5.8,5.9 and 5.1, 24 h = 4.4, 3.0 and 3.2-fold change respectively). Cytotoxic effects were also evident at 24 hours (pure e-juice with nicotine = 29.6%, flavoured e-juice with nicotine = 21% and CS = 50.7%).

Conclusion. E-cigarettes impact barrier integrity of the airway epithelial cells, causes airway epithelial cell death which results in marked localised inflammation. More research is required to see if exposure also has long term implications.

DECREASED EXPRESSION OF GLUCOCORTICOID RECEPTOR IN PERIPHERAL BLOOD CYTOTOXIC/PRO-INFLAMMATORY LYMPHOCYTES IN CYSTIC FIBROSIS

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Introduction/Aim. We have previously reported reduced expression of glucocorticoid receptor (GCR) in lymphocytes associated with inflammation and corticosteroid resistance in several chronic inflammatory lung diseases including chronic obstructive pulmonary disease and bronchiolitis obliterans syndrome. We hypothesised that there would be steroid resistance in cystic fibrosis (CF), evident by increased numbers of blood cytotoxic pro-inflammatory lymphocytes in CF and that these lymphocytes would lack GCR.

Methods. Blood was collected from CF patients [median age 37 (34 – 48) y] and age matched controls. Expression of cytotoxic molecules perforin and granzyme B, and expression of GCR, and pro-inflammatory cytokines IFNγ and TNFα, were determined in $CD8^+$ and $CD4^+$ T ($CD3^+$), NKT-like ($CD3^+CD56^+$), and NK ($CD3^-CD56^+$) cells using flow cytometry. Data presented as median (range).

Results. The percentage of $CD8^+$ and $CD4^+$ T, NKT-like, and NK cells expressing granzyme B and TNFα was increased in blood from CF patients vs controls [CF vs control: $CD3^+$ granzyme B: 30% (7 - 49) vs 9% (1 - 29); $CD56^+$ granzyme B: 67% (55 - 80) vs 32% (4 – 45); $CD4^+$ granzyme B: 21.5% (5 – 38) vs 3% (1 – 16); $CD3^+CD56^+$ granzyme B: 67% (30 – 91) vs 20% (1 – 33)]. Reduced expression of GCR was identified in $CD8^+$ T and NKT-like cells with loss of GCR associated with increased production of TNFα (r = -0.683, P = 0.042). There was a negative correlation between FEV_1 and % $CD8^+IFN\gamma^+$ cells (r = -0.932, P = 0.021).

Conclusion. Increased peripheral blood cytotoxic, pro-inflammatory T and NKT-like cells is associated with reduced expression of GCR in patients with CF. Mechanisms that increase GCR expression may reduce steroid resistance in these lymphocyte subsets and help negate chronic inflammation in patients with CF.

CIGARETTE SMOKE-INDUCED EMPHYSEMA AND LUNG INFLAMMATION ARE ATTENUATED BY LOW-DOSE AZITHROMYCIN IN BALB/C MICE

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Introduction/Aim. Cigarette smoke (CS)-induced emphysema is an important contributor to chronic obstructive pulmonary disease (COPD). We have shown the efficacy of azithromycin in reducing airway inflammation in COPD and in reducing exacerbations in severe asthma; however, the effects of long-term azithromycin on emphysema development have not been shown. We employed live animal imaging to monitor emphysema development and the effects of interventional azithromycin treatment in CS-exposed mice.

Methods. BALB/c mice (female, 10-weeks; n = 5/cohort) were exposed to CS for 1 hour twice daily, 5 days/week, for 12 weeks (CS). Half were co-treated with low-dose azithromycin during weeks 7-12 (CS + Azi; 0.2 mg/kg/day). Micro-computed tomography (micro-CT) and magnetic resonance imaging (MRI) scans were acquired longitudinally. Histological examinations were performed post-mortem (mean linear intercept (Lm) and leukocyte infiltration).

Results. CS increased median Lm (CS: 42.45 μm vs control: 34.7 μm; P = 0.0317); this was recovered in CS + Azi mice (33.03 μm). Average CT values were reduced in CS mice (CS: -399.5 Hounsfield units (HU) vs control: -384.9HU; P = 0.0286) but not in CS + Azi mice (-377.3HU). CT values negatively correlated with Lm (r = -0.7972; P = 0.0029) and T_2-weighted MRI (r = -0.6434; P = 0.0278). MRI also showed significant CS-induced inflammatory changes that were attenuated by azithromycin in the lungs, and positively correlated with Lm (r = 0.7622; P = 0.0055) and inflammatory foci counts (r = 0.6503; P = 0.0257).

Conclusion. Monitoring of emphysema development is possible via micro-CT and MRI. Interventional low-dose azithromycin treatment in CS-exposed mice attenuated the development of pulmonary emphysema.

TP 042

THE DYSFUNCTIONAL CYSTIC FIBROSIS AIRWAY EPITHELIUM ALONE DOES NOT INDUCE PATHOLOGICAL REPROGRAMMING OF RECRUITED NEUTROPHILS

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Introduction/Aim. Polymorphonuclear neutrophils (PMNs) undergo pathological reprogramming upon recruitment into cystic fibrosis (CF) airways, as exemplified by increased CD63 and decreased CD16 expression. This altered profile is recapitulated in a transmigration model in which blood neutrophils are recruited through an epithelium into cell-free airway fluid from CF patients placed apically. Here, we thought to determine whether PMN migration and direct interaction with dysfunctional CF airway tissue (primary CF epithelia and/or CF fibroblasts) would induce their reprogramming.

Methods. Nine transmigration conditions were tested: standard model with small airway H441 cell line alone; non-CF or CF disease human lung fibroblasts alone; H441 cells with either non-CF or CF fibroblasts; non-CF or CF primary airway epithelial cells (pAEC) alone (n = 5 non-CF, n = 3 CF) and with their respective lung fibroblasts (n = 5 non-CF, n = 4 CF). Once established, models were inverted and PMNs isolated from healthy adult donor blood were migrated in duplicate for 10 hours from the basolateral into the apical compartment containing the chemoattractant leukotriene B4. CD16 and CD63 expression was compared on migrated vs. unmigrated PMNs by flow cytometry.

Results. Comparing PMNs migrated through the standard H441 model, H441 co-cultured with fibroblasts, and fibroblasts alone, we found no difference in CD63 or CD16 expression. In PMNs migrated through CF pAEC alone or with fibroblasts, signs of reprogramming were observed (mean shift in median fluorescence intensity -MFI- of 704.2 ± 796.3 for CD63, and -1015 ± 666.1 for CD16). However, the change in CD63 expression was not significantly different from that measured on PMNs migrated through non-CF epithelium (mean shift in CD63 MFI of 608.4 ± 651.4, $P > 0.05$).

Conclusion.

Migration through CF epithelium alone is not sufficient to trigger airway PMN reprogramming. This suggests additional contributing factors stemming from prior inflammation or infection are required. Future work will incorporate infection of the epithelium in the transmigration model.

TP 043

AIRWAY CILIA RECOVERY FOLLOWING LUNG TRANSPLANT

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Introduction/Aim. Cilia are microscopic hair-like structures that lined the surface of epithelial cells on nasal passageways and lungs, and are responsible protecting the airways from infections through coordinated beating to clear debris and bacteria. Cilia beat pattern (CBF) and frequency (CBF) of the transplanted lungs can be compromised secondary to the transplant process, which could potentially lead to an impairment of overall airway clearance and be a cause for increased lung infections in some transplant recipients. This study explored cilia recovery amongst lung transplant recipients.

Method. Patients receiving single or bilateral lung transplant (n = 20) at the Alfred Hospital, Melbourne were recruited for assessments of cilia recovery following 6 and 12 weeks post-transplant. Brush samplings of the inferior nasal turbinate and the lower airway on the apical segment of the lower lobe were performed at each time points, and represent recipient and donor CBP/CBF, respectively. Ciliated cells were analysed at 500 frames per second (fps) using a high speed video microscopy.

Results. At 6 weeks post-transplant, the lower airways cilia beat 2.6 Hz slower than the upper airways (4.88 ± 2.09 Hz vs. 7.48 ± 2.23 Hz). The lower airways cilia beat pattern were generally seen reduced in beating amplitude, and clearance of debris appeared ineffective in several patients. At 12 weeks post-transplant, the lower airways cilia showed recovery in CBF with the overall difference in CBF reduced to 1.2 Hz (6.01 ± 1.38 Hz vs. 7.19 ± 1.07 Hz). The cilia beating pattern was also improved and more efficient clearance seen.

Conclusion. Airway cilia recovery following transplant can be delayed for 12 weeks post-transplant.

Key Words. Cilia recovery, cilia beat frequency (CBF), lung transplant, airway clearance

Nomination for New Investigator Award. No

NOVEL ROLE OF INFLAMMASOME ACTIVITIES IN CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD) EXACERBATIONS

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Introduction/Aim. A major cause of mortality and morbidity in COPD are acute exacerbations (AECOPD), most frequently triggered by infections, such as *influenza A virus (IAV)*. However, the identity of key factors of the immune system which contribute to AECOPD remain ill-defined. Innate immune responses to pathogens depend on the activation of inflammasomes, which facilitate the maturation and release of pro-inflammatory cytokines such as IL-1β. Recently, clinical studies and human *in vitro* data have demonstrated excessive activation of inflammasomes in AECOPD. The aim of this study was to investigate a novel functional link between inflammasome activation and *IAV* infection in the pathogenesis of AECOPD.

Methods. We employed a murine COPD model with acute *IAV infection*. Specifically, 6-week-old mice were exposed to cigarette smoke (CS) for 8 weeks. After 8 weeks, mice were infected with *IAV* and culled 5 days post infection. We also used COPD patient serum during stable disease, with their own corresponding IAV-induced acute exacerbation.

Results. We discovered excessive productions of genes and proteins encoding AIM2 which forms a cytoplasmic DNA-sensing inflammasome, and IL-1β in a murine COPD model with acute *IAV infection*. Nevertheless, the first-line therapy for AECOPD is glucocorticosteroids, which is limited in its efficacy. In that respect, Pirfenidone (PFD) is clinically used anti-inflammatory therapeutic. Importantly, our compelling data supported that PFD can alleviate the mRNA expressions of *Aim2*, and *Il1β* in COPD model following acute *IAV infection*. *We also discovered an elevated IL-1β protein levels in serum of AECOPD patients compared to their stable status*.

Conclusion. Collectively, we define for the first time that hyper-activation of AIM2/ IL-1β axis plays a role in AECOPD. Finally, our data inform the future clinical utility (repurposing) of PFD to target inflammasomes in AECOPD and this would represent an enormous change in the therapeutic paradigm.

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CHARACTERISATION OF A SURROGATE TYPE-II ALVEOLAR CELL CULTURE MODEL FOR ATP BINDING CASSETTE SUBFAMILY A MEMBER 3 (ABCA-3) DEFICIENCY

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Introduction/Aim. ATP Binding Cassette Subfamily A Member 3 (ABCA-3) is a lipid transporter protein highly expressed in type-II alveolar (AT-II) cells. Mutations in *ABCA3* can result in severe respiratory disease in infants and children. Cell cultures derived from patients with ABCA-3 deficiency that reflect the genetic and phenotypic features of ABCA-3 associated lung disease, would provide a means to study disease mechanisms and investigate therapeutics. Primary AT-II cells, while physiologically relevant to ABCA-3 deficiency, are not generally accessible. ABCA-3 is present in the nasopharynx, hence primary nasal epithelial cells could potentially provide a more accessible cell culture model. Our aim was to investigate the suitability of nasal epithelial cells to study ABCA-3 deficiency.

Methods. Expression of *ABCA3*, and AT-II cell markers, *SFTPB* and *SFTPC*, in nasal epithelial cells and primary AT-II cells, were quantified by droplet digital PCR. Protein localisation of ABCA-3 was visualised by immunofluorescent microscopy. Functionality of the ABCA-3 protein in nasal epithelial cells derived from human subjects with or without ABCA-3 deficiency was assessed by the capacity of the cells to detoxify doxorubicin.

Results. While ABCA-3 protein was localised in the cytoplasm of primary nasal epithelial cells, mRNA levels were 6.35×10^3-fold lower in nasal epithelial cells compared to primary AT-II cells. Gene expression of *SFTPB* and *SFTPC* was also significantly lower by 5.26×10^6- and 5.36×10^6-fold, respectively. Higher concentrations of doxorubicin reduced cell viability in ABCA-3 deficient nasal epithelial cells compared to controls in an assay-dependent manner when using an MTS assay but not with a lactate dehydrogenase assay or by calcein blue staining.

Conclusion. There may be a role for nasal epithelial cell cultures to model ABCA-3 deficiency depending on endpoints of interest. However, alternative approaches that more accurately replicate the AT-II phenotype need to be explored.

Grant Support: N/A

THE EFFECTS OF LUNG STRETCH AND ACID ASPIRATION ON THE PROTEOMIC RESPONSE TO MECHANICAL VENTILATION

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Introduction/Aim. Clinically, ventilator-induced lung injury contributes to mortality in mechanically ventilated patients. We have previously shown that the magnitude of regional tidal stretch is linked to the expression of inflammatory genes. However, this study was conducted in healthy lungs and it is unclear whether prior lung injury alters the response. Using a mouse model, we investigated the separate/combined effects of acid aspiration and mechanical ventilation (MV) on regional/global lung stretch and how this is associated with the proteomic response.

Methods. Adult BALB/c mice were divided into four groups: intratracheal saline, intratracheal HCl, Saline/MV or Acid/MV. Regional/global specific tidal volume (sVT) and specific functional residual capacity (sFRC) were measured at baseline and after 2 h of ventilation (PIP: 12cmH$_2$O; PEEP: 2cmH$_2$O) using dynamic high-resolution 4DCT images. Lung tissue was dissected into 10 regions corresponding to the image segmentation for proteomic analysis using Orbitrap LC-MS.

Results. Acid aspiration significantly reduced global sVT. 2 h of MV further decreased global sVT and sFRC in the animals pre-exposed to acid, while such changes were not observed in the Saline/MV group. Proteomic analysis revealed 42 dysregulated proteins in both Saline/MV and Acid/MV groups, and 37 differentially expressed proteins in Acid/MV group. Mapping of the overlapped proteins showed significant enrichment of complement/coagulation cascades (CCC). Analysis of 37 unique proteins in Acid/MV group resulted in an identification of additional 6 proteins relating to CCC and 7 down-regulated proteins involved in mitochondrial respiratory chain (MRC). The MRC protein levels were positively correlated with sFRC (r = 0.381, $P < 0.001$), while the CCC protein levels were negatively associated with sVT (r = -0.196, $P = 0.030$) and MRC protein levels (r = -0.207, $P < 0.001$).

Conclusion. Pre-existing acid injury aggravated the deleterious response of lung to MV by decreasing lung volumes. Such changes were correlated with the expression of proteins related to mitochondrial respiration and activation of complement and coagulation pathway.

ASSESSMENT OF GENE MODIFIER SLC6A14 EXPRESSION IN CYSTIC FIBROSIS AIRWAY EPITHELIAL CELLS IN RESPONSE TO PATHOGENS

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Introduction/Aim. Genome wide association studies have identified the Solute Carrier Family 6 Member 14 (*SLC6A14*) gene to contribute to the severity of respiratory impairment in CF [1]. SLC6A14 is an amino acid transporter that participates in the adhesion of *P. aeruginosa* to bronchial epithelial cells [2]. However, its expression in CF has not been conclusively established nor its impact on inflammation and infection. This study aimed to determine the expression of SLC6A14 gene in primary airway epithelial cells from both non-CF and CF children as well its expression in response to various pathogenic infections.

Methods. Airway epithelial cells (AECs) were obtained and established from children with and without CF[2]. Primary cell cultures were then exposed to various pathogens including human rhinovirus 1b (HRV1b, MOI 0.1), *P. aeruginosa* (MOI 0.01), Nthi (2.5x10^7 cfu), RSV (1x10^6 pfu). At 24-hour post infection, cells were collected to extract RNA and SLC6A14 gene expression assessed via qPCR.

Results. There was greater baseline expression of *SLC6A14* in CF compared to non-CF cohorts. This expression was further upregulated in response to infections with various pathogens, with greater fold changes observed following either HRV1b or RSV infection. Interestingly, co-infection of respiratory virus and bacteria increased *SLC6A14* expression compared to bacteria alone.

Conclusion. There was greater baseline expression of *SLC6A14* in CF than non-CF and that pathogenic infections induced further upregulation of its expression. This suggests that *SLC6A14* participates in epithelial response to infection. As respiratory virus and bacterial infections early in life are important contributors to pathogen-induced lung damage in CF, further assessment of the role of *SLC6A14* in lung pathophysiology is warranted.

References:

1. Di Paola M, et al, SLC6A14 Is a Genetic Modifier of Cystic Fibrosis That Regulates Pseudomonas aeruginosa Attachment to Human Bronchial Epithelial Cells. *MBio*, 2017, 8: 1
2. Martinovich et al, Conditionally reprogrammed primary airway epithelial cells maintain morphology, lineage and disease specific functional characteristics. I, 2017, 7:17971

ZINC SIGNALLING MAY BE INVOLVED IN PULMONARY HYPERTENSION VIA CO-REGULATION OF NO-INDUCED VASODILATION AND ENDOTHELIN-1-INDUCED VASOCONSTRICTION

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Introduction/Aim. Previous studies by us and others have shown airway zinc dyshomeostasis in chronic obstructive pulmonary disease, a condition that is associated with pulmonary hypertension and other cardiovascular comorbidities. Mechanisms of how zinc is involved in vascular pathology remain however largely unknown. We hypothesize that zinc ions are directly involved in balancing the effects of vasoconstrictors vs. vasodilators.

Methods. Primary cultures of human pulmonary artery smooth muscle cells (HPASMC) were analysed for expression of zinc transporters SLC39A (ZIPs) and zinc storage metallothioneins (MTs) at mRNA and protein levels by RT-PCR and quantitative immunofluorescence/confocal microscopy (IF), respectively. Cell subcultures were exposed to different concentrations of zinc, or zinc chelation by TPEN (20 μM, 2 hrs). Endothelin-1 was measured intracellularly by IF. Human subcutaneous microvessels were obtained from donors undergoing hernia surgery; effects of zinc addition or chelation on vasodilation/vasoconstriction were measured by myography.

Results. Gene and protein expression of multiple ZIPs and MTs was demonstrated in HPASMC. Zinc chelation in HPASMC with TPEN resulted in upregulated intracellular expression of endothelin-1 (3.5 fold, $P < 0.05$), paralleled by an upregulation of ZIP2 and ZIP12 but down-regulation of MT1. Exposure of microvessels for 10 min to zinc at physiologic concentrations (6.25-25 μM) abrogated endothelin-1-induced vasoconstriction in a concentration-dependent manner; zinc chelation (TPEN 25 or 50 μM), in contrast, induced a steady vasoconstriction.

Conclusion. Zinc ions are involved in co-regulation of NO-induced vasodilation and balancing endothelin-1-induced vasoconstriction. Regulation of cellular zinc influx could thus be targeted in vascular pathology, in particular pulmonary hypertension.

Grant Support:

ASPERGILLUS CLINICAL ISOLATES INDUCE SIMILAR INNATE IMMUNE RESPONSES BY PRIMARY AIRWAY EPITHELIAL CELLS

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Introduction/Aim. An association between Aspergillus infection and accelerated structural lung disease in early cystic fibrosis (CF) has been proposed. However, the specific immunological mechanisms elicited towards Aspergillus in young children are poorly understood. We investigated innate immune responses to Aspergillus challenge using primary airway epithelial cell cultures (pAEC).

Methods. Ten Aspergillus clinical isolates were obtained from children with CF, along with an ATCC reference strain and two invasive Aspergillus isolates. Isolates were typed by genomic sequencing of the internal transcribed sequence (ITS) region and MALDI-TOF. Submerged and air liquid interface cultures of pAEC were challenged with Aspergillus conidia. Media was harvested at 6 hours and 24 hours. Supernatant from submerged cultures was used to characterise neutrophil responses to Aspergillus infections via an in vitro migration model.

Results. Our study found that while multiple Aspergillus strains are successful colonisers in CF, there were no strain specific patterns in proinflammatory responses or susceptibility profiles. Notably however, echinocandin resistance amongst the isolates was prevalent in our data. We identified that Aspergillus may suppress proinflammatory cytokine suppression during germination. We also observed that CF air liquid interface cultures retained more conidia after 6 hours, however this was not consistent across all isolates Lastly, Aspergillus infection alone did not induce neutrophils into increased exocytosis of primary granules, which has been associated with progressive structural lung remodelling and the development of bronchiectasis in young children with CF previously.

Conclusion. Data from our study suggests that if Aspergillus is to be therapeutically managed early following isolation in CF airways, strain of Aspergillus may not be important. The next stage is to adopt quantitative methods for measuring Aspergillus growth and an 'omics' approach to determine host-level variations in response to Aspergillus compared to typical CF pathogens.

DEDICATED XV HUMAN SCANNER DELIVERING 4D REGIONAL LUNG FUNCTION ANALYSIS WITH A LOWER DOSE THAN CHEST X-RAY

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Introduction/Aim. X-ray Velocimetry (XV) delivers richly detailed quantification of patient lung function by measuring the regional ventilation distribution throughout the entire lung, at all phases of the respiratory cycle. The technology has been successfully developed for clinical use as software applied to analyse cinefluorographs acquired on commonly available fluoroscope equipment. However, an imaging system specifically optimised for XV technology has the potential to reduce scan time and cost, as well as further reducing radiation dose. The Australian Lung Health Initiative (ALHI) has brought together engineers, data scientists, respiratory physiologists, physicians and manufacturers to deliver an XV scanner which minimises dose, in particular for young children.

Methods. Proof of concept studies were performed using a combination of theoretical modelling and animal imaging studies. For the first time, porcine subjects were imaged with XV imaging protocols using clinical cinefluoroscopes. Variations were made to the prototype to support the design process and validate the modelling. Piglets were selected as appropriate surrogates for young children.

Results. Modelling shows that dose could be reduced to less than 60% of a standard chest X-ray by combining automated acquisition and exposure optimisation. Optimising image timing throughout the breath can significantly reduce the number of images required (and therefore the dose). Additionally, the experiments demonstrate the further dose reduction achievable through tuning the energy and exposure of the dynamic X-ray imaging.

Conclusion. Preliminary studies, performed using a combination of modelling and experiments, demonstrate that a dedicated XV scanner for regional ventilation measurement will significantly reduce patient radiation exposure, enabling the technology to be used regularly and safely, including by young children.

Declarations. Jonathan Dusting and Andreas Fouras are 4Dx employees and shareholders. David Parsons is a 4Dx shareholder

MUSCLE ENERGY TECHNIQUE FOR CHRONIC OBSTRUCTIVE PULMONARY DISEASE: PROTOCOL FOR A FEASIBILITY TRIAL

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Introduction/Aims: Chronic obstructive pulmonary disease (COPD) is a common progressive lung condition. The main symptoms are chronic cough and breathlessness, but many individuals experience extra-pulmonary symptoms with comorbidities like skeletal muscle dysfunction, obesity and cardiovascular disease. This has led to a shift towards multi-disciplinary management integrating pharmacological and non-pharmacological therapies such as pulmonary rehabilitation (PR). Preliminary evidence suggests manual therapy (MT) may play a role in the non-pharmacological management of COPD, but further research is required to explore the clinical use of MT as an adjunctive treatment. The primary aim of the study is to evaluate the feasibility and safety of implementing a MT treatment protocol as an adjunct to a PR program for people with COPD.

Methods: The study is a non-controlled feasibility trial of 33 people with moderate to severe COPD who are enrolled in a PR program at a metropolitan hospital. Participants will receive two exercise sessions per week for eight weeks as part of the standard PR program, and one MT session prior to PR in weeks 1-3 and 5-7 of the program. The primary outcomes are feasibility (acceptability of the intervention and implementation of the trial) and safety in terms of adverse events. Secondary outcomes include Chronic Respiratory Questionnaire Self-Administered Individualized, COPD Assessment Test, lung function and capacity, and exercise capacity.

Discussion: This research will determine the feasibility of implementing a MT treatment protocol as an adjunct to PR for people with COPD. The findings will inform a future controlled trial to test the efficacy of the intervention in this population. Trial registration ACTRN12618000801213.

CHARACTERISATION OF COPD PATIENT DEMOGRAPHICS, CLINICAL CHARACTERISTICS, AND CO-MORBIDITIES BY BLOOD EOSINOPHIL COUNTS IN NEW ZEALAND

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Introduction/Aim. COPD eosinophilia is an important COPD phenotype that is poorly described in Asia. The aim of this study was to describe the demographic and clinical characteristics of COPD patients in New Zealand (NZ) using measured blood eosinophil count (BEC).

Methods. We conducted a population-based study to describe COPD patients (age ≥ 40) having ≥1 BEC recorded between 1/1/2011 - 12/31/2012 in the NZ HealthStat primary care database with ≥12 month of medical record history before and after the index date. Users of inhaled corticosteroids (ICS) were excluded from the analysis as ICS therapy is known to cause a dose-dependent reduction of BEC.

Results. Of 2,909 patients with a COPD diagnosis, BEC was available for 1,215 (41.8%) patients within the follow-up period. The geometric mean BEC (10*9/L) was 0.19 amongst non-ICS treated patients, and was higher for females without asthma diagnosis (0.24 vs. 0.17 [male] and 0.19 [female with asthma diagnosis]), aged 40-49 (0.03 vs. 0.24 [age 50-59], 0.14 [age 60-69] and 0.21 [age 70+]), and Maori ethnicity (0.20 vs. 0.12 [Pacific], 0.17 [Asian] and 0.18 [Others]). It was also found higher for overweight patients (0.21 vs. 0.17 [Obese], 0.20 [normal] and 0.13 [underweight]), and those with mean blood neutrophil count <5000 cells/μL (0.21 vs. 0.16 [neutrophil ≥5000 cells/μL]).

Conclusion. After adjusting for the potential effect of ICS therapies, increased BEC in COPD patients was found to be higher for Maori ethnicity, obesity, younger age, and less neutrophilic population. Further research is needed to understand how BEC relate to patient phenotypes.

MOTIVATION TO PURSUE SELF MANAGEMENT STRATEGIES AMONG PATIENT WITH COPD

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Introduction/Aim: It is widely accepted today that COPD patient self-management can improve outcomes. A 2018 RCCP quality project conducted by the author showed that many patients perceived the COPD checklist to be helpful in self-management terms. Despite this, many reported that they didn't have the motivation to maintain practice regarding the checklist. This project seeks to explore the self-management related motivations of COPD patients at depth, via a patient interview study.

Method: Interview-based qualitative study among 20 RCCP patients with COPD.

Results: The interview fell into two naturally occurring parts: i) Opening discussion about the RCCP and the COPD checklist; ii) Experiential discussion about living with COPD and motivation to self-manage. The RCCP was characterised by participants as a 'forever program' which was of fundamental importance to them. It was discussed as a source of information, ideas, hope, support and human connection. When speaking of their motivation to self-manage interestingly, participants included a sense of reciprocity between them and their RCCP clinician(s) as a factor at play: "they are working for me, so I must work for them". Other key experiential domains which were central to motivation to self-manage related to participants' intra-personal and existential positioning and their family/social networks. Barriers to self-management were either respiratory symptom- or mood-related. In both cases, extant enablers were drawn on to deal with barriers, which were often seen by participants as insidious. A model explanatory of enablers and barriers to self-management will be presented and discussed in relation to how programs might be able to better build on enabling factors to optimise their patients' outcomes

Conclusion: The RCCP itself is a significant enabler of motivation to self-manage, as is intra-personal disposition and family social engagement. Barriers are symptom- or mood-related and countered by the particular suite of enablers/motivators which are available to each patient.

Key Words: COPD, Self-management, Motivation

Nomination for New Investigator Award

'WILLINGNESS TO PAY': THE VALUE ATTRIBUTED TO PROGRAM LOCATION BY PULMONARY REHABILITATION PARTICIPANTS

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Introduction/Aim. The 'contingent valuation' method is increasingly used to quantify the value of services not available in traditional markets, by assessing the monetary value an individual ascribes to the benefit provided by an intervention. The 'willingness to pay' (WTP) approach is the most commonly used technique to elicit strengths of individual preferences and may inform new models of service delivery. The aim of this study was to determine preferences for home or centre-based pulmonary rehabilitation (PR) for participants with chronic obstructive pulmonary disease (COPD) using the WTP method.

Methods. Participants with stable COPD were randomly assigned to home (n = 80) or centre-based PR (n = 86). At their final session, participants were asked to nominate the maximum that they would be willing to pay to undertake home-based PR in preference to a centre-based program. If unable to nominate an amount, a bidding approach (pre-specified range of monetary values) was used to help identify the representative value. Multiple linear regression was used to investigate relationships between participant features and WTP values.

Results. Responses for WTP were provided by 68 participants in each group. Home ownership was the only variable with a significant relationship with WTP value; people who owned their home were 2.9 times more likely to express a value above zero ($P = 0.018$). No significant difference for WTP values was observed between groups (centre-based: mean \$179, median \$83 [IQR \$6 to \$233]; home-based: mean \$168, median \$100 [\$0 to \$251]; $P = 0.86$).

Conclusion. Economic evaluations of new models of care should reflect the value of both health and non-health benefits to individuals. This is the first exploration of WTP for treatment location in people with COPD. Home ownership represents an individual's socioeconomic status and supports the validity of WTP results in the context of PR.

CHARACTERISATION OF COPD EXACERBATIONS AND HOSPITAL READMISSIONS BY DECAF SCORE

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Introduction/Aim. COPD exacerbations are one of the most frequent reasons for hospital admissions. The DECAF(Dyspnoea, Eosinopaenia, Consolidation, Acidaemia, atrial Fibrillation) score can be used to prognosticate risk of mortality and facilitate identification of low-risk patients suitable for home-based care. [1,2] This retrospective audit was aimed at characterising COPD exacerbations admitted to a single tertiary hospital using the DECAF score.

Methods. Medical records of consecutive patient admitted for COPD exacerbations between March and September 2017 were reviewed. In addition to DECAF criteria, date and time of presentation, psychosocial circumstances and time to subsequent hospital admissions were compared for the low and high-risk DECAF categories (0-2 and 3-5 respectively).

Results. A total of 124 patients (mean age 74 years old, 61% female) of variable COPD severity were included. The mean DECAF score was 1.07; mean duration of hospitalisation was 4.1 days. Most admissions (n = 109, 88%) were of low risk category with only 1 inpatient death. Two inpatient deaths (2/15) occurred in the high risk groups. Higher DECAF scores were associated with longer duration of hospitalisation and shorter time for respiratory readmissions. (Table 1) Of patients within the low risk categories, 65% presented after-hours (between 8 pm and 8 am) and/or during weekends. The inpatient management largely consisted of allied health inputs from social worker, physiotherapist of occupational therapist.

Table 1: Time to hospital readmissions stratified by DECAF categories

DECAF Score	Number of patients	Readmission of any cause	Respiratory readmission	Non-respiratory medical readmission
Low risk				
0	41	136 days	143 days	126 days
1	48	141 days	107 days	210 days
2	20	78 days	66 days	112 days
High risk				
3	12	78 days	54 days	77 days
4-5	3	70 days	42 days	-

Conclusion. The majority of tertiary admissions for COPD exacerbations were of low DECAF severity with very low in-hospital and 30-day mortality. The main driver of admissions appears to relate to timing of presentations and social circumstances.

References:

1. Echevarria et al. Validation of the DECAF score to predict hospital mortality in acute exacerbations of COPD. *Thorax* 2016; 71:133-140

2. Dismore et al. What are the positive drivers and potential barriers to implementation of hospital at home selected by low-risk DECAF score in the UK: a qualitative study embedded within a randomised controlled trial. *BMJ Open* 2019; 9: e026609

TP 055

ANTIBIOTIC USE IN ACUTE HOSPITALISED COPD PATIENTS

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Introduction/Aim. Antimicrobial resistance is a growing concern internationally. Guidelines including Therapeutic Guidelines and COPD-X exist to guide practitioners in the appropriate prescription of antibiotic therapy for patients hospitalised with acute exacerbations of COPD (AECOPD). We aimed to determine concordance to the COPD-X guidelines in the management of patients admitted with acute exacerbations of COPD, specifically the prescription of antibiotic therapy.

Methods. A prospective audit of COPD hospital admissions from five tertiary care hospitals in five states in Australia was conducted. A standardised audit tool was used to collect data relating to type and number of antibiotics administered, along with clinical data including increasing levels of breathlessness, increasing sputum volume and change in sputum colour.

Results. Prospective data were obtained for 207 admissions in 171 patients between October 2012-April 2013. The mean $\pm$ SD age was 70.2 ± 9.9 years, 50.3% were male, and 95.3% Caucasian.

There were 232 antibiotic courses prescribed for 186 patient admissions. Overall, 69.4% of all admissions received one antibiotic, 19.4% received two antibiotics and 1.5% received three antibiotics, with differences seen in prescription practices between the sites ($P < 0.001$).

Of the 232 antibiotic courses, the most commonly prescribed antibiotics were Benzylpenicillin (19.0%), Cephalosporin and Tetracycline/doxycycline (both 15.9%), Amoxicillin/ampicillin (12.1%) and macrolides (9.9%).

Of the patients who reported no change in the composite symptoms of sputum colour and increase in sputum volume, 83.1% were prescribed antibiotics (any antibiotic class). Overall, 31.6% of admissions were prescribed guideline concordant antibiotics (amoxicillin/ampicillin or tetracycline/ doxycycline), with significant differences seen between the sites (range 0.0% - 55.4%; $P < 0.001$).

Conclusion. Wide variation is seen across Australia in the type and number of antibiotics prescribed to patients experiencing an AECOPD. Poor concordance was seen to prescription of the recommended therapy, suggesting overuse of antibiotics for COPD exacerbation management.

Grant Support: Nil

Declaration of Interest. We declare that we have no conflicts of interest related to the above project.

TP 056

CLINICIANS' PERCEIVED BARRIERS AND FACILITATORS TO OPTIMAL ACUTE OXYGEN USE

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Introduction/Aim. COPD patients administered uncontrolled oxygen therapy have poorer outcomes. Guidelines recommends prescription of oxygen therapy, yet adherence is poor. We aimed to identify barriers and facilitators to practicing in accordance with evidence-based guidelines, and determine the beliefs and attitudes relating to acute oxygen therapy.

Methods. A national cross-sectional survey was conducted. The survey consisted of 3 sections;
1. Basic demographic details,
- Clinical scenarios relating to actions and beliefs about oxygen therapy and
- Barriers and facilitators to use of guidelines utilising a 5-point Likert scale

Convenience sampling was employed. A paper-based survey was distributed at the TSANZSRS Annual Scientific Meeting. An online survey was emailed to the TSANZ membership and to John Hunter Hospital clinical staff.

Results. Responses were received from 132 clinicians. Most were nurses (52.6%), followed by doctors (30.1%) and other clinicians (17.3%). Over a third (37.4%) were unaware/unsure if they knew about the TSANZ oxygen-guidelines.

When asked to choose the target oxygen saturation for several clinical scenarios, respondents did poorly overall, with between 16.2%-69.2% correct. Most (79.8%) stated that oxygen should be treated like other drugs, but 64.4% believed that it was not treated that way. Most (72%) agreed that the prescription of oxygen was important. However, just 21% stated they only administered oxygen when a prescription was written.

Most clinicians (74%) believed that it was difficult to get doctors to prescribe oxygen.

Most agreed (77%) that it was difficult to provide care when the equipment was not available. Clinicians did not believe they were resistant to working with protocols (72%), had difficulty changing routines (81%) or that they were not sufficiently trained (72%).

Conclusion. Knowledge gaps about oxygen therapy in acute care exist. There is discordance between clinicians' beliefs and actions in relation to the administration of oxygen therapy. Strategies to improve these outcomes are needed.

TP 057

AN INVESTIGATION INTO AUTOIMMUNITY IN COPD

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Introduction/Aim. Recently there have been indications that autoimmunity plays a role in the development and progression of chronic obstructive pulmonary disease (COPD). Previous studies have demonstrated that COPD patients have higher concentrations of autoantibodies which target a more diverse panel of auto-antigens. The aim of this project is to identify the antigenic targets of the autoantibodies in the serum of COPD patients using a proteomics approach to better understand disease progression.

Methods. Serum and tissue from COPD and donor (non-COPD) patients were obtained pre lung transplant at St Vincent's Hospital, Sydney. Serum antibodies were isolated using immunoprecipitation and samples prepared for liquid chromatography-tandem mass spectrometry (LC-MS/MS) analysis using tryptic shotgun preparation methods.

Results. Using the mass spectrometry analysis, we identified proteins associated with the antibodies in the serum derived from all COPD and donor samples. A total of 143 proteins were identified which all have very diverse functions and derive from differing sites around the body. Most of these proteins were found across both the COPD and donor cohorts however, there were small subsets of proteins unique to the COPD (7 proteins) and Donor (20 proteins) serums.

Conclusion. A unique subset and changes in abundance of autoantigens were identified in this study. Further examination is required to determine whether any of the autoantigens contribute to the disease development and progression.

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TP 058

OXYGEN PRESCRIPTIONS IN A METROPOLITAN HOSPITAL NETWORK ARE SUBOPTIMAL

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Introduction/Aim. Despite the widespread usage of oxygen, inappropriate administration may lead to adverse events. TSANZ guidelines provide guidance on oxygen prescription and administration, specifically identifying patients with COPD as a group at risk of adverse events.

The aim of this study was to assess the adherence to TSANZ oxygen prescription and oxygen saturation aims in admitted patients with COPD.

Methods. We conducted a retrospective chart review of patients admitted to Monash Health between the 1/1/2018 and 30/6/2018. Patients were identified from a coding search of relevant categories. Records were reviewed for oxygen prescription and administration with regards to TSANZ guidance. Adverse events possibly due to oxygen toxicity were recorded.

Results. 557 episodes were reviewed. Mean ($\pm$SD) age was 74.1 ($\pm$11.4), 281 (50.4%) were male, 101 (18.1%) used home oxygen and 85 (15.1%) lived in residential care. Most patients were admitted for an exacerbation of airways disease: 180 (32.3%) non-infective and 170 (30.5%) infective. 521 patients presented through the emergency department with only 78 (14.9%) having a correctly documented oxygen prescription. 469 patients required admission to hospital, with only 166 (35.3%) having a documented oxygen prescription which was TSANZ adherent. Complications possibly related to inappropriate oxygen administration occurred in 48 patients (8.6%).

Conclusion. Rates of documentation of an appropriate oxygen prescription adherent to guidelines were low both in the emergency department and during ward admission. However complications due to over oxygenation were infrequent. This study supports the implementation of measures to improve clinician prescribing of oxygen.

Reference:

1. Beasley R et al. TSANZ Oxygen Guidelines for Acute Oxygen Use in Adults. *Respirology*, 2015, 20, 1182-1191

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TP 059

LONG TERM NON-INVASIVE VENTILATION IN STABLE HYPERCAPNIC CHRONIC OBSTRUCTIVE PULMONARY DISEASE

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Introduction/Aim. Hypercapnic respiratory failure in stable COPD is associated with higher mortality. Long-term NIV may improve survival and reduce admissions, but randomized trials results are conflicting. This study reviews characteristics and outcomes of hypercapnic COPD patients commenced on long-term NIV at a tertiary centre.

Methods. All patients with primary diagnosis COPD commenced on long-term NIV at The Prince Charles Hospital from 2013 to 2017 were identified. Demographic, polysomnographic, clinical, device, admissions and arterial blood gas data was retrieved from medical records. Patients were divided into two groups for analysis based on significant OSA (AHI 15) and/or possible obesity hypoventilation (BMI >30).

Results. 65 COPD patients were identified and polysomnographic data was available for 50. Mean FEV1% was 37 and P_aCO_2 60.6 mmHg. Mean follow up was 3.2 years, with 47 (94%) maintaining adherence of median 8.2 hours/day. The median was IPAP 16 cm and EPAP was 7 cm.. Most patients (n = 39; 78%) had concomitant OSA/obesity and 11 patients (22%) had COPD alone. The latter group were younger (mean age 60.0 vs 67.8 years, $P = 0.02$), with lower FEV1% (0.25 vs 0.41; $P < 0.01$), P_aCO_2 (58.8 vs 67.6 mmHg; $P = 0.01$) and higher usage (9.7 vs 7.5 hours/day; $P = 0.02$). Patients with COPD alone had more episodes of acute type 2 respiratory failure in the preceding 12 months (median 2 vs 1; $P < 0.01$) but no difference in readmissions. Kaplan-Meier survival was similar for both groups (2-year 76%; log-rank $P = 0.80$).

Conclusion. Most patients with hypercapnic COPD commenced on long-term NIV have overlap OSA/obesity. Those with COPD alone were more likely to have had antecedent acute T2RF and poorer lung function, but demonstrate higher average device usage. High patient acceptance and mitigation of recurrent hospitalisation support its role in selected patients.

TP 060

A DRUG USE EVALUATION OF ANTIBIOTICS AND CORTICOSTEROIDS PRESCRIBED FOR THE MANAGEMENT OF ACUTE EXACERBATIONS OF COPD AT THE PRINCE CHARLES HOSPITAL

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Introduction/Aim. The national COPDX and Therapeutic Guidelines recommend systemic corticosteroid (CS) treatment for acute exacerbations of COPD (AECOPD). Antibiotic therapy with oral amoxycillin or doxycycline is recommended if infection is present. Intravenous antibiotics should be substituted with oral antibiotics within 72 hours. The aim of this study is to assess guideline concordance of prescribed antibiotics and CS for AECOPD at a large quaternary hospital with over 600 admissions per annum with an AECOPD.

Methods. A retrospective audit of patients admitted to TPCH between 1 April 2015 and 31 September 2015 with a primary diagnosis of AECOPD (ICD codes: J44.0-J44.1, J44.8-J44.9, J42, J43-J43.9). Pre-admission, inpatient and discharge antibiotic and CS doses, routes of administration, duration of therapy and patient allergies will be collected from medical records, discharge medication records and dispensing software.

Results. There were 396 admissions with an AECOPD during the study period. To date, 20 admissions in 20 patients were audited. Mean age was 74.8 years, 50% were females and median length of stay was 8 days (1 – 35 days). Dual intravenous (IV) antibiotics were given at presentation in 8 patients (40%) and 4 patients (20%) received an IV plus an oral antibiotic. Median duration of IV antibiotic treatment was 4 days (1 – 7 days). One patient received dual oral antibiotics (5%) while 4 patients (20%) received no antibiotic. Median number of different antibiotics received over the duration of the admission was 4 (1 – 6 antibiotics). Corticosteroids were prescribed in 18 patients (90%) for a median duration of 8 days (1 – 19 days). Preliminary analyses show prescription of antibiotics and CS at time of presentation were guideline concordant in 4/20 patients (20%).

Conclusion. Preliminary results demonstrate guideline concordance for antibiotics and CS in the treatment of AECOPD at TPCH is low. These results are consistent with previous retrospective audits conducted in Australian hospitals.

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TP 061

COEXISTING COPD AND BRONCHIECTASIS: PATIENT CHARACTERISTICS IN AN AUSTRALIAN RESPIRATORY UNIT

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Introduction/Aim. Chronic obstructive pulmonary disease (COPD) and bronchiectasis are two lung diseases characterised by chronic bacterial infection, acute pulmonary exacerbations and reduced quality of life. It has recently been suggested that the two chronic diseases coexist. There is a paucity of management guidelines available for concomitant COPD-bronchiectasis. This study aims to examine the characteristics of COPD patients with and without bronchiectasis, to further investigate the relationship between the two conditions.

Methods. This retrospective study collected clinical and pathological data from patients admitted to The Prince Charles Hospital between 1 April 2015 and 31 September 2015. Inclusion criteria were 1) a primary diagnosis of an acute exacerbation of COPD and 2) computed tomography (CT) chest imaging, used to separate patients into either COPD-alone or COPD with coexistent bronchiectasis groups. Primary outcomes included length of stay (LoS), sputum microbiology results, and C-reactive protein (CRP) levels.

Results. To date, 127 patients were identified, comprising 48 patients (38%) with COPD-bronchiectasis (52% F) and 79 patients (62%) with COPD-alone (54% F). As a cohort, patients with bronchiectasis were of a more advanced age (COPD-bronchiectasis: 73.2 +/- 14.3 years; COPD-alone: 68.1 +/- 9.5 years) and had a higher mean LoS (COPD-bronchiectasis: 5.7 +/- 5.3 days; COPD-alone: 5.5 +/- 4.3 days) than patients without bronchiectasis. Classical respiratory pathogens were detected in 41.7% of the COPD-bronchiectasis group, as compared to 20.3% of the COPD-alone group. Mean CRP was higher in patients with COPD-bronchiectasis (75.4 +/- 93.5 mg/dL) than in COPD-only patients (57.9 +/- 66.5 mg/dL).

Conclusion. Our preliminary data indicates that patients with comorbid COPD-bronchiectasis tend to be more advanced in age and spend longer in hospital than patients with COPD alone. Furthermore, mean CRP levels are higher in patients with COPD with coexistent bronchiectasis, potentially suggesting a more inflammatory phenotype.

TPL 004

EVALUATING THE USE OF THE AUSTRALIAN AND NEW ZEALAND COPD GUIDELINES IN CLINICAL PRACTICE: A USER SURVEY

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Introduction/Aim. A plethora of clinical guidelines exist providing recommendations on best practice care across specific disease areas. The aim of this study was to explore opinions of health professionals on the joint Lung Foundation Australia/ Thoracic Society of Australia and New Zealand publication, The COPD-X Plan: Australian and New Zealand Guidelines for the Management of Chronic Obstructive Pulmonary Disease. Areas of interest included familiarity with COPD-X, uptake, barriers to use, application in clinical practice and use in quality improvement initiatives.

Methods. A survey was conducted amongst registered users of the COPD-X Guidelines from September to November 2019.

Results. There were 296 survey responses primarily from Australia. Nurses were the largest user group (43%), followed by allied health (27%), GPs (15%) and respiratory specialists (9%). 62% of respondents saw COPD patients on a daily basis. 38% of respondents were familiar with COPD-X, with only 16% very familiar. 20% of respondents identified barriers to use including difficult format, preference for another guideline and lack of interest or time, especially in primary care. With regards to impact and relevance, 91% of respondents said COPD-X was applicable to health professionals other than respiratory specialists and was relevant to clinical practice. 89% said COPD-X improved their knowledge and understanding of COPD management; 85% said COPD-X supported the delivery of patient-centred care; 85% said it was relevant across hospital, primary and community care settings and 81% said it was applicable to geographically diverse healthcare settings.

Conclusion. Survey responses indicated positive opinions from the user group relating to the impact and relevance of COPD-X on the management of patients with COPD. However, there were varied opinions on the optimal format of a clinical guideline. Further work will be undertaken to compile a report of recommendations to improve the usability and uptake of COPD-X in clinical practice. It is suggested that additional effort needs to go into the promotion of COPD-X and engagement with health professionals outside the registered COPD-X user group.

SEX DIFFERENCES IN THE CLINICAL CHARACTERISTICS OF ABORIGINAL PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE IN THE TOP END REGION OF NORTHERN TERRITORY OF AUSTRALIA

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Introduction/Aim. The burden of chronic health conditions, including chronic obstructive pulmonary disease (COPD) is higher in Aboriginal Australian population and more so in those living in remote and regional communities of Northern Territory (NT). There is paucity of information in the literature in the differences and similarities between male and female Aboriginal patients with COPD which we sought to characterise in this study.

Methods. This is a five-year retrospective study of NT adult Aboriginal Australian patients living in regional and remote communities who were identified to have a clinical diagnosis of COPD. Demographic/clinical data, lung function tests, comorbidities and smoking status were analysed.

Results. Of the 365 patients with COPD, 204 (56%) were female and female patients had higher mean BMI (25.4) compared to males (23.6), reported more shortness of breath (59.3%) V (47.8%) and had a higher co diagnosis of asthma (39.2%) V (23.6%). Smoking status was not different in both males and females (current 65% in both groups). Coronary artery disease was more prevalent among males (16.1%) compared to females (6.4%). Spirometry data showed males had more severe reduction in FEV_1 /FVC < 0.7 (81.4%) V (68.7%) and FEV_1 % (39.4%) V (44.7%) compared to females.

Conclusion. Smoking status was highly prevalent among both males and females with more severe reduction in lung function noted amongst males compared with females. However, female patients were more likely to report symptoms such as dyspnoea.

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DISCHARGE CHECKLISTS AND THEIR ROLE IN COPD PATIENT MANAGEMENT

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Introduction/Aim. The latest guidelines developed by the Thoracic Society of Australia and New Zealand (TSANZ) and the Lung Foundation for the management of chronic obstructive pulmonary disease (COPD) emphasize the importance of patient education, self-management of exacerbations, pulmonary rehabilitation, and communication between primary and tertiary medical staff in ensuring good patient outcomes. Our aim is to assess the implementation of a discharge checklist to improve patient care, ensuring patients have access to all evidence based interventions in line with COPD-X guidelines.

Methods. Management checklists were performed for patients presenting with an acute exacerbation of COPD prior to discharge. The checklist records parameters such as patient spirometry, smoking status, blood gas results, referral to pulmonary rehabilitation and respiratory outreach services, and COPD medications. Rates of the above are compared to an audit done by the Agency of Clinical Innovation (ACI) from 2016–2018.

Results. 45 out of 47 (96%) patients were referred to see their GP post discharge, compared to 30 out of 39 in the ACI audit (77%). 32 out of 47 (68%) of patients were referred to a respiratory outreach program, compared to 10/39 (26%) in the ACI audit. In the 2018 ACI audit, 2 out of 39 (5%) of patients were considered for pulmonary rehabilitation. With the COPD discharge checklist, 16 out of 47 (34%) of patients were considered for pulmonary rehabilitation. 6 patients (13%) had a COPD action plan in place, compared to 2 (5%) in the ACI audit.

Conclusion. COPD discharge checklists have been shown to optimize the management of COPD patients demonstrating increased referral to pulmonary rehabilitation, respiratory outreach programs, and smoking cessation. COPD discharge checklists should be considered to be implemented in daily clinical care. Larger studies would be beneficial to further assess their impact in COPD populations.

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TP 063

ASSOCIATION BETWEEN PAIN AND PULMONARY REHABILITATION OUTCOME

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Introduction/Aim. Pain has been associated with reduced activity and quality of life in people with chronic respiratory disease (CRD). Pulmonary rehabilitation (PR) is effective in improving exercise capacity and quality of life in people with CRD, however the impact of pain on PR outcome is not well understood. The aim of this study was to describe and compare pain characteristics in people with CRD in PR and examine associations between pain and PR outcome.

Methods. Medical records of PR participants at West Park Healthcare Centre between 2016 and 2017 were retrospectively reviewed. Electronic and paper-based medical records were reviewed for self-reported pain. Medications for pain were classified using the World Health Organisation Anatomic Therapeutic Code system.

Pain characteristics were compared between types of CRD, PR setting, program completion rate, changes in exercise capacity (6-minute walk test) and health-related quality of life (Chronic Respiratory disease Questionnaire) with the Chi-squared and Kruskal-Wallis H test as appropriate.

Results. Of the 488 PR participants, the overall prevalence of pain was 77%. The prevalence of pain varied between PR settings (inpatient:81%, outpatient 66% $P = 0.001$) and types of CRD (obstructive:80%, restrictive:69% $P = 0.040$). Pain locations were reported in 301 of 311 medical records that documented pain with a mean of 2 ± 1.3 painful body locations per record. The number of pain locations were similar amongst different types of CRD ($P = 0.318$). PR completion rate, changes in exercise capacity and health-related quality of life were not different those with or without pain ($P > 0.05$ for all).

Conclusion. Pain is common amongst PR participants with CRD. While the prevalence of pain varied between participants with different types of CRD, pain did not affect PR outcomes. Pain should not be perceived as a barrier to referral to and participation in PR.

TP 064

CHARACTERISTICS OF THE COPD "SUPER EXACERBATOR"

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Introduction/Aim. Susceptibility to exacerbation (≥2 community or hospital exacerbations/year) is a proposed COPD phenotype. Hospitalised acute exacerbations of COPD (AECOPDs) constitute the major component of COPD morbidity and healthcare expenditure. We investigated whether patients with extreme AECOPD propensity (≥3 readmissions) who we termed "super exacerbators" had different characteristics to patients who did not readmit.

Methods. 155 unique individuals hospitalised for AECOPD were prospectively recruited to an observational study. Subsequent readmission status was derived from electronic medical records of Monash Health over the next 3 years.

Results. Of 155 index admissions, 154 survived till hospital discharge. Of these, 58/154 (37.6%) had no readmissions. In contrast, 45/154 (29.2%) had ≥3 readmissions with a median of 5 [4-10] readmissions. Time to readmission for the population overall was 167 [33-414] days. Super-exacerbators had a median readmission time of 114 [29-427] days

At index hospitalisation, super-exacerbators had a higher frequency of frequent previous hospitalisations (44.4% v 22.4%, $P = 0.02$), similar FEV 48.8% [31.5-75.2] vs 45.2%[37.3-53.2], $P = 0.23$ but lower TLCO (29.9 [22.6-40.4] v 39.5[30.4-48.2], $P < 0.005$, more home oxygen (40% v 20.6%, $P = 0.03$) and higher baseline eMRCD scores (5 v 4, $P = 0.04$). Male gender (73.3% v 50%, $P = 0.016$), comorbid cardiac failure (37.8% v 19.0%, $P = 0.03$) and alcohol misuse (15.5% v 3.4%, $P = 0.03$) were more prevalent.. CAT scores were similar but HADS Anxiety was higher (10 [7-14] v 7[4-11], $P = 0.02$). The proportion self-identifying as not coping at home was higher (55.5% v 27.6%, $P = 0.004$). There was no difference in cardiac biomarkers, eosinophils or exacerbation aetiology. No difference in age, length of stay or 12 month survival was observed

Conclusion. Super exacerbators are a common subgroup amongst hospitalised AECOPD, constituting a large proportion of COPD healthcare burden. Propensity to hospitalisation may reflect poor social support, comorbidities and anxiety as well as baseline disease severity.

EFFECT OF COMBINING HOSPITAL IN THE HOME AND DOMICILIARY NASAL HIGH FLOW ON LENGTH OF STAY AND READMISSION FOR HOSPITALIZED ACUTE EXACERBATIONS OF CHRONIC OBSTRUCTIVE LUNG DISEASE. A FEASIBILITY STUDY

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Introduction/Aim. Nasal high flow (NHF) may improve symptoms of dyspnoea in both stable and acutely exacerbating chronic obstructive lung disease (COPD). This may reduced symptoms are readmission rate.

Methods: This was a feasibility study prospectively recruiting subjects admitted to hospital for acute uncomplicated exacerbations of COPD. Consenting subjects were commenced on NHF and discharged when clinically stable determined by the clinical team who were not part of the study. NHF was maintained for minimum of 6 hours per day in the home setting for 30 days under supervision of HITH. Outcome measures were compared to matched retrospective controls

Endpoints: 1. Hospital length of stay 2. 30 day readmission rate

Results.

COPD presentations	1227
Excluded: (complicated presentation)	1068
Enrolled	42
Age	71 (51-79 yrs)
M:F	24:18
FEV1	45% pred
LOS	4 days 18 hrs
	(SD 2 days 23 hrs)
30 day readmission	4 (12%)
Matched retrospective controls	
N	110
LOS	4 days 22 hrs
	(SD 3 days 11 hrs)
30 day readmission	TBC

Conclusion. The addition of NHF to the discharge plan supported by HITH was not associated with reduced LOS but was associated with low 30 day readmission rate

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TRENDS IN LUNG FUNCTION PARAMETERS AMONG ABORIGINAL PATIENTS WITH CHRONIC RESPIRATORY DISEASES AT THE TOP END NORTHERN TERRITORY OF AUSTRALIA

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Introduction/Aim. About 30% of the population in the Northern Territory (NT) of Australia are considered to be of Aboriginal origin and chronic respiratory conditions are known to be higher in this population. Presence of poor lung function as measured by spirometry has been documented in the published literature in this population. However, there is paucity of information in the literature in regards to the trends in the lung function abnormalities among Aboriginal patients with chronic respiratory conditions.

Methods. This is a retrospective study of adult Aboriginal patients who underwent pulmonary function tests through the respiratory service based at the Royal Darwin Hospital at the NT of Australia. Demographic. Clinical, underlying respiratory and medical co-morbidities were analysed. Lung function results were analysed to provide information on the difference/trend between the first and subsequent last available test.

Results. A total of over 500 Aboriginal patients were noted to have undergone lung function test. Many number of patients lived in the remote and regional communities of the NT. The outcome of the trends in the lung parameters with underlying chronic lung conditions will be presented.

Conclusion. The trends in the lung function abnormality is likely to provide an insight into the progression of chronic lung disease in the Aboriginal population of the NT Australia.

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REDUCING AVOIDABLE COPD EMERGENCY ROOM PRESENTATIONS: AN INTEGRATED CROSS-HEALTH SERVICE UTILISATION SCOPING INITIATIVE IN SOUTH QUEENSLAND

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Introduction/Aim. Public Health Networks PHNs and The Australian Institute of Health and Welfare are calling for solutions that reduce COPD Emergency Department (ED) presentations, and decrease economic burden. The rationale for this multisite research project was to better establish the context of the situation facing EDs in South West Queensland with a focus on over-utilisation, and to provide some solutions.

Methods. 1. Qualitative scoping exercise with 18 staff and 18 patients across 3 major Queensland Health (QH) sites. 2. Scoping review (International literature). 3. QH 2 year data systems summary of characteristics associated with avoidable COPD admissions. 4. Health economic analysis of actual costs for ED presentation.

Results. Thematic analysis from both staff and patient interviews reveals the following core concepts worthy of more in-depth exploration. **1.** Integrated communication of patient assessment and history data. **2.** A restructure of nurse led roles (Home Visits). **3.** A failure to rescue. **4.** Knowledge utilisation among ED clinicians. The Scoping Review confirms research should target ED avoidance and community management. Systems summary data confirm infective exacerbation, co-morbidities like Coronary heart disease, Depression, and Asthma as major contributors to presentation. Economic data reveals a total health service cost of $42, 142, 474 for ED presentations across all 3 sites. 41.1% of presentations assessed as category 3 or 4 in the EDs were transferred home on the same day. Targeting ED avoidance in this cohort reveals a potential cost saving of $533 per patient or $1,269,181 (as per, National Hospital Cost Data Collection estimates).

Conclusion. Innovative and targeted ED avoidance strategies are required that offer alternative COPD assessment points, ongoing support and monitoring, and earlier detection of deterioration, e.g. nurse led home visits. Clinician compliance with COPD X guidelines needs to be actively measured and reported.

BLOOD FLOW RESTRICTED EXERCISE PROMOTES HIGHER MUSCLE STRENGTH GAINS THAN TRADITIONAL RESISTANCE TRAINING IN PEOPLE WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE

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Introduction/Aim. Blood flow restricted exercise (BFRE) is a novel training regimen that uses low loads associated with blood flow restriction (BFR) that has been shown to promote the same benefits for skeletal muscle as high-intensity exercise. Thus, it is emerging as a possibility for populations that are not able to exercise at higher intensities, such as people with chronic obstructive pulmonary disease (COPD). In this perspective, this research aimed to compare the effects of BFRE and traditional resistance exercise in the muscle strength of people with COPD.

Methods. Seventeen individuals (64.56 ± 7.32 SD years) with moderate COPD were randomized into three groups and underwent 6 weeks of one of the following protocols: **low-load blood flow restriction (LLBFR)** – knee extension at 30% of 1-maximum repetition (1RM) with 50% of BFR; **moderate load (ML)** – knee extension at 60% of 1RM; and **control (C)** – usual care. Muscle strength for knee extension was assessed prior to training and after the 6th week of exercise. Statistical significance was considered as $P < 0.05$.

Results. Two participants did not finish the protocol and their data were analysed by intention to treat. No significant difference was found between the groups at baseline ($P < 0.05$). Both LLBFR and ML groups increased strength significantly between the first and second measures ($P < 0.001$, $P = 0.033$, respectively) and no change was observed on the control group overtime ($P < 0.05$). Post-training strength for the ML was 35.7% significantly higher than control ($P < 0.001$). As for LLBFR, strength at the final assessment was significantly higher than control (51.4%, $P < 0.001$) and ML (24.4%, $P = 0.035$) after training.

Conclusion. Moderate load exercise and low load blood flow restricted exercise can increase muscle strength; however, the latter promotes higher strength gains in people with COPD.

TP 069

THE MIDLAND NIV SCORE

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Introduction/Aim. Our aim was to create a simple new tool to predict Non – Invasive Ventilation failure (death or intubation) in people with type 2 respiratory failure of any cause. Current risk prediction models including SAPS3-CNIV) are complex with both numerous and subjective variables. It will allow us to accurately counsel patients and plan for location of care.

Methods. SAPS3 and additional variables were collected on all individuals managed with NIV between November 2016 to March 2018. Multivariate logistic regression analysis was used to develop the score including all SAPS3 variables using stepwise exclusion criteria of P value >0.1. Beta-coefficients of the final model (X10) to create the NIV score. The accuracy of the score was then compared with SAPS3-CNIV.

Results. 150 patients with acute T2RF (PH <7.35 and Pco2 > 45) managed by NIV. The mortality rate was 17% and 8.7% were intubated. The final model for NIV failure is shown in table below. Individuals with Midland NIV score of ≤11 had an average 13% NIV failure rate versus 66% in those with a score ≥ 12. The model AUC was 0.75 (95%CI 0.67-0.84) with similar accuracy to SAPS3-CNIV score (AUC 0.71, 95%CI 0.62-.881, comparison P = 0.4), yet containing only five variables compared to 34.

Midland NIV Variable	Adj-Odds Ratio	95% CI	P Value	Midland NIV Score
Age ≥ 70 years	2.36	0.96-5.78	0.06	+4
WCC ≥15 10^9/L	2.46	1.04-5.82	0.04	+5
No known COPD	3.55	1.37-9.15	0.009	+6
Absence of APO	4.09	1.38-12.10	0.01	+7
Creatinine ≥310 μmol/L	3.85	1.27-11.66	0.02	+7

WCC (white cell count), APO (acute pulmonary oedema), COPD (chronic obstructive pulmonary disease)

Conclusion: Midland NIV score is a simple score to predict NIV failure at initiation in acute T2RF. Comparison shows it is as accurate but simpler than SAPS3-CNIV score. Low Midland NIV score (<11) patients may be managed outside the ICU. As a retrospective study it warrants prospective external validation.

Grant Support: Nil

TP 070

CHARACTERISTICS AND HEALTH-RELATED OUTCOMES OF RESPIRATORY PATIENTS ON LONG TERM OXYGEN THERAPY

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Introduction/Aim. Long term oxygen therapy (LTOT) is prescribed for patients with chronic respiratory disease and persistent resting hypoxaemia, based on arterial blood gas criteria defined in landmark trials of patients with chronic obstructive pulmonary disease (COPD). Health-related outcomes of respiratory patients who are prescribed LTOT in clinical practice remain uncertain. This retrospective single centre audit explored characteristics and health-related outcomes of respiratory patients prescribed LTOT in a tertiary hospital setting.

Methods. Records for patients with COPD or interstitial lung disease (ILD) who were prescribed LTOT between January 2012 and December 2018 at Austin Health were audited, with patients prescribed only ambulatory oxygen therapy or palliative oxygen therapy excluded. An initial random sample was included for preliminary analysis. Data collected included demographic information, comorbidities, hospitalisations and mortality.

Results. Fifty three patients (61% female, n = 41 (77%) with COPD) were prescribed LTOT). The mean age was 74.4 ± 9.8(SD) years. The mean Charlson comorbidity index was 6.26 ± 2.27 (SD), which was higher for those with COPD compared to ILD (6.68 [SD 2.07] vs ILD 4.83 [SD 2.40], P < 0.05). Cardiac disease (60%), pulmonary hypertension (55%) and sleep disordered breathing (23%) were the most common comorbidities. This study population was hospitalised for a median of once a year both prior to (IQR 1-3) and after (IQR 0.5-2) the commencement of LTOT. Twenty-three patients (43%) died within one year of commencing LTOT and the overall 5 year survival was only 7.5%, with no patients with ILD surviving this long.

| | Demographics | | | Survival | | |
	Age (years)	% male	Smoke exposure (pk/y)	1-year (%)	2-year (%)	5-year (%)
Total (n = 53)	74.4 ± 9.8	39.0	46 ± 34	56.6	45.3	7.5
COPD (n = 41)	75.4 ± 8.2	36.6	52 ± 33	49.1	41.5	7.5
ILD (n = 12)	70.6 ± 13.7	41.6	28 ± 30	7.5	3.8	0

Conclusion. In this preliminary analysis, patients with COPD had a higher comorbidity burden than those with ILD. The prognosis for respiratory patients requiring LTOT is poor, worse than for most cancers, with a notably shorter survival for those with ILD.

Grant Support: Nil

COST-EFFECTIVENESS OF A SINGLE-INHALER TRIPLE THERAPY VS A DUAL BRONCHODILATOR FOR PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD) IN AUSTRALIA

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Introduction/Aim. IMPACT (NCT02164513) demonstrated clinical benefits of once-daily fluticasone furoate/umeclidinium/vilanterol (FF/UMEC/VI) 100 μg/62.5 μg/25 μg versus UMEC/VI (62.5/25 μg) for moderate/severe Chronic Obstructive Pulmonary Disease (COPD) with exacerbation history. These results helped evaluate cost-effectiveness of FF/UMEC/VI versus UMEC/VI from the Australian healthcare payer perspective.

Methods. Economic model combined a decision-tree for within-trial period (52 weeks) with a Markov model to extrapolate longer-term outcomes: health states reflect COPD severity (defined by predicted FEV_1, presence/absence of recent exacerbations) & death. Disease progression & exacerbation rates were determined by risk equations based on TORCH (NCT00268216). No exacerbation reduction treatment effect was applied. Baseline characteristics, efficacy & medication use were from IMPACT. Australian-specific medication & healthcare-resource unit costs/drug prices (Aus\$) were from published sources inflated to 2018 values. Health-state utilities were from IMPACT (decision-tree) and the literature (Markov model). Costs/health outcomes were discounted at 5% (per Australian Payer guidelines) & modelled to a 10-year horizon. Robustness to alternative assumptions or parameter values was tested in scenario & sensitivity analyses, including probabilistic sensitivity analysis.

Results. Over ten years, the model predicted fewer moderate/severe exacerbations with FF/UMEC/VI versus UMEC/VI (moderate 4.493, severe 1.066 versus 4.711, 1.126, respectively), more life-years (LYs), quality-adjusted life-years (QALYs) & higher total costs (6.831, 4.965, \$21,240 versus 6.758, 4.901, \$20,270, respectively). Incremental cost-effectiveness ratios (ICERs): \$13,238/LY, \$15,145/QALY gained. In scenario & one-way sensitivity analyses, ICERs ranged from dominant (cost-saving, more effective) to \$35,722, with results most sensitive to varying drug acquisition costs. At a willingness-to-pay threshold of \$50,000/QALY, FF/UMEC/VI has 71% probability of being cost-effective (overall population). In the $FEV_1 < 50\%$, ≥2 exacerbations subgroup (prior year), FF/UMEC/VI was the dominant treatment, more effective & cost-saving versus UMEC/VI. FF/UMEC/VI remained cost-effective across all scenarios and sensitivity analyses in the subgroup.

Conclusion. Treatment with FF/UMEC/VI is a cost-effective option, versus UMEC/VI, for the treatment of symptomatic COPD within the Australia healthcare setting.

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Disclosures. The authors declare the following real or perceived conflicts of interest during the last 3 years in relation to this presentation: MS, AM, NR, AT, MH and ASI are GlaxoSmithKline plc. employees. MS, AM and ASI hold shares with GlaxoSmithKline plc. ASI is also an unpaid professor at McMaster University, Canada. KN and NR are ICON employees. ICON received funding from GlaxoSmithKline plc. to conduct this study. SS has received travel support from GlaxoSmithKline plc., Astra Zeneca and Roche to attend meetings. SS has also been a consultant to and principal investigator on trials sponsored by GlaxoSmithKline plc. PB has received personal fees from GlaxoSmithKline plc.

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RETROSPECTIVE CHARACTERIZATION OF AECOPD ADMISSIONS TO A QUEENSLAND RESPIRATORY UNIT

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Introduction/Aim: In Australia, acute exacerbations of chronic obstructive pulmonary disorder (AE-COPD) accounted for 66 250 admissions in the 2014 financial year, representing a substantial healthcare burden. Given the well-documented variation in the outcome of individual AE-COPD presentations, we aimed to identify the factors that underlie prognosis in patients with AE-COPD.

Methods: A retrospective audit was conducted using clinical and pathology data from all patients admitted to The Prince Charles Hospital between 1 Apr 2015 and 31 Sep 2015 with a primary diagnosis of COPD. Measured exposures included age and gender; sputum and nasopharyngeal swab (NPS) results; C-reactive protein (CRP) levels; and peripheral eosinophil count. The primary outcome was length of stay (LoS). Univariate regression analyses were conducted to evaluate correlations.

Results: There were 396 admissions with a primary diagnosis of COPD over the study period. The mean age was 70.33 ± 12.29 (SD) and 50.3% were female. The average LoS was 4.98 ± 5.38 (SD). Sputum cultures were performed on 44.2% of admissions, of which 32.6% demonstrated a classic respiratory bacterial pathogen (e.g. *S. pneumoniae*, *H. influenzae*, *P. aeruginosa*). NPS testing was conducted on 48.2% of admissions, of which 29.3% tested positive for viral infection. Increased CRP levels were associated with a prolonged LoS (R = 0.10; *P* = 0.048). Notably, increased peripheral eosinophil count was associated with a shorter LoS (R = 0.17; *P* < 0.001).

Conclusion: Patients requiring hospitalization for AE-COPD tend to be of an older age and are associated with a range of viral and bacterial pathogens, consistent with characteristics and prevalences previously reported in the literature. From this preliminary data, CRP levels and peripheral eosinophilia appear to be modestly effective predictors of AE-COPD outcome. Importantly, we note that utilization of microbiological testing was relatively low in this AE-COPD cohort.

Grant Support: None

TP 075

THE EFFECTIVENESS OF CHINESE PULMONARY REHABILITATION PROGRAM

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Introduction/Aim. Pulmonary rehabilitation is standard of care for patients with chronic obstructive pulmonary disease and other chronic lung diseases. Language and cultural barriers limit subgroups from accessing key therapies shown to reduce dyspnoea, fatigue and healthcare related quality of life. As a result, pulmonary rehabilitation, despite its benefits, has been under-utilized. Within the Hurstville region there is a large Chinese community. The aim of this study is to demonstrate the benefit of a language specific rehabilitation class by providing a service conducted by healthcare professions fluent in Cantonese and Mandarin.

Methods. Prospective cohort study was performed at Hurstville Private Hospital including patients with chronic lung disease, referred by bilingual Respiratory Specialist. The project was carried out over a 12-month period, with 8 week program blocks with at least one bilingual physiotherapist present each class. Baseline and post-rehabilitation 6 minute walk test (6MWT) and pulmonary function tests (PFTs) performed, in addition to St George Respiratory Questionnaire (SGRQ) that had been translated to Chinese pre- and post-rehabilitation.

Results. 30 patients are enrolled in the study. Preliminary data analysis indicated 80% were male and ex-smokers with mean age 74 (±7.09). 90% of patients had one or more cardiovascular comorbidity. At baseline, mean FEV1 was 1.78 (±0.67), FVC 2.69 (±0.81) and 6MWT distance was 269.3 m (±75.6). The differences in PFTs, 6MWT distance, SGRQ are presented. We also described the correlation between PFTs and 6MWT with SGRQ scores. Preliminary analysis of SGRQ scores suggests improvement in dyspnoea and quality of life scores.

Conclusion. This study highlights the benefits of pulmonary rehabilitation in patients of NESB through implementation of language specific programs, improving their access to key therapies to optimise their chronic lung disease. While there was no significant improvement in lung function, patients noted improvement in dyspnoea and quality of life.

TPL 006

IMPROVED PULMONARY REHABILITATION COMPLETION WITH PERSONALIZED EXERCISE AND EDUCATION MODULES: THE PUREMOD TRIAL

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Aim. To determine the feasibility and effect of a novel Pulmonary Rehabilitation Modular (PuReMod) program on pulmonary rehabilitation (PuRe) completion, health outcomes, and knowledge in people with chronic respiratory disease (CRD).

Hypothesis: Personalising the mode of PuRe exercise and education delivery according to the patient's preference and identified needs would improve the PuRe completion rate and be feasible to deliver.

Design. Prospective cohort study with historical comparison group.

Methods. People with CRD referred to PuRe attended a face-to-face assessment. Based on eligibility criteria and health and safety screening, participants were offered a choice of one of three group exercise training modules: hospital land(gym)-based, hospital water(pool)-based, or home-based telerehabilitation. Supervised exercise sessions were twice weekly for eight weeks. Based on medical/screening history and lung disease knowledge, participants were allocated to tailored education modules. Outcomes were compared to an historical traditional PuRe group.

Results. Of 159 participants (45% male; 73 $\pm$ 10 (SD) years) recruited in the PuReMod trial to date, 146 (92%) were eligible for more than one exercise training module. Participant choice of land-based, water-based, and home-based telerehabilitation exercise modules were 72%, 17%, and 11%, respectively. Modular education reduced average PuRe education duration by 5.7 $\pm$ 0.8 (SD) hours ($P < 0.001$). The completion rate for PuReMod was 65% compared with 55% for traditional PuRe ($P < 0.001$). Improvements in health outcomes and lung disease knowledge for PuReMod were similar to traditional PuRe.

Conclusion. Compared to traditional PuRe, PuReMod improved the PuRe completion rate and reduced PuRe education hours, with similar improvements in health outcomes and lung disease knowledge to traditional PuRe.

PATTERN AND SEVERITY OF LUNG FUNCTION RESULTS AMONG ABORIGINAL PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE IN THE TOP END REGION OF NORTHERN TERRITORY OF AUSTRALIA

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Introduction/Aim. Chronic obstructive pulmonary disease (COPD) is noted to be highly prevalent among Aboriginal Australian population (compared to non-Aboriginal population) and more so in the Northern Territory (NT) of Australia. There are no established normative spirometry values currently available for the Australian Aboriginal population, especially from the NT of Australia.

Methods. In this retrospective study we evaluated spirometry results of Aboriginal patients with a clinical diagnosis of COPD over a 5 year period. Demographic, clinical, comorbid conditions and smoking status was collected. Spirometry values FEV_1, FVC, FEV_1/FVC ratio were analysed.

Results. There were 762 unique spirometry results available for analysis during the study period. Only good quality tests results were included. The study participants included were adults aged 18 years and above, residing in urban and regional and remote Aboriginal communities of the NT Australia.

This study is currently in progress and the results of the study will be presented at the meeting.

Conclusion. This study will add to better understanding of spirometry data on Aboriginal Australian patients with a diagnosis of COPD.

Grant Support. Nil

USING AN ELECTRONIC MEDICAL RECORD REPORTING TOOL TO IMPROVE TIME TO TREATMENT OF *P. AERUGINOSA* IN CHILDREN WITH CYSTIC FIBROSIS

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Introduction/Aim. Close tracking of clinical details and recording outcomes is a feature of high-performing cystic fibrosis (CF) centres. To improve our practice we developed a reporting tool, utilising the capabilities of our electronic medical record (EMR) to search for new growth of *P. aeruginosa*. The aim of this study is to determine if the tool is associated with a shorter time to initiation of eradication therapy for *P. aeruginosa*.

Methods. The reporting tool was developed using the "Slicer-Dicer" functionality of Epic™ EMR. The report displays any patient that has ever attended a CF clinic and has *P. aeruginosa* present on culture (oropharyngeal swab, sputum, or bronchial lavage) within 4 weeks. Effectiveness of this intervention was assessed via chart review of every patient with a positive *P. aeruginosa* culture in the 20 weeks before and after the intervention was introduced. The primary outcome was the number of days taken between the collection of the sample and any intervention suggested by the CF team. A 1-tailed t-test was performed to assess for any significance difference between the means.

Results. Pre-intervention: 39 patients cultured *P. aeruginosa* (mean age 12.6y, 8 m - 19y old, 63% female). Mean time from date of sample collection to antibiotic change: 17.6 days ($\pm$23 SD).

Post- intervention: 25 patients (mean age 13.1y, 10 m -19y old, 29% female). Mean time from date of sample collection to antibiotic change: 7.1 days ($\pm$3.5 SD).

The difference between the means of 10.5 days was statistically significant ($P = 0.044$)

Conclusion. The introduction of this tool has reduced delays in the average time to initiate *P. aeruginosa* eradication. This supports the role of clinicians using the functionality of electronic medical record systems to provide targeted, timely, quality care.

Grant Support: None

BIOMARKERS TO DETECT INFLAMMATION IN YOUNG CHILDREN WITH CYSTIC FIBROSIS

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Introduction/Aim. A landmark study has demonstrated that the presence of neutrophil elastase (NE) in broncho-aveolar lavage (BAL) is a key risk factor for the development of bronchiectasis in young children living with cystic fibrosis (CF) [1]. We have completed a study which has demonstrated that NE expression in the lungs of young children occurs via the mechanism of neutrophil extracellular trap (NET) expression. The aim of this study was to establish if NE and NET expression could be monitored using non-invasive blood biomarkers.

Methods. Levels of NE and NET expression were assessed in BAL fluid using ELISA assays and confocal microscopy. Forty three different parameters were measured in peripheral blood samples using multiplex assays, spectroscopy and microscopy and were correlated with the presence of BAL NE and NET expression.

Results. A cohort of 29 children with CF (mean age 3.9 ± 2.1 yrs) and 24 children with a chronic wet cough (mean age of 4.2 ± 1.9 yrs) were studied. We also included control groups with no detectable NE/NET in BAL and peripheral blood samples from controls without respiratory disease. Of the 43 parameters measured, three correlated with the expression of NETs; circulating DNA complexes, interleukin (IL)-6 and C-reactive protein (CRP) levels. Levels of IL-6 and CRP were significantly associated with levels of NE expression.

Conclusion. The measurement of IL-6, CRP and circulating DNA complexes in the peripheral blood correlate with lung inflammation. These may represent potentially useful biomarkers to guide management in children with chronic suppurative lung disease.

Reference:

1. Sly PD et al, Risk factors for bronchiectasis in children with cystic fibrosis. *N Engl J Med*., 2013, 368, 1963-1970

ACCEPTABILITY OF USING PERSONALISED MINI-ORGAN-AVATARS TO ACCELERATE DRUG DISCOVERY AND PREDICT DRUG RESPONSE IN CYSTIC FIBROSIS PATIENTS

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Introduction. Individual patient derived pre-clinical cell models (organoids/Avatars) have helped guide drug discovery for a number of diseases including Cystic Fibrosis (CF). This technology may also help guide treatment choices at an individual level using personalised medicine. However, little is known about the acceptability of patient derived cell models to the CF community or the wider population.

Methods. We used a cross sectional online explainer video and questionnaire. Our questionnaire was adapted from a recently published study on willingness to use patient-derived xenografts in cancer care [1]. Acceptability was examined in five domains; willingness to use organoids, perceived advantages and disadvantages of organoids, maximum acceptable out-of-pocket costs, maximum acceptable turnaround time, acceptable source of tissue. Between March and July 2019, participants were recruited via email invitation, in person at CF clinic and using social media.

Results. 139 individuals completed the online questionnaire. The cohort included CF adults (10%), parents of children under 18 with CF (33%), non-CF parents (29%) and non-CF adults (28%). 98% of respondents found that the advantages of patient derived stem cell models outweighed the disadvantages. Responses were not significantly different between the groups of participants. The most important advantage was that organoids might help doctors choose the right drug more quickly, without having to test drugs on the patient. The most important disadvantage was that the treatment recommended from the avatar testing may be unavailable or too expensive. 94% of participants chose the nose as the site they would most likely consider being sampled.

Conclusion. Using patient derived organoids is extremely acceptable to the majority of adults who completed the questionnaire. Participants were mostly likely to choose the least invasive procedure to obtain samples.

Reference:

1. Wakefield, C.E., et al., The Avatar Acceptability Study: Survivor, Parent and Community Willingness to Use Patient-Derived Xenografts to Personalize Cancer Care. *EBioMedicine*, 2018. 37: 205-213.

LONG-TERM OUTCOMES FOLLOWING INFECTION AND INFLAMMATION IN EARLY CF LUNG DISEASE

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Introduction/Aim. Infection and inflammation are critical to the pathogenesis of cystic fibrosis (CF) lung disease. In infancy, the detection of pathogenic organisms and neutrophilic inflammation in the lower airways is associated with earlier development of bronchiectasis and lower lung function at age 6-years. This study explores the impact of early life lower airway infection and inflammation on survival, need for lung transplant and the development of structural and functional lung disease over 25-years.

Methods. A birth cohort of infants newly diagnosed with CF was established at the Royal Children's Hospital, Melbourne, Australia, in 1992, soon after the introduction of newborn screening for CF. Bronchoscopy and bronchoalveolar lavage (BAL) were performed at study entry and approximately annually thereafter. Quantitative microbiological culture was performed and inflammatory markers were measured contemporaneously. Where possible, 16S rRNA gene analysis was performed on stored BAL fluid.

Clinical outcome data, including survival, need for lung transplant, rate of decline of FEV_1 and bronchiectasis severity, defined by the CF-CT score, were obtained from participant medical records and the Australian Cystic Fibrosis Data Registry.

Results. One hundred infants with CF (50% male), were recruited between 1992-1999. A total of 255 BALs were performed, median three per participant (range 0-5). Sixty-six surviving adults (71%, seven participants lost to follow up), are currently aged 21-29-years.

Conclusion. To our knowledge, this is the first comprehensively studied birth cohort of infants with CF, diagnosed predominantly via newborn screening and who underwent serial lower airway microbiological assessment, to reach adulthood. This study therefore provides a unique insight into the role of early life lower airway infection and inflammation in the pathogenesis and progression of CF lung disease.

SITAGLIPTIN IMPROVES CLINICAL OUTCOMES IN CYSTIC FIBROSIS IMPAIRED GLUCOSE TOLERANCE

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Introduction/Aim. Individuals with Cystic Fibrosis (CF) are increasingly entering their 4th decade of life with over 50% of individuals developing glucose abnormalities by this time. CF Impaired Glucose tolerance (CFIGT) and Cystic Fibrosis Related Diabetes (CFRD) are the most common non-pulmonary manifestations of Cystic Fibrosis. Already a chronic disease with an enormous treatment burden, these two conditions place an additional risk of nonadherence to therapy. Sitagliptin, a dipeptidyl peptidase-4 inhibitor has been utilised in the Mater CF clinic for at the last 5 years, however there are no randomised controlled trials assessing its use in this population. Here we describe our experience with the use of sitagliptin in the CF population.

Methods. A retrospective chart review was conducted for all CF patients with a known history of CFIGT as demonstrated by an oral glucose tolerance test (OGTT). Electronic records were interrogated and data extracted for at least 12 months prior to the commencement of sitagliptin and for at least 12 months following. The patients acted as their own controls, with data collected used to determine response after at least a 12 month period of sitagliptin use.

Results. Early analysis of individual's with complete data sets appears to be positive (see graphs) - Complete data analysis will be completed by February 2020.
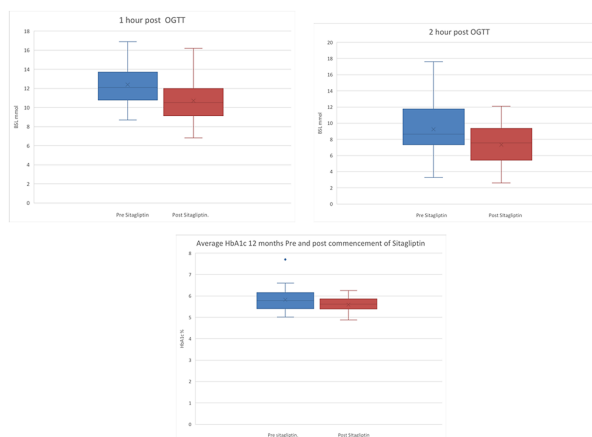
Conclusion. Sitagliptin represents a potential novel treatment option for individuals with CFIGT as an alternative to standard insulin therapy where poor adherence is demonstrated. Further investigation of this oral therapy in particular its effect on beta cell function, metabolic hormones and pancreatic function will provide a gateway to understand the intricacies of CF glucose abnormalities better.

TP 081

RESTORING CFTR USING ANTISENSE OLIGONUCLEOTIDES FOR A CYSTIC FIBROSIS CAUSING SPLICE MUTATION C.2989-1G > A

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Introduction/Aim. Over 2000 different mutations have been reported in patients with Cystic Fibrosis (CF) and found to occur in all *CFTR* exons and introns. Many mutations are not amenable to current therapies, and therefore new drugs must be developed. Antisense oligonucleotides (AOs) are synthetic nucleic acid analogues designed to anneal to selected splice motifs within pre-mRNAs. AO binding alters the recognition of the splice site by the spliceosome and therefore modulates exon selection. c.2989-1G > A causes skipping of *CFTR* exon 19, which disrupts the reading frame, and abolishes CFTR protein production. We hypothesize by also skipping exon 18 in patients with c.2989-1G > A the reading frame will be restored, and the induced protein isoform may regain function or become amenable to CFTR modifying drugs.

Methods. Three AO sequences were initially optimised using 2'-O-Methyl modified bases on a phosphorothioate backbone (2OMe) and transfected using lipofectamine into primary airway epithelial cells (AECs) from non-CF and child with CF causing c.2989-1G > A/ c.2989-1G > A. The transfection is left for 48 hours after which the cells are collected, and RNA extracted. PCR primers that amplify *CFTR* exons 17 to 21 are used to determine the efficacy of exon skipping. PCR bands are measured using densitometry and the density of the full-length band to the exon skipped band is compared.

Results. The 2OMe sequence produced 64% exon 18 skipping in c.2989-1G > A/ c.2989-1G > A CF airway epithelial cells. In non-CF AECs the efficiency was greatly reduced to only 11% exon 18 skipping.

Conclusion. Exon 18 can be efficiently skipped from the *CFTR* transcript in c.2989-1G > A/ c.2989-1G > A CF-derived airway epithelial cells. We propose that exon skipping to restore the reading frame of the *CFTR* gene, resulting in improved CFTR protein production. This new internally truncated CFTR protein could have improve function and/or become amenable to CFTR modifying drugs.

TP 082

19F-MRI OF INHALED PERFLUOROPROPANE FOR IMAGING PULMONARY VENTILATION

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Introduction/Aim. Existing clinical measures of pulmonary ventilation either provide no regional information (eg. spirometry) or incur ionising radiation doses restricting serial use (eg. CT, V/Q scans). Recent studies using ^{19}F-MRI of inhaled perfluoropropane (PFP) have demonstrated its utility as a safely repeatable modality to assess regional pulmonary ventilation without the technical requirements of hyperpolarized ^{3}He- or ^{129}Xe-MRI. However, scarce signal in short breath-hold length acquisitions present a hurdle to widespread clinical implementation.

Aim: To implement ^{19}F-MRI of inhaled PFP on a Siemens 3T MRI scanner and perform acquisitions on healthy volunteers to assess the feasibility for application to clinical research studies of patients with respiratory disease.

Methods. 11 healthy volunteers (3M/8F, aged 23-43 years) provided written informed consent. Participants underwent a single MRI scan session where they were imaged using a ^{19}F-tuned birdcage torso coil (Rapid Biomedical, Rimpar, Germany) interfaced to a 3T MRI scanner (MAGNETOM Prisma, Siemens Healthcare, Erlangen, Germany). ^{19}F images with 10mm isotropic resolution were acquired in a 23 second breath hold following 4 deep inhalations of a 79% PFP / 21% oxygen gas mixture using a 3D VIBE sequence in-house modified to support ^{19}F acquisitions (TE/TR=0.9/8.6ms). 8mm isotropic resolution images were additionally acquired in two participants.

Results. 3D ventilation images were obtained in all volunteers within a single breath hold, showing homogeneous gas distribution. Figure 1: 10mm isotropic ^{19}F-MRI image (PFP gas signal in colour), overlaid on an anatomical image. Figure 2: 3D dataset of PFP distribution with 8mm isotropic resolution.

Conclusion. Images of inhaled inert tracer gas were obtained with 0.5ml voxel volume within a breath hold. There is scope for optimisation of scanner hardware and scan protocols to further improve spatial and temporal resolution. The methods are suited to studies of patient groups such as asthma, COPD, and cystic fibrosis.
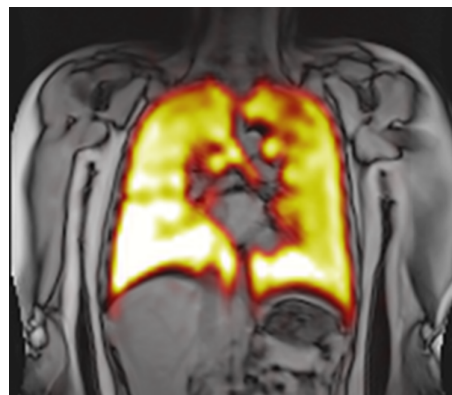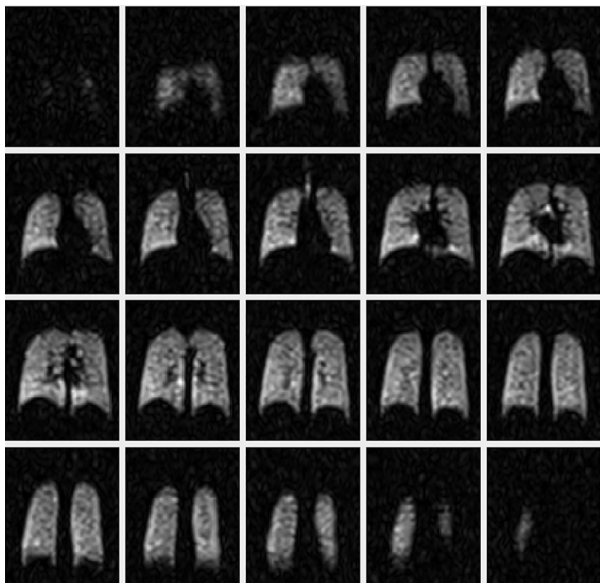
LONGITUDINAL CHANGES IN NEUTROPHIL PHENOTYPES AND LUNG DISEASE OUTCOMES IN EARLY CYSTIC FIBROSIS

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Introduction/Aim. We have recently established that a pathological phenotypic shift occurs within polymorphonuclear neutrophils (PMNs) upon recruitment to CF airways. Predominant phenotypic features in adults with CF are reduced phagocytic receptor expression (CD16^{Lo}) and hyperexocytosis of protease containing primary granules (CD63^{Hi}), which is associated with CT-scan based outcomes and may drive extracellular protease burden. Over a 3-year period, we are characterising airway PMN phenotypes in young children with CF over multiple visits to understand the initiation of this phenotypic shift. We hypothesise that the burden of airway PMN phenotype shift positively correlates with clinical lung disease progression.

Methods. Bronchoalveolar lavage (BAL) cell fraction and blood (where possible to allow comparison with circulating PMNs) are obtained from children with CF less than 3 years old as a sub-study of the AREST-CF program. PMNs are then analysed for phenotype shift (CD16^{Lo} CD63^{Hi} expression) by flow cytometry. Parameters of clinical lung disease including CFTR mutation, airway microbiology, neutrophil elastase protease burden and PRAGMA-CF chest computed tomography (CT) score are also collected at each visit.

Results. To date, 38 children aged 36 months or less have been recruited to the study, with 20 recruited at 3 months of age. We have assessed BAL from 59 visits, resulting in multiple assessments for 23 participants. Matched blood has been collected for 78.0% of the visits. Infection prevalence was 23.4% (11 / 47 for whom microbiology results were available). Our interim analysis finds that CD16^{Lo} CD63^{Hi} PMNs constitute a significantly higher proportion of the BAL cell fraction at the 36-month visit compared to the initial 3-month visit (19.2% vs 3.5%, respectively, $P < 0.05$).

Conclusion. Our results demonstrate it is possible to longitudinally characterise PMN phenotypes in young children with CF. We aim to complete multi-variate analyses of PMN phenotype shift and clinical disease outcomes in 2021.

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OXIDATIVE STRESS AND DYSREGULATED SPHINGOSINE-1-PHOSPHATE SIGNALING IN BRONCHIAL EPITHELIAL CELLS IN RESPONSE TO *P. AERUGINOSA* TOXIN, PYOCYANIN

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Introduction/Aim. Pyocyanin, a virulent factor of *Pseudomonas aeruginosa*, is implicated in causing oxidative stress, inflammation and cell death in the lungs in cystic fibrosis. We hypothesized that the effects of pyocyanin on bronchial epithelial cells are associated with dysregulated sphingosine-1-phosphate (S1P) signalling.

Methods. A 16HBE human bronchial epithelial cell line was exposed for 24 h to pyocyanin at a range of physiologically achievable concentrations, 3.125, 6.25, 12.5, 25, 50 and 100 μM. CellRox assay for oxidative stress and annexin-V binding for apoptosis were performed using flow cytometry. Protein expression and subcellular localization of sphingosine kinases (SPHK1/2; involved in S1P production and function), SPNS2 (a mediator of S1P transport) and RAC1 were analysed by immunofluorescence and confocal microscopy. Extracellular/intracellular S1P production was measured by 3H-Sph isotope labelling.

Results. In pyocyanin-treated HBE, a significant increase in oxidative stress was detected at concentrations above 6.25 μM (12.5 μM: 3-fold, $P < 0.01$), while apoptosis increased at higher concentrations (25 μM: 2.5-fold, $P < 0.05$; or 50 μM: 3.3-fold, $P < 0.001$). SPHK1 and SPNS2 localized to cytoplasm and RAC1-enriched lamellipodia and filopodia; which were lost from pyocyanin-treated cells. SPHK2 localized to the nucleus and perinuclear cytoplasm and was reduced with 12.5 μM but restored with 50 and 100 μM of pyocyanin. Preliminary data showed a pyocyanin-induced increase of extracellular S1P, in line with increased shedding of SPHK1/SPNS2/RAC1-positive extracellular vesicles.

Conclusion. Our data indicates complex and dose-dependent effects of pyocyanin on human bronchial epithelial cell, including increased oxidative stress and apoptosis accompanied by dysregulated sphingosine-1-phosphate (S1P) signalling, and highlight new pyocyanin-mediated targets for cystic fibrosis.

Grant Support:

ESTABLISHING PATIENT-DERIVED NASAL SPHEROIDS AS A NON-INVASIVE PERSONALISED MODEL FOR ASSESSING CFTR MODULATORS EFFECTIVENESS IN PATIENTS WITH CF

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Introduction/Aim. Patient-specific cell models and *in vitro* CFTR functional assays are fundamental for drug development in cystic fibrosis (CF). Air-liquid interface (ALI) cultures of human nasal epithelial (HNE) cells are rapidly emerging as relevant surrogate of the gold standard human bronchial epithelial (HBE) cells. The need for large cell numbers to establish ALI cultures and the cumbersome electrophysiology measurement limit its use to low-to-mid throughput studies. Here, we seek to overcome these hurdles by investigating the feasibility of establishing patient-derived three-dimensional nasal spheroids as a non-invasive predictive screening platform to assess CFTR function.

Methods. HNE cells derived from F508del/F508del patients (n = 3) were expanded using conditionally reprogramming culture (CRC) method. CRC HNE cells were embedded in matrigel and differentiated for 14-21 days. CFTR activity in differentiated nasal spheroids were assessed using forskolin-induced swelling (FIS) assay. Beating cilia in differentiated nasal spheroids was imaged using high-speed video and immunofluorescence staining was performed to validate mucociliary differentiation.

Results. CRC HNE cells aggregated to form enclosing spheres in matrigel within 3-5 days of seeding. After 14–21 days, they formed lumen-facing pseudostratified epithelium with mucociliary differentiation. Functional beating cilia was present and cilia beating frequency measurements were within the range of 15-20 Hz. Immunostaining showed differentiated nasal spheroids formed 2–3 cell layer thick wall surrounding 1-5 lumen areas. Robust expression of MUC5AC (goblet cell marker) were detected in the lumen while acetylated tubulin (ciliated cell marker) lined the luminal surface. p63^{+} basal cells were confined to the outermost or basal compartment. Epithelial tight junction proteins, ZO-1 and E-cadherin indicative of epithelial barrier function were also detected. Differentiated nasal spheroids demonstrated time-dependent swelling response up to 2 h post-forskolin stimulation. Approximately 80-150 successful spheroids suitable for FIS assay were obtained from 0.5-1x10^{6} cell seeding population for all patients.

Conclusion. Nasal spheroids present as promising patient-derived cell models suitable for assessing CFTR function.

TP 086

THE CLINICAL EXPERIENCE AND PATIENT REPORTED OUTCOMES USING THE AEROBIKA OSCILLATING POSITIVE EXPIRATORY PRESSURE DEVICE IN ADULTS WITH CF: A CLINICAL AUDIT

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Introduction/Aim. The Aerobika was recently introduced as an alternative oscillating positive expiratory pressure (OscPEP) airway clearance therapy (ACT) device. We aimed to evaluate the physiotherapy practice and patient reported outcomes (PRO) of the Aerobika for regular ACT over two years in adults with CF.

Methods. Patients were provided with an Aerobika and educated about its use and cleaning. Resistance settings and dosage were individualised. Patients recorded their experiences on visual analogue scales (VAS) with anchors from -5 (less effective) to 0 (no difference) to +5 (more effective).

Results. Eighty patients (47 female) trialled the Aerobika for regular ACT over the past two years. Data presented as mean (SD), range. Age: 34.3(10.5) 19-67 years; FEV1 51.8(18.4) 23-96% predicted; FVC 70.0 (15.7) 46-113%; BMI 21.4(2.5)17.7-28.5). PRO were completed after use for at least 3 months. Usual ACT devices prior to Aerobika: PEP 44/80 = 55%: mask 39%; mouthpiece 61%; OscPEP 41/80 = 51%: Flutter 78%; Acapella 22%. Mucolytics 46/80 = 58%: hypertonic saline 6% = 65%; 3% = 20%; 0.9% = 15%. All used AD or huffing for sputum expectoration. VAS scales: Resistance setting: +1(most) = 46%; mid setting = 29%; -5 (least) = 25%. Effectiveness compared with usual ACT: +2.3(2.1), range -5 to +5; Sputum volume cleared: +1.8(2.1),-5 to =5; How clear/free breathing: 2.1(1.8),-5 to+5; Effort +2.1(2.0), -2 to +5; Tiring: 1.8(1.9),-3 to +5. Time: +1.6(2.4),-5 to +5; Easy to use: 4.1(1.6), -2 to +5; Use for regular ACT: 3.8(2.2), -5 to +5; Adherence increase: 1.3(3.4), -5 to +5; Did not like Aerobika 8/80 (found PEP more effective). Combination with mucolytics: 71/80, HS 6% = 46%; 3% = 17%; 0.9% = 37%. Nebuliser: AeroEclipse 51%; AeronebGo 46%; EFlow 3%. BPA free plastic is durable.

Conclusions. Patients were enthusiastic about using the Aerobika. They found it easy to use and at least as useful for sputum clearance as usual ACT. They particularly valued combining it with mucolytics to save time while achieving effective ACT.

Grant Support:

TP 087

THE METANEB FOR AIRWAY CLEARANCE THERAPY IN ADULTS WITH CF IS EFFECTIVE FOR TREATING REFRACTORY MUCUS PLUGGING IN ADULTS WITH CYSTIC FIBROSIS

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Introduction/Aim. Intrapulmonary percussive ventilation (IPV) using the Metaneb was recently introduced at the Alfred. Our aim was to evaluate the clinical experience, feasibility, safety and patient reported outcomes after using the Metaneb for airway clearance therapy (ACT) in adults with CF.

Methods. Patients with refractory mucus plugging were selectively treated with the Metaneb providing nebulised mucolytic therapy combined with constant positive airway pressure (CPEP) and constant high frequency oscillations (CHFO). Patients were treated with a series of two to three minute cycles of each modality with pauses for expectoration. Dosage was individualised. Patients recorded their experiences on visual analogue scales (VAS) comparing the Metaneb with their usual ACT. VAS scale anchors ranged from -5 (worse) to 0 (no difference) to +5 (better) after treatment with the Metaneb compared with their usual ACT.

Results. Thirty four patients (14 male) were treated with the Metaneb. Data is presented as mean (SD), range. Age: 35.9 (11.2) 20-76 years; FEV1: 46.2 (16.8) 25-87% predicted; FVC: 65.9(15.0) 47-105%; BMI 22.0 (4.0) 17.7-40.2. Patient reported VAS scales of Metaneb versus usual ACT: Effectiveness of Metaneb for airway clearance: 3.4 (1.2) range 1 to 5; Sputum volume cleared: 2.8 (1.5), 0 to 5; How clear/free breathing was after treatment: 3 (1.6), 0 to 5; ACT time taken: 0.3 (2.1), -3 to 3; how tiring Metaneb treatment: 1.1 (2.9), -3 to 5; how easy breathing with Metaneb: 1.6 (1.9), -1 to 5; preference for Metaneb with exacerbations: 4.6 (1.1), 1 to 5; mucolytics used: isotonic saline two thirds of patients, HS one third; CPEP and CHFO pressures: 10-20cmH2O; preferred CHFO frequency: 230 RPM (n = 32). Treatment time was similar to usual ACT (PEP/Oscillating PEP/Autogenic drainage/Forced Expirations). There were no adverse events.

Conclusions: Treating selected adults with CF with the Metaneb was feasible, safe and more effective in clearing refractory mucus plugging than usual ACT.

A NEW, SHORT PATIENT-REPORTED EXPERIENCE MEASURE (PREM) FOR CYSTIC FIBROSIS (CF) CARE – THE ADULT CYSTIC FIBROSIS EXPERIENCE (ACE) MEASURE

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Introduction/Aim. To develop a short patient-reported experience measure specific to cystic fibrosis care.

Methods. A 10 question PREM was developed, based on the Picker PPE-15[1], in combination with factors identified as being most important to cystic fibrosis care from results of a Patient Satisfaction Survey (PSS). The PSS had 157 responders (representing 57% clinic attenders). Consumers nominated the most important aspects of CF care: discussions with the CF team; safe, private and comfortable care spaces; accessibility and low waiting times. These were included in the PREM. Each aspect could score 0-10 (best), total 100. There were 2 rating questions about the PREM itself (total score 20) and people were offered the option to be identified for individual follow-up on low scoring aspects of care. A pilot was undertaken to elicit consumer acceptability of the measure.

Results. There were 19 responders across 6 care settings. The mean ACE score was 86/100 (range 25-100). Twelve females and 7 males responded, aged 30—34 years. The measure scored 17-20/20 indicating the measure was easy to use and important to inform efforts to improve the patient experience of cystic fibrosis care. The measure has since been transcribed into the REDCap[2] platform for further evaluation of its utility and impact.

Conclusion. The ACE is a short, easy to use PREM. It is acceptable to consumers and has the potential to inform health care providers about individual and population priorities to improve the consumer experience of cystic fibrosis care.

References:

1. Jenkinson C, Coulter A, and Bruster S. The Picker Patient Experience Questionnaire: development and validation using data from in-patient surveys in five countries. *Int J for Quality in Health Care.* 2002. 14(5):353-58.
2. Harris P A, Taylor R, Thielke R et al. Research electronic data capture (REDCap)—a metadata-driven methodology and workflow process for providing translational research informatics support. *J Biomed Inform.* 2009. 42(2):377-81.

IS PERIPHERAL EOSINOPHILIA ASSOCIATED WITH INCREASED RISK OF SEVERE EXACERBATIONS IN CYSTIC FIBROSIS PATIENTS?

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Introduction/Aim. Peripheral eosinophilia in stable asthma and COPD patients is increasingly recognised as a predictor of future risk of exacerbations. The aim of this study is to investigate whether peripheral eosinophilia in stable cystic fibrosis patients is associated with risk of severe exacerbations.

Methods. Retrospective analysis of electronic records of all cystic fibrosis patients who were managed by a tertiary referral hospital was conducted. All patients who had an outpatient visit when their disease was considered stable (lack of infective symptoms, no current therapeutic antibiotics and no intravenous antibiotics use for 4 weeks) with an available peripheral eosinophil count within 30 days were included. All had minimum subsequent 12 month follow up. Recipients of lung transplant were excluded. Pearson's correlation was used to investigate the association between peripheral eosinophilia and risk of severe exacerbations in the 12 months follow up period.

Results. Among 104 patients included, 50 were female (48%), the mean (SD) age was 28.93(12.5) whereas the mean (SD) percentage predicted FEV1 was 0.76(0.38). 94/104 patients had an available Immunoglobulin E level within 6 months. The mean (SD) for Immunoglobulin E was 211.8(565). 10 patients (9%) had prolonged exacerbations. 53(50.9%) were being treated with inhaled corticosteroids and only 3 were receiving oral corticosteroids.

A positive significant correlation between peripheral eosinophil count and number of severe exacerbations in the subsequent 12 months was found (0.238, $P = 0.015$) using Pearson's correlation. The maximum eosinophil count in the index year was also associated with an increased risk of exacerbations (0.631, $P = 0.00$).

Conclusion. There appears to be an association between peripheral eosinophil count and risk of severe exacerbations in cystic fibrosis patients. Future studies are needed to further explore this association and consider targeted therapies.

TP 090

DOES GENE MODULATION THERAPY IMPROVE GLUCOSE CONTROL IN CYSTIC FIBROSIS?

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Introduction/Aim. Impaired Glucose tolerance (CFIGT) and Cystic Fibrosis Related Diabetes (CFRD) are two of the most common non-pulmonary manifestations of Cystic Fibrosis (CF). Lumacaftor/ Ivacaftor better known as "Orkambi," was approved by the Pharmaceutical Benefits Scheme (PBS) for use in Australia for individuals with CF homozygous for the f508 mutation in late 2018. The availability of this gene modulation therapy provided our clinical unit with the unique opportunity to determine whether standard Lumacaftor/Ivacaftor (Orkambi) therapy improves glucose abnormalities over a 12 month period. Endocrine and metabolic markers were analysed using a mixed meal tolerance test (MMTT) to determine if any changes occurred over this time period. We also hypothesise that, with better taste and tolerability than an Oral Glucose Tolerance Test (OGTT), the utilisation of a MMTT may be a more readily adhered to diagnostic test to assess beta cell function and metabolic hormones in CF.

Methods. This was a prospective cohort interventional study.CF patients newly commencing on standard Lumacaftor/Ivacaftor (Orkambi) therapy were recruited. Patient endocrine and metabolic markers were assess using a MMTT, with samples taken at baseline, 15, 30, 60 and 90 minutes after ingestion of a mixed meal. The patients acted as their own controls, with data collected immediately prior to commencing standard therapy and then 12 months following commencement. Data collection and analysis will be completed by February 2020.

Conclusion. Gene modulation therapy is proving to be beneficial to individuals with Cystic Fibrosis. Significant improvements in lung function, BMI and exacerbation rates have been shown in various studies. Its effect on glucose control however remains largely unknown. This study will determine the extent to which CFTR modulation alters glucose control in CF.

Grant support: NIL

TP 091

IS IMPULSE OSCILLOMETRY (IOS) BETTER THAN SPIROMETRY FOR MONITORING TREATMENT OUTCOMES IN CYSTIC FIBROSIS (CF) ADULTS ON ORKAMBI? A PILOT STUDY

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Introduction/Aim. Spirometry is the gold standard for monitoring lung function in the CF population. IOS is a diagnostic tool that detects airway resistance and requires significantly less patient effort to perform than spirometry. ORKAMBI (lumacaftor/ivacaftor) treatment has been reported to result in significant improvements in spirometry in CF patients. The aim of this study is to compare IOS and spirometry in evaluating the effectiveness of ORKAMBI treatment for patients with CF homozygote Phe508.

Methods. CF patients commencing ORKAMBI treatment were prospectively recruited into the study. IOS and spirometry were performed prior to and 6 months after commencing ORKAMBI treatment.

Results. Twenty two patients aged 30.6 ± 8.9 years (mean $\pm$ SD) were recruited and fourteen patients have completed the study to date for analysis.

Table 1 Spirometry and IOS Values Before and After ORKAMBI in CF Adult Patients

Parameter	Mean Pre-ORKAMBI treatment	Mean Post-ORKAMBI treatment
FEV_1, L	2.88 ± 0.88	2.96 ± 0.90
FVC, L	4.23 ± 0.99	4.28 ± 0.98
FEV_1/FVC, L	68.43 ± 13.60	68.79 ± 12.54
FEF_{25-75}, L	2.18 ± 1.40	2.20 ± 1.21
R5, kPa/L/s	0.39 ± 0.13	0.42 ± 0.17
R20, kPa/L/s	0.32 ± 0.11	0.32 ± 0.06
R5-R20, kPa/L/s	0.07 ± 0.11	-1.73 ± 6.90
AX, Hz	2.37 ± 5.49	1.40 ± 2.07
Fres, Hz	15.97 ± 7.27	18.52 ± 8.95

FEF_{25-75}: forced expiratory flow between 25-75% of FVC; R5: Resistance at 5 Hz; R20: Resistance at 20 Hz; AX: area under the reactance curve; Fres: resonance frequency *$P < 0.05$ statistically significant. Results are presented as mean $\pm$ standard deviation.

Using linear mixed-effects model controlling for repeated measurements over time and adjusted for confounders including gender and age, there was no significant difference pre and post ORKAMBI treatment. The results did show a significant correlation between spirometry and IOS resistance values.

Conclusion. Significant changes in spirometry or IOS pre- and post-ORKAMBI treatment were not demonstrated in this study. However, there was significant correlation between spirometry and IOS resistance values over time as demonstrated by linear mixed effects model. This study is ongoing.

Grant Support:

ORKAMBI IN PATIENTS WITH CYSTIC FIBROSIS AND SEVERE LIVER DISEASE

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Introduction/Aim. Cystic fibrosis is a genetic disease with multisystem involvement. Orkambi (Lumacaftor/Ivacaftor) is approved for patients 6 years and above with homozygous Phe508del in Australia and is not recommended in those with severe liver disease who were excluded from the trials. Limited studies have shown an increased medication exposure (AUC_{0-12hr} by approximately 50% and maximum drug concentration by approximately 30%) in adults with moderately impaired hepatic function (Child-Pugh class B). It is unknown whether patients with homozygous Phe508del and severe liver disease may benefit from Orkambi for pulmonary and nutritional optimisation given exclusion from trials. There are no previously published pharmacokinetic studies in this population. Following patient request and discussions with clinical Ethics, this study was designed to assess the pharmacokinetics and the safety of Orkambi in this patient population.

Methods. This is a prospective study that is being conducted at the Queensland Children's Hospital. Patients between 6-18 years of age, homozygous for Phe508del and meeting the inclusion and exclusion criteria will be recruited. Patients will have their baseline investigations performed and commenced on half the usual dose of Orkambi with 6-11 year olds receiving Lumacaftor 100 mg/ Ivacaftor 125 mg tablets twice daily and patients 12-years and older receiving Lumacaftor 200 mg/ Ivacaftor 125 mg tablets twice daily for four days. Bloods for pharmacokinetic studies will be collected on day-1 at 2 h, 4 h, 6 h, 8 h, 24 h, and on day-4 at 0 h, 2 h and 8 h post dose. Liver functions will be monitored with serial blood tests during the four days and at four weeks. Liver elastography will be performed at baseline and at four weeks.

Conclusion. This study will provide pharmacokinetic and serial liver function data to guide Orkambi administration in this group of patients.

LUNG FUNCTION CORRELATES WITH QUALITY OF LIFE IN SCHOOL-AGE CHILDREN WITH CYSTIC FIBROSIS

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Introduction/Aim. Life-expectancy with Cystic Fibrosis (CF) is rising due to rapid advancement in treatment regimens. Quality of life (QOL) is increasingly recognised as an important outcome measure in interventional trials. Previous studies have identified a relationship between lung function and QOL in adults with CF. This study examines the relationship between QOL and lung function in early school-aged children with CF.

Methods. In total, 125 children aged 6.5-10 years enrolled in the Australian Respiratory Early

Surveillance Team for Cystic Fibrosis (AREST CF) program from CF clinics at the Royal Children's Hospital (RCH) in Melbourne (n = 66) and the Princess Margaret Hospital (PMH) in Perth (n = 59), Australia were included. Children and their parents completed the Cystic Fibrosis Questionnaire Revised (CFQ-R) at 3 consecutive annual visits across 2-years of follow-up. Spirometry and multiple-breath washout (MBW) testing were undertaken at the same visit with FEV1%predicted and Lung Clearance Index (LCI) recorded respectively. Correlation between lung function parameters and QOL scores and differences between parent and child perspectives on QOL with CF were evaluated.

Results. Associations between parent CFQ-R domain scores and FEV1%predicted were found for physical (r = 0.3843; n = 82, $P < 0.005$), respiratory (r = 0.4887; n = 82, $P < 0.005$), eating (r = 0.3363; n = 75, $P < 0.005$) and body (r = 0.3378; n = 75, $P < 0.005$) domains. Further, associations between parent CFQ-R domain scores and LCI were observed for physical (r = -0.3669; n = 63, $P < 0.005$) and body (r = -0.3408; n = 63, $P < 0.05$) domains. Associations between child CFQ-R domain scores and FEV1%predicted were found for eating (r = 0.4100; n = 49, $P < 0.005$) and body (r = 0.3068; n = 47, $P < 0.05$) domains. Mean child CFQ-R physical and emotional domain scores were significantly lower than parent scores ($P < 0.005$) across all visits.

Conclusion. We report association between lung function and parent-reported QOL for physical, respiratory, eating and body domains. Child-reported QOL also correlated with lung function for eating and body domains. In addition, children reported overall worse QOL compared to parent-proxy reports during early school age.

REAL-WORLD EXPERIENCE OF THE INITIATION OF ORKAMBI® IN A LARGE ADULT CYSTIC FIBROSIS CENTRE

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Introduction/Aim. Cystic Fibrosis (CF) is common multi-system genetically inherited condition. The gene modulator agent lumacaftor/ivacaftor (LUM/IVA, Orkambi®) was listed on the Pharmaceuticals Benefits Scheme in October 2018 for Phe508del homozygote CF patients. Prior to this, patients could receive LUM/IVA as part of a clinical trial or through a managed access programme (FEV1 < 40%). An initiation pathway for LUM/IVA was developed at the Alfred Hospital to evaluate its clinical efficacy and safety in treatment naïve CF adults. This is a 6 months analysis of these patients.

Methods. A prospective, open label, single-centre clinical evaluation of adult CF patients commenced on LUM/IVA at the Alfred Hospital. Assessment of clinical surveillance data pre-treatment and at 1, 3 and 6 months was performed. Data collected included blood indices, lung function, weight, BP, nutritional status, exercise capacity, psychosocial functioning, anxiety and depression screening and cognitive function.

Results. 136 patients were Ph508del homozygotes at baseline with 55 patients either on LUM/IVA, trialled and ceased LUM/IVA or on an alternative modulator agent. 81 patients were identified as being PBS LUM/IVA candidates for the initiation pathway. Patients needed to be adherent with routine treatments prior to starting LUM/IVA.

As of the end of September 2019, 18 patients had completed 6 months treatment with LUM/IVA. The mean change in ppFEV1 was 3.5 +/- 5.35% (SD) (P = 0.013; range -6.5% to 13.9%) with an associated increase in weight (1.91 +/- 2.98 kg (SD), P = 0.015) and BMI (0.64 +/- 0.99 kg/m^2 (SD), P = 0.014). Three patients discontinued treatment secondary to side-effects.

Conclusion. A coordinated approach to the initiation of the LUM/IVA is associated with comparable results to those identified within clinical trials. However patients exhibit a variable response, which currently cannot be predicted prior to starting LUM/IVA.

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OUTCOMES OF ARTERY EMBOLISATION FOR CYSTIC FIBROSIS PATIENTS WITH HAEMOPTYSIS AT THE PRINCE CHARLES HOSPITAL

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Introduction/Aim. Haemoptysis is common in Cystic Fibrosis (CF). Bronchial Arterial embolization (BAE) is integral in CF haemoptysis management, but largely guided by expert opinion. We report 20 years of experience performing BAE a major tertiary adult CF centre.

Methods. A retrospective review of CF patients who underwent BAE between 1st January 1998 to 31st December 2017 at the Prince Charles Hospital, Adult CF Centre, including follow-up data to 31st December 2018. patients' demographics, genotype, lung function, medication use, comorbidities (liver disease, CF related diabetes), organism growth, pulmonary exacerbation, BAE procedures were recorded. Mortality, all-cause hospitalisation and transplantation rates were also recorded. Differences in the distributions of categorical variables of interest by clinical endpoint were tested using Fisher's exact test. Mortality was explored using Kaplan Meier methods. Hazard ratios for mortality and recurrent AE were derived from univariable Cox regression models. Analyses were performed using the Stata statistical software package (Version 15).

Results. 45 patients required 95 embolisations (Median BAE per patient 2 (interquartile range 1-3). *Pseudomonas aeruginosa* was isolated 95% of the time prior to BAE. Particle-based BAE was almost universally employed (99%). 16 (36%) died and 23 (51%) required repeat BAE. All cause mortality rate of 4.1% (95% CI: 2.5-6.7%) per year. The median time from first procedure to death was 5.3 years. None of the variables tested were significantly associated with mortality. BAE requirement was significantly higher in patients already on tranexamic acid compared to those not (HR: 3.7; 95% CI 2.0-6.9). Median hospitalisations were 2 per year. 8 received lung transplants for the study period.

Conclusion. Repeat BAE in our cohort was common. Mortality rate and median hospitalisations in our cohort were similar to previously published data. A higher proportion of our cohort were transplanted compared to previously studied CF BAE cohorts.

Grant Support: None

TP 096

THE NEWLY DEVELOPED A-STEP IS A FEASIBLE AND SAFE, MAXIMAL, INCREMENTAL, EXTERNALLY PACED STEP TEST FOR ADULTS WITH CYSTIC FIBROSIS

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Introduction. Limitations of available exercise tests for adults with cystic fibrosis (CF) include time, space, cost, accessibility and ceiling effects.

Aim. To develop and evaluate feasibility and safety of a new CF disease specific maximal, incremental, externally paced test across a range of lung function (FEV_1), age, height and body mass index (BMI).

Methods. The A-STEP was developed for adults with stable CF without precluding comorbidities and carried out by a trained physiotherapist on a 20 cm step, using an interval timer App. The A-STEP starts at 18 steps/minute (a cadence of 72 beats/minute), increasing by 2 steps/minute with a maximum level of 15. Outcome measures of: SpO_2, HR, BP, shortness of breath "Lungs" and leg fatigue "Legs" (measured on a scale of 0-10) were recorded at resting baseline; end of each level; peak exercise and recovery. Maximal effort was determined by reaching at least one of: ≥90% predicted HRmax; ≥9/10 "Lungs"; ≥9/10 "Legs" ≥9/10.

Results. Forty adults (20 male) participated. Results presented as mean ± SD(range): Age: 31.7 ± 7.4(22-48) years; FEV_1:57.2 ± 20.4 (27-98)%; Height: 167 ± 8.9(146-185.5)cm; BMI: 22.1 ± 2.7(17.7-30)kg/m2. A-STEP baseline results: SpO_2 97.9 ± 1.8(93-100)%; HR: 79.6 ± 13.4 (49-106)bpm: BP: 115.7 ± 14.7(89-158)mmHg "Lungs" 0.33 ± 0.7(0-3)/10; "Legs": 0.3 ± 0.7(0-3)/10. A-STEP peak: SpO_2 92.1 ± 5.0(78-99); HR 164.1 ± 17.0(118-190); BP: 146.3 ± 19.5(109-196); "Lungs" 8.2 ± 1.2(5-10); "Legs" 8.4 ± 1.4(5-10).

Mean levels completed for FEV_1 based disease severity: normal (≥80%) 11.78 levels; mild (≥60 and < 80%) 11; moderate (≥41 and < 60%) 9.54; severe (<41%) 7.38. All participants completed a recommended minimum of 6 A-STEP levels. Nine reached their maximal level in 6-7 minutes; 26 in 8-12 minutes (recommended duration for maximal testing); 5 in 12-15 minutes. One reached a maximal test after 15 levels.

Conclusion. The A-STEP is a new disease specific, feasible and safe, maximal, incremental, externally paced test across the spectrum of age and disease severity in adults with stable CF. Future validity testing needs to be undertaken.

TP 097

AN AUDIT OF INPATIENT OXYGEN PRESCRIPTION AT A TERTIARY HOSPITAL

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Introduction. Oxygen is a common medical therapy utilised in acute medical patients with the potential for serious adverse effects. Current guidelines recommend oxygen to be prescribed and administered with a documented oxygen saturation target of 92 to 96% or a reduced target of 88 to 92% for those at risk of hypercapnia. This audit assesses the prescription and administration practices of oxygen therapy at a major tertiary hospital.

Methods. A total of 109 charts of patients admitted under thoracic medicine over a four-week period from June to August 2019 were reviewed. Data was collected regarding patient demographics, oxygen use, prescription and administration.

Results. 60 patients (55%) received oxygen therapy during their admission. Of these, 47% were female with a median age of 70. 29 patients (48%) had a diagnosis of COPD, 16 (27%) were on home oxygen therapy and 15 (25%) were identified as CO2 retainers. Overall, 52 patients (87%) had an oxygen prescription sticker in their medication chart. The oxygen rate, device and saturation targets were prescribed 98%, 94% and 100% of the time, respectively. Nursing staff administration of oxygen was correct in 94% of cases. Currently being on oxygen at time of chart review (OR 5.0, $P = 0.031$) and being admitted between 5 pm and 8 am (OR 1.4, $P = 0.002$) were associated with increased oxygen prescription. Patient ward, home oxygen use, COPD or CO2 retainer status were not associated with sticker usage. Lower saturation targets of 88 to 92% were associated with CO2 retainers (OR 4.1, $P = 0.033$) and COPD patients (OR 2.8, $P = 0.002$).

Conclusion. Our results suggest that oxygen prescription and administration is performed according to national guidelines in the vast majority of thoracic medicine patients at a major tertiary hospital. Areas identified for improvement include increasing acknowledgement of those at risk of hypercapnia and ensuring prescription is completed on admission. Future studies are recommended to assess whether these results reflect hospital-wide practice.

Grant Support: Nil

TP 098

EFFICACY AND SAFETY OF TALC PLEURODESIS: A SINGLE TERTIARY CENTRE 5 YEAR CASE SERIES

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Introduction. Talc pleurodesis is the recommended strategy to manage symptomatic malignant pleural effusions. Prior studies report efficacy between 29-70%. Patient selection is key.

Aim. Measure outcomes for talc pleurodesis in a tertiary centre and whether established risk factors (elevated pleural LDH, low pleural pH, residual effusion pre-procedure, drain output >200 ml/24 hours, multiloculated effusion) could be used in patient selection.

Method. A five-year chart review was completed for talc pleurodesis for malignant effusions. Risk factors for poor outcomes were recorded along with resolution (total, partial and nil) immediately, 28 days or discharge and long term.

Results. There were 102 talc pleurodesis (28 medical, 74 VATS). The VATS group were 6 years younger. Immediately post pleurodesis, 30% had complete resolution (18% medical cases, 34% surgical) and 64% partial resolution (68% medical, 62% surgical).

Long term, 14% had complete resolution (11% medical, 15% VATS) and 33% partial resolution (11% medical, 39% surgical).

VATS was 19% more likely to have immediate complete resolution than medical pleurodesis (trend *P* value 0.075, CI 0.64-1.02). At 28 days patients with no risk factors were 31% more likely to have complete resolution (*P* value <0.05, CI 0.55-0.89). No cases with a residual effusion pre procedure achieved complete resolution at 28 days.

No risk factors were statistically significant in the long term.

Discussion. There were only a small number who achieved long term success with talc pleurodesis (14% complete resolution and 33% partial resolution) which differs from published data.

Those undergoing VATS had more immediate success. Having no risk factors was associated with a greater likelihood of success at 28 days. There were no differences in the long term.

Residual and multiloculated effusion could be used to predict success, and potentially in a patient selection algorithm. A limitation is the small number of cases.

Grant Support: None

TP 099

CLINICAL PREDICTORS FOR SUB-OPTIMAL COMPUTED-TOMOGRAPHY PULMONARY ANGIOGRAM (CTPA) IN THE INVESTIGATION OF PULMONARY EMBOLISM

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Introduction/Aim. Suboptimal computed-tomography pulmonary angiograms (CTPAs) may lead to missed diagnoses in pulmonary embolism, additional investigation and delay in treatment. The aims of this study were to determine the rate of suboptimal CTPAs and to identify clinical variables associated with suboptimal scans.

Methods. This was a retrospective review of consecutive CTPA scans performed in our institution over a 3 month period. Suboptimal CTPA scan was defined as mean pulmonary artery trunk attenuation of <250 Hounsfield units, or with radiologist interpretation of overall technical inadequacy to draw definitive conclusions. Subject demographics and a range of clinical variables were obtained and compared.

Results. A total of 400 subjects (38% Male; mean age 63.5 ± 18.1 (SD)) were included for analysis. Pulmonary embolism was identified in 12.8% of subjects. The rate of suboptimal CTPA was 12.8% (51/400). The most common reason for suboptimal scans was poor contrast enhancement (92%), followed by movement artefact (12%). The mean age was significantly lower in those with suboptimal CTPA (58.5 ± 18.8 vs 64.2 ± 17.9, $P < 0.04$). The mean BMI was higher (37.2 ± 18.6 vs 27.6 ± 7.0; n = 246, $P < 0.001$). Correspondingly obese individuals (BMI > 30) were significantly more likely to have a suboptimal scan (20% vs 8.7%, $P < 0.02$). No significant difference in other clinical variables was identified, including pregnancy status, hypotension, atrial fibrillation and renal dysfunction.

Conclusion. The rate of suboptimal CTPA is low as assessed by pulmonary artery contrast opacification and radiologist interpretation. Obesity and younger age appear to have been associated with suboptimal scans. Regression analysis to determine independent clinical predictors of suboptimal CTPA will be performed.

Grant Support: Nil

AUDIT ON SMALL BORE INTERCOSTAL CATHETER COMPLICATIONS IN RESPIRATORY PATIENTS AT WESTMEAD HOSPITAL

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Introduction/Aim. Small-bore intercostal catheters (ICCs) are first-line management for pneumothoraces and pleural effusions, however current literature suggests that up to 8-42% become dislodged. The aim of our study was to determine the rate of dislodgement in small-bore ICCs in patients cared for by Respiratory Physicians at Westmead Hospital, Sydney. Secondary outcomes included factors associated with dislodgement and rates of other complications.

Method. A retrospective analysis of 200 admissions cared for by the Westmead Respiratory Department requiring small-bore ICC insertion (≤20Fr) between September 2016 and October 2018 was undertaken. Patients with large-bore ICCs, pleural aspiration, pleural biopsies and tunnelled catheters were excluded. Patient, procedural and nursing data was collected and analysed using Microsoft Excel and SPSS. Proportions were compared using Log Rank (Mantel-Cox) testing. A P value of <0.05 was considered significant.

Results. The final audit population included 128 patients, comprising 155 small-bore ICCs, with a mean age of 63, majority male (68%) and independent in mobility (73%). The overall dislodgement rate was 9.68% (n = 15), with 53% dislodging within 48 hours. Dislodgement rates were high in ICCs inserted for pneumothoraces (n = 9/56,16.1%, P = 0.08) and statistically significant in women (n = 9/50,18%, P = 0.01). Dislodgement was lowest in ICCs inserted in the respiratory department (2% fall-out rate), and higher in those inserted in the emergency department (ED;26%) and interventional radiology (10%), though this was not statistically significant (P = 0.07). Other complications included blockage (n = 28/155,18.1%) and disconnection (n = 3/155,1.9%).

Conclusion. The dislodgement rate is within the literature reported rate. Dislodgement appears to occur early and is more common when in women, for pneumothoraces, and when inserted in ED or interventional radiology. Considering needle aspiration for primary spontaneous pneumothoraces may reduce ICC insertion rates, particularly in the ED. Interventions emphasising drain care and patient education should be considered. A prospective audit following implementation of daily multidisciplinary ICC rounds is planned.

Key Words. Small bore intercostal chest drains, dislodgement, complications

A REVIEW OF THE EFFECTS OF HIGH-INTENSITY INTERVAL-BASED TRAINING ON EXERCISE CAPACITY IN ADULTS WITH A CHRONIC RESPIRATORY CONDITION: WHERE ARE WE NOW AND WHAT IS NEXT?

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Background. This review summarises data from studies exploring the effect of high-intensity interval training (HIIT) on exercise capacity in adults with chronic respiratory conditions.

Methods. We reviewed the literature (six databases) from inception to present (from 2010 to present for chronic obstructive pulmonary disease [COPD]). Studies undertaken in adults with a chronic respiratory condition were included when participants were randomised to receive; (i) HIIT or no exercise or, (ii) HIIT or moderate intensity continuous exercise. To evaluate the training effect, data were extracted on peak rate of oxygen uptake (VO_{2peak}) and maximal work rate (W_{max}). Meta-analyses were conducted where possible.

Results. In people with COPD, two studies demonstrated between-group differences favouring HIIT compared with no exercise (VO_{2peak} MD [95% CI] 4 mL/kg/min [1 to 7] or W_{max} 16 W [5 to 27]). Meta-analyses demonstrated no advantage for HIIT compared to continuous exercise on these outcomes (VO_{2peak} MD -0.13 L/min [-0.05 to 0.03]; 8 studies or W_{max} MD 0.73 W [CI -3.84 to 5.21]; 9 studies). In people with cystic fibrosis (CF), no studies have compared HIIT to no exercise and the two studies that compared HIIT to continuous exercise reported similar benefits. In people prior to resection for non-small cell lung cancer, one study demonstrated a between-group difference in favour of HIIT compared with no exercise on VO_{2peak} (MD 4 mL/kg/min [2 to 6]). In asthma, one study demonstrated a between-group difference in favour of HIIT compared with no exercise on VO_{2peak} 3 ± 4 mL/kg/min and one that compared HIIT to continuous exercise reported similar benefits. No studies were identified non-CF bronchiectasis or interstitial lung diseases.

Conclusions. In COPD, HIIT increases exercise capacity when compared with no exercise and produces a similar magnitude of change in exercise capacity as continuous exercise. There is a paucity of studies exploring the effects of HIIT in other respiratory conditions.

Declaration of interest. Nil.

Nomination for awards. Physiotherapy & Cystic Fibrosis.

TP 102

THE EFFECT OF BRIEF EDUCATION ON THE PRESCRIPTION OF OXYGEN IN AN INPATIENT ELECTRONIC MEDICAL CHART (EMC)

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Introduction/Aim. Oxygen is often administered to patients without a prescription, potentially increasing mortality, morbidity and hospital stay. When we implemented an EMC in 2018, oxygen prescription by our medical officers (MOs) dropped. Our MOs should change the medical review criteria according to target oxygen saturations.

We hypothesised that education on oxygen therapy improves its EMC prescription. We investigated the effect of education on EMC oxygen prescription, review criteria and oxygen delivery.

Methods. We collected baseline data from inpatients on oxygen over 6 weeks, spanning 2 rotations of MOs. We then delivered a brief education program to MOs and nurses, focussing on oxygen prescription, devices and saturation targets based on TSANZ guidelines. In the next 10 weeks, we collected outcome data and provided monthly feedback to our MOs.

Outcome data are EMC oxygen prescription (device, flow rate/FiO2 & target saturation) and appropriate changes to the medical review criteria. We assessed if oxygen delivery on patients matched the prescription.

Results.

	Pre-education (n = 52)	Post-education (n = 61)
EMC prescription	0	22 (36%)
Review criteria change	26 (50%)	40 (65%) $P = 0.94$ (not significant)
Accurate O2 delivery	0	22 (100% of prescriptions)

Oxygen was not prescribed before education. EMC oxygen prescription improved after education, but the rate was low (36%), and the higher rate of review criteria change was not significant. When prescribed, nurses accurately administered oxygen.

Conclusion. EMC Oxygen prescription is improved with a brief education program, but more research is needed to improve prescription rates and investigate sustainability.

TP 103

PROTOCOL FACTORS INFLUENCE COMPLIANCE TO MOBILE ECOLOGICAL MOMENTARY ASSESSMENTS (MEMA): SYSTEMATIC REVIEW AND META-ANALYSIS

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Introduction/Aim. Mobile ecological momentary assessment (mEMA) uses handheld devices (phones) to assess behaviours and symptoms in real life/real time. Participant compliance with mEMA schedules impacts ecological representatives of data, yet it is unclear which (if any) schedule components influences compliance. This systematic review explored associations between mEMA protocol components and compliance.

Methods. Nine electronic databases were searched (2006-2017) for observational studies reporting compliance to mEMA for health-related data from adults (>18 years) in nonclinical and clinical settings. Independent authors extracted data with discrepancies resolved by consensus. Random effects meta-analysis explored factors associated with cohort compliance (monitoring duration, prompts per day, questions per prompt, device type, training, incentives and burden score). Random effects ANOVA ($P \leq .05$) assessed differences between nonclinical and clinical data sets.

Results. Of 176 eligible studies, 105 (60%) reported compliance in 115 data sets (nonclinical n = 69, clinical n = 46). Meta-analysis (nonclinical n = 42, clinical n = 31) estimated overall compliance of 83.1% (95%CI = 79.7, 89.6) with no difference between nonclinical and clinical data sets (P .07). For nonclinical and clinical data sets, lowest compliance was associated with 4-5 prompts/day (nonclinical = 77.4%, clinical = 81.5%) and number of questions/prompt (≥26 nonclinical = 63%, 9.5-26 clinical = 71.1%). For clinical data sets only, 7-day mEMA schedules had significantly lower compliance (n = 10, 77.9%; 95%CI = 71.5, 83.6%) compared to those <7 days (93.5%), 14 days (84.3%) and > 14 days (87.1%). No other factors were significantly associated with compliance.

Conclusion. When designing mEMA protocols, informed choices concerning monitoring duration, prompts per day and questions per prompt may potentially increase participant compliance.

AUDIT ON MANAGEMENT OF MORBIDLY OBESE PATIENTS WITH PULMONARY EMBOLISM (PE)

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Introduction/Aim. To examine current choice and dosage of anticoagulant therapy and associated clinical outcomes among patients who were diagnosed with PE and weighed more than 120 kg or BMI 40kgm[2]

Methods. Retrospective review of patients diagnosed with PE at Nepean hospital over a 2 years period (01/03/2017- 28/02/2019). Patients were identified via DRG and weight and BMI recorded from the electronic medical record. For those weighing >120 kg, anticoagulation choice, length of stay, inpatient mortality, need for ICU admission, PE severity, inpatient vs outpatient management, planned duration of anticoagulation, re-admission within 6 months were recorded. Descriptive statistics are used to analyse the data collected.

Results. Out of 678 patients who were diagnosed with PE, 51 patients had a weight > 120 kg or BMI > 40kgm[2] including 14 patients who weighed >150 kg. 33 patients were commenced on therapeutic enoxaparin (19 of which were commenced on a dose <1 mg/kg bd), 12 patients were started on DOAC, 5 patients received intravenous heparin and one remained on warfarin. 7 patients were discharged on enoxaparin, 26 patients on DOAC and 17 patients were discharged on warfarin. Clinical outcomes were affected by severity of PE. 9 patients required ICU admission with one inpatient mortality, all of which had at least intermediate low risk PE. Majority of patients who required ICU admission were either started on therapeutic enoxaparin or heparin infusion and 3 patients required thrombolysis, only one patient with intermediate low risk PE was started on apixaban. Average length of stay in hospital was 5.4 days. 1 patient was readmitted with recurrent PE within 6 months and was found to have subtherapeutic INR while being on warfarin.

Conclusion. A significant number of patients were given a DOAC or lower than the recommended dose of enoxaparin. Patient numbers were small but there were no significant adverse outcomes associated with these therapies.

Grant Support: N/A

THE USEFULNESS OF BRONCHOALVEOLAR LAVAGE CELLULAR PATTERN IN DIAGNOSING INTERSTITIAL LUNG DISEASE

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Introduction/Aim. Interstitial Lung Disease (ILD) is a heterogeneous group of pulmonary diseases for which accurate diagnosis is crucial in guiding treatment and prognosis. Bronchoalveolar lavage (BAL) cellular analysis can help narrow differential diagnosis of ILD. We aimed to determine if BAL results altered clinical diagnosis of ILD.

Table 1. Effect on BAL on 6 most commomn ILD subtypes

IPF = Idiopathic Pulmonary Fibrosis
HP = Hypersensitivity Pneumonia
CT-ILD = Connective Tissue-ILD
IIP = Idiopathic Interstitial Pneumonia

Methods. We retrospectively analysed 115 consecutive BAL results of patients with suspected ILD at Waikato Hospital from May 2018 to September 2019. Each patient's BAL cellular pattern was interpreted according to the American Thoracic Society Clinical Practice Guideline (2012) as either Lymphocytic (>15%), eosinophilic (>1%), neutrophilic (>3%). Samples with >5% squamous cells were considered contaminated. If more than 1 cellular pattern existed the dominant pattern was accepted. The majority of cases were discussed in a dedicated ILD multidisciplinary meeting.

Results. 89 patients were evaluated. 9 (10.1%) were lymphocytic, 36 (40.4%) neutrophilic, 8 (9%) eosinophilic, 23 (25.8%) mixed cellular and 6 (6.7%) benign. Table 1 displays BAL cellular patterns on our 6 most common ILD subtypes. BAL was consistent with diagnosis in 26 (29.2%) cases, suggested an alternative diagnosis in 30 (33.7%) cases and was inconsistent with diagnosis in 7 (7.9%) cases. 18 (20.2%) cases with a mixed cellular pattern were felt to be clinically significant in narrowing diagnosis and 5 (5.6%) were non-supportive of diagnosis. 3 (3.4%) BAL results were contaminated.

Conclusion. BAL provides clinically useful information in the diagnosis of ILD in the majority of cases. Further studies are needed to establish a graded degree of significance of each cell type percentage in mixed cellular samples.

Grant Support: Nil

RADIOLOGICAL FEATURES OF ABORIGINAL PATIENTS WITH CHRONIC RESPIRATORY DISEASES IN THE TOP END REGION OF NORTHERN TERRITORY OF AUSTRALIA

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Introduction/Aim. Chronic respiratory conditions is one of the main contributes to morbidity and mortality among Aboriginal population of Australia. Previous studies have shown that presence of multiple pulmonary conditions, such as COPD and bronchiectasis are common in this population, especially among Aboriginal patients living in the Northern Territory of Australia. In this study we evaluated the radiological features in a cohort of Aboriginal patients who were referred to the Respiratory service at the Royal Darwin Hospital.

Methods. Adult Aboriginal patients over 18 years of age were included in this retrospective study. Chest X-ray and CT scans were analysed for pattern of Emphysema, bullous disease, bronchiectasis, cystic lung disease, nodules, granulomatous, chronic infection and interstitial lung disease.

Results. The preliminary results demonstrated that Aboriginal patients to have quite advanced emphysematous changes, Co-occurrence of COPD and bronchiectasis is also highly prevalent in this population. Furthermore cystic and bullous type of radiological findings are also frequently noted.

Conclusion. Our study demonstrates the unique radiological findings in the defined Aboriginal population from the NT with chronic lung diseases that has not been well described in the literature in the past. Furthermore, multiple pulmonary radiological findings/pathology are also common in this population.

Grant Support. Nil

CT-GUIDED LUNG BIOPSIES (CTLB) PERFORMED BY A RESPIRATORY PHYSICIAN AND RADIOLOGISTS – A COMPARATIVE STUDY OF ACCURACY, EFFICIENCY AND COMPLICATIONS IN A REGIONAL CENTRE

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Introduction/Aim. CTLB in the investigation of pulmonary masses is a widely utilised procedure routinely performed by radiologists, with limited international data on these procedures being performed by respiratory physicians. We explore the accuracy, efficiency and safety profiles of CTLB performed by a respiratory physician as compared to radiologists in a regional Australian hospital setting.

Methods. A retrospective analysis was undertaken of 210 consecutive patients undergoing CTLB over the 9-year period between December 2010 and July 2019 in a regional hospital. Data was sourced from procedure and pathology reports, pulmonary imaging and patient records, and correlations assessed using Pearson chi-squared testing.

Results. In the study population, 85 biopsies were performed by three radiologists and 125 by one respiratory physician. Onsite cytology was not available.

No difference in diagnostic accuracy was noted in definitive diagnoses (83% radiologist-performed v 85% physician-performed procedures, $P = 0.74$) and adequacy for immunohistochemistry (73% v 63%, $P = 0.097$).

In terms of procedural efficiency, the average procedure duration differed (34 minutes v 41 minutes, $P < 0.01$) with a mean difference of 7.7 minutes however the average radiation dose did not differ (360 mGy. cm v 343 mGy.cm, $P = 0.82$).

Safety analysis revealed that rates of significant pneumothorax and haemorrhage differed between groups. The rate of post biopsy minor pneumothorax on CT were 29% v 31%, and major pneumothorax were 13% v 3% ($P = 0.041$). Delayed pneumothorax on 4 hour chest x-ray occurred in 21% v 12% ($P = 0.112$). Minor pulmonary haemorrhage on post-biopsy CT was noted in 63% v 66% ($P = 0.66$), and 6 major pulmonary haemorrhages in the radiologist-performed group.

Conclusion. Respiratory physician-performed CTLB are comparable to radiologist-performed procedures in terms of diagnostic accuracy and patient radiation. Whilst there is a minimally longer procedure duration for the respiratory physician, this is seen alongside a better safety profile with regard to immediate major pneumothorax and major pulmonary haemorrhage.

Grant Support: None.

DETERMINANTS OF PNEUMOTHORAX AND PULMONARY HAEMORRHAGE RISK IN CT-GUIDED LUNG BIOPSIES (CTLB) PERFORMED IN A REGIONAL CENTRE

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Introduction/Aim. Pneumothorax and pulmonary haemorrhage are commonly cited complications of CTLB. We investigated CTLB risk factors associated with these two complications in a regional centre.

Methods. A retrospective analysis was performed of 210 consecutive patients undergoing CTLB over the 9-year period between December 2010 and July 2019 in a regional hospital. Data were sourced from procedure reports and pulmonary imaging, with correlations assessed using Pearson chi-squared testing.

Results. The study population's pneumothorax rate was 37% on immediate post-biopsy CT and 17% on 4-hour post-biopsy CXR.

On immediate post-biopsy CT, there were no significant pneumothorax risk difference with lesion multiplicity (single or multiple), location (upper vs. lower lobes), proximity to fissures, needle approach or patient position. Significant risk differences were noted with lesion size (highest risk 53% in 2-3 cm lesions vs. lowest risk 19% in >5 cm lesions, $P = 0.02$), and increasing pleura-to-lesion distance (lowest risk 25% in lesions abutting pleura vs. highest risk 59% in >2 cm lesions, $P < 0.01$).

On 4-hour post-biopsy CXR, there were no significant pneumothorax risk difference with lesion size, multiplicity, location, proximity to fissures, needle approach or patient position. Significantly increased risk was noted with increasing pleura-to-lesion distance (abutting pleura 9% vs. >2 cm 29%, $P = 0.03$).

The minor localised haemorrhage rate (along needle tract or peri-lesional) was 65% on immediate post-biopsy CT, with 5 moderate-severe haemorrhages. There were no significant haemorrhage risk differences with lesion multiplicity, location, proximity to fissures, needle approach or patient position. Significant risk differences were noted with decreasing lesion size (<2 cm 88% vs. >5 cm 27%, $P < 0.01$) and increasing pleura-to-lesion distance (abutting pleura 34% vs. >2 cm 97%, $P < 0.01$).

Conclusion. Pneumothorax and haemorrhage risk in CTLB are higher with smaller lesion size and increasing pleura-to-lesion distance. No significant risk differences were noted in this regional population with lesion multiplicity, location, proximity to fissures, needle approach or patient position.

TRACHEAL PAPILLOMATOSIS: A RARE CASE OF RESPIRATORY PAPILLOMATOSIS

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We present the case of a 65 year old male smoker who presents with dyspnoea on exertion for six years. Three months ago he developed a chronic wet cough with difficulty expectorating and sense of sputum getting stuck mid-chest. Symptoms worsened when lying supine. Examination revealed expiratory wheeze in the upper zones bilaterally with bronchial breath sounds in the lower zones. Spirometry demonstrated obstruction with a fixed plateau in the expiratory portion of the flow volume loop with normal inspiration. Computed tomography of the chest showed a large mid-tracheal lesion. Bronchoscopy demonstrated an isolated fungating multi-lobulated lesion resembling a squamous cell carcinoma causing significant endoluminal obstruction. The patient was transferred to a tertiary centre where a debulking procedure was performed using rigid bronchoscopy and diathermy. Due to excessive dynamic compression after debulking, a metallic stent was inserted achieving patency and complete symptom resolution. Surprisingly, histology demonstrated benign squamous papilloma which confirmed a diagnosis of tracheal papillomatosis. The stent was subsequently removed after six weeks and the patient has remained symptom free for two months since.

Tracheal papillomatosis is a benign condition characterised by papillomatous growth of bronchial epithelium in the trachea secondary to underlying HPV infection. It is a rare subtype of recurrent respiratory papillomatosis occurring in 18-40 cases per million predominantly affecting males. Risk factors for malignant transformation include cigarette smoking, radiation exposure, bleomycin, and HPV-11 or HPV-16 subtypes. Tissue diagnosis is the gold standard and is useful in excluding malignant transformation. Endoscopic intervention remains the best treatment available to relieve obstruction. Surveillance bronchoscopy is performed to monitor for recurrence. Adjuvant pharmacotherapies including antivirals, interferon, and the HPV vaccine have not conclusively been shown to reduce recurrence rates however EGFR inhibitors may be used for EGFR positive respiratory papillomatosis.

Mid-tracheal lesion 5cm below the vocal cords
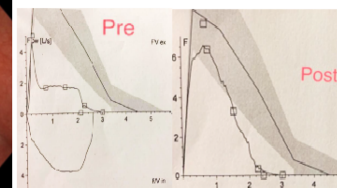
Flow volume loops pre and post excision of the lesion

Key Words. Papillomatosis, Rare Diseases, Interventional Pulmonology

TP 108

ANAESTHESIA FOR RIGID BROCHOCOPIC INTERVENTIONS FOR CENTRAL AIRWAY OBSTRUCTION (CAO): A MULTI-CENTRE AUDIT

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Introduction/Aim. CAO is a relatively rare but critical medical problem, with outcome of therapeutic interventions influenced by patient-, disease-, operative- and anaesthetic factors. Multiple anaesthetic and ventilation techniques can be employed with rigid bronchoscopy. We examined these techniques used at our centres and their associated peri-operative outcomes.

Methods. This is a retrospective audit of all rigid bronchoscopic procedures by a single operator conducted at Westmead Public and Private hospitals for CAO. Data was collected from electronic and paper medical records on patients' demographics, anaesthetic requirements, interventions performed, complications and mortality. Data was analysed using Excel and SPSS.

Results. A total of 98 procedures were performed on 71 patients (41 male) between 2010 and 2018. Most had an ASA score of 3 or 4. 37 patients (52%) had a diagnosis of COPD with median FEV1 of 1.43 L and median FEV1% of 52%. All procedures were performed under general anaesthesia, and 51 (52%) involved neuromuscular blockade. The most common sedatives included propofol and remifentanil infusion. 54 patients (55%) received intra-operative IV steroids, most commonly dexamethasone 8 mg. Ventilation strategies employed included ventilator-assisted or –controlled ventilation (SIMV/ PCV/ Spontaneous) for 73 procedures (75%), manual ventilation for 13 procedures (13%). High frequency jet ventilation was only employed for two individuals for part of the procedure. Potential anaesthesia-related complications included transient hypoxia (7/98), self-resolving hypercapnia (8/98), sustained hypercapnia requiring NIV (2/98), failed extubation (1/98) and 4/98 patients intubated well prior to procedure remained intubated post. No significant association was determined between anaesthetic strategy employed and complications. Risk of incident respiratory failure was no different in those patients with or without COPD.

Conclusion. CAO carries a significant morbidity in a generally unwell cohort. Different sedation and ventilation techniques were employed in our cohort. Rates of severe or sustained post-operative respiratory were overall low and were not associated with any particular intra-operative ventilation strategy employed.

Grant Support: Nil

TP 109

SAFETY AND COMPLICATIONS OF INTERCOSTAL CHEST DRAIN INSERTION AT AUCKLAND CITY HOSPITAL

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Introduction/Aim. Intercostal chest drain (ICD) insertion is a common procedure for management of pleural disease. Guidelines from British Thoracic Society outline standards to minimise potential complications. Currently ICD insertion at Auckland City Hospital is performed by doctors with variable procedural experience. The aim of this study was to review ICD insertion practices and to assess complications.

Methods. Patients who had ICD insertion and were discharged from a medical service between 1 January and 31 December 2016 were identified. Exclusion criteria were lung transplant, surgical ICD, indwelling pleural catheter, and diagnosis of empyema. Data recorded include demographics, drain characteristics, use of bedside ultrasound and the role of the proceduralist. Complications were classified as immediate or delayed complications. For patients requiring more than one ICD only the first ICD insertion was analysed.

Results. 62 eligible patients were identified. The most common indications were pneumothorax (52%) and pleural infection (26%). The total number of ICD insertions was 73. Eight patients underwent more than one ICD insertion. Of the 30 patients with pleural effusion 18 had bedside ultrasound, nine had ultrasound by radiology department and three had no documented ultrasound guidance. 45% of ICDs were inserted by a Respiratory Medicine resident medical officer. There were no cases of immediate haemothorax, symptomatic hypotension or organ puncture. There were two cases of pneumothorax. There were 16 delayed complications involving 13 patients. Half were of inadvertent ICD removal. There were three cases of drain blockage, four surgical emphysema and one re-expansion oedema. There were no deaths.

Conclusion. There were no life-threatening immediate complications due to ICD insertion, however significant number of patients experienced delayed complications. There was significant deviation from standards for the use of ultrasound guidance. Results should be used to develop an action plan and a re-audit is recommended to improve safety of ICD insertion.

Grant Support: Nil

CLINICAL ATTRIBUTES OF INDIVIDUALS DIAGNOSED WITH CULTURE-NEGATIVE AND CULTURE-POSITIVE TUBERCULOSIS

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Introduction/Aim. Active infection with Mycobacterium tuberculosis (MTB) is often difficult to diagnose due to its fastidious nature and lack of available gold standard tests with high sensitivity. Even in well-resourced settings, approximately 20-30% of patients are diagnosed clinically (i.e. culture-negative TB [CNTB]) without confirmatory tests. Studies describing populations with CNTB are lacking. The aim of this study is to describe the clinical attributes of patients diagnosed with CNTB in comparison to culture-positive TB (CPTB).

Methods. This single centre retrospective study at a metropolitan health service in Victoria audited pharmacy records identifying those prescribed anti-tuberculous treatment between 2015 to 2018. Medical records were reviewed including pathology, radiology and procedural reports. Individuals with HIV were excluded. CNTB was defined as either; no evidence of MTB growth in mycobacterium culture; or positive MTB PCR if no culture was obtained. Descriptive statistics were used to summarise the clinical characteristics of patients in each group.

Results. Of the n = 66 patients treated for active infection with MTB, n = 37 had pulmonary disease, n = 24 extra-pulmonary and n = 5 both. Mean age was 45(19); 52% were females, 95% were overseas-born and 48% with recent travel history. CNTB patients comprised 33% of the cohort. There was no significant difference in baseline patient characteristics between CNTB and CPTB. Presenting symptoms were similar between both groups, apart from weight loss which was more common in patients with CPTB (41% vs 15%, $P = 0.046$). There was no significant difference in pre-existing comorbidities, radiological findings between the groups. Both groups underwent a similar number of diagnostic procedures.

Conclusion. Almost one-third of those treated for active MTB infection were culture-negative. Alternative diagnoses were reached in 1 in 6 of those diagnosed with CNTB. Those with CNTB had similar demographics and clinical presentations to those with CPTB, except for weight loss, which was less common in the culture negative group.

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POST-PROCEDURAL, LIFE-THREATENING ADENITIS IN A NON-BIOPSIED LYMPH NODE FOLLOWING EUS-B

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Case Report. A 59 year old woman was referred for investigation of a large, confluent right paratracheal (4R) nodal mass, bilateral pulmonary nodules, paraaortic lymphadenopathy, and liver lesions. 4 passes of a 50 mm station 7 lymph node were taken at EUS-B, using a 21 gauge needle. The procedure was accomplished without difficulty, with no immediate complications. Histology revealed metastatic melanoma.

4 days later the patient represented with fevers, rigors and chest pain. She was hypotensive, requiring vasopressor support. Blood cultures grew *S. milleri* and *S. viridans*. CT revealed that the 4R mass had enlarged, compressing the trachea, and had developed internal gas. Following a 19 day admission (7 in ICU) with antibiotics, the patient was discharged.

Discussion. Mediastinal infections are a recognised complication of EBUS and EUS-B, ranging from simple adenitis to mediastinitis. The mechanism of infection is thought to be inoculation of biopsied tissue with oropharyngeal flora, which has contaminated the working channel prior to needle insertion. Whilst localised adenitis of a biopsied lymph node has previously been reported, we believe this is the first report of life-threatening adenitis in a non-biopsied node.

The thoracic lymphatic system is incredibly complex, with significant anatomical variability and possibility for communications between lymphatic channels [1]. It is thus feasible that bacteria introduced to a station 7 node could be transmitted through lymphatic spread to station 4R. It is also known that 7% of patients undergoing EBUS-TBNA [2] and 4% of patients having EUS-guided FNA [3] experience bacteraemia. We therefore theorise that the infection of a non-biopsied node has occurred either from direct lymphatic drainage between the biopsied and eventually infected nodes, or by seeding of the affected node through systemic bacteraemia.

Conclusion. This is, to our knowledge, the first reported case of severe, life-threatening adenitis post EUS-B in a non-biopsied lymph node.

Grant Support: Nil

References:

1. Bolca C. Lymphatics of the Mediastinum, Esophagus and Lungs: Thoracic Surgeon's Point of View. *J. Surg*. 2014; 10(2): 113-115.

2. Steinfort DP, Johnson DF, Irving LB. Incidence of bacteraemia following endobronchial ultrasound-guided transbronchial needle aspiration. *Eur Respir J* 2010; 36:28-32.

3. Janssen J, Konig K, Knop-Hammad V, et al. Frequency of bacteraemia after linear EUS of the upper GI tract with and without FNA. *Gastrointest Endosc* 2004; 59:339-344

INDWELLING PLEURAL CATHETERS AT THE PRINCE CHARLES HOSPITAL

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Introduction/Aim. Indwelling pleural catheters (IPCs) are indicated for symptomatic management of malignant pleural effusion (MPE), particularly in the setting of non-expandable lung and failed talc pleurodesis. Many patients receive multiple pleural procedures in the lead up to insertion of an IPC. The aim of this study was to assess the use of IPCs at The Prince Charles Hospital (TPCH) between May 2016 to May 2019, define the number of pleural procedures patients receive prior to an IPC, and assess complications and outcomes related to IPC insertion.

Methods. Data was retrospectively collected using an electronic database. Demographic data, information pertaining to malignancy and treatment, imaging findings, and number and type of prior pleural procedures including pleurodesis were obtained from medical records. The number of effusion-related hospital days pre- and post-insertion of IPC and complications related to IPC were recorded. Data was analysed using Excel software.

Results. 16 IPCs were inserted at TPCH between 1st May 2016 to 31st May 2019 – 15 for MPE. The number of prior pleural procedures ranged between 1 and 10, with a median of 2.5 and mean of 3.06. Only two out of 15 patients with MPE had a prior pleurodesis attempt (via talc slurry). No patient from TPCH catchment area received more than three pleural procedures prior to IPC insertion. However, three patients from surrounding hospital districts received more than three pleural procedures. The average number of effusion-related inpatient days prior to IPC insertion was 18.4 days, compared to 15 days following insertion. Six patients experienced complications related to the IPC, three requiring removal.

Conclusion. This small observational study confirms that patients often receive multiple interventions prior to insertion of an IPC, and highlights the need for coordination between hospital districts to ensure access to a definitive pleural procedure.

Grant Support: Nil

CRYOBIOPSY USING FLUID FILLED VS AIR FILLED BRONCHIAL BLOCKADE BALLOON

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Introduction/Aim. Cryobiopsy is a minimally invasive transbronchial biopsy procedure technique to acquire lung parenchymal tissue with the aim of obtaining larger sample sizes with better preserved architecture to aid diagnostic accuracy and confidence in both diffuse and localised pathologies. This audit aims to compare complications with balloon migration and bleeding following adoption of fluid filling of the balloon blockade. Anticipate fewer incidences with the more controlled filling of balloon with fluid.

Methods. Retrospective analysis of data from the Royal Brisbane and Women's Hospital between July 2016 and July 2019. Bronchial balloon blockade is a standard part of cryobiopsy procedure, however our local procedure was altered from air filling to fluid filling. Amount instilled determined by proceduralist to achieve complete blockage of selected bronchi. Our database was compared pre and post this procedural change.

Results. Over 50 cryobiopsies were performed between July 2016 and July 2019. 79% of these procedures were completed without any recorded complication. Of the 21% with complications, 11% were pneumothorax (with half being managed conservatively), 5.5% were bleeds nil requirements for invasive intervention, 4.5% other). Median blood loss was 6 g & 7 g respectively, however there were 7 episodes of bleeds >20 g (20-175 g) with 8 episodes of balloon issue/migration filling with air. This is compared to fluid filled balloon with 4 episodes of issue/migration and 3 episodes of blood loss >20 g.

Conclusion. Utilisation of fluid filled bronchial blockade balloon appears to lead to a more controlled expansion and reduced balloon placement retention issues/migration and therefore less incidences of bleed complications.

Grant Support: Nil

DIAGNOSTIC PERFORMANCE OF 19G EBUS-TBNA IN SUSPECTED LYMPHOMA

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Introduction/Aim. Endobronchial ultrasound-guided transbronchial needle aspiration (EBUS-TBNA) represents a minimally-invasive approach in the evaluation of mediastinal and/or hilar lymphadenopathy. Diagnostic performance of EBUS-TBNA in lymphoma using standard 22-gauge (22G) needle is variable, and is limited by sample volumes that are often inadequate for histopathological assessment. This study examines the diagnostic utility of 19-gauge EBUS-TBNA needle in the evaluation of suspected lymphoma.

Methods. We prospectively collected clinical and procedural information for patients undergoing EBUS-TBNA with 19G needle at Royal Melbourne Hospital for investigation of mediastinal/hilar lymphadenopathy, where lymphoma was considered in the differential diagnosis. All consecutive patients between June 15, 2016 and July 10, 2019 were included in this cohort. Procedural diagnoses were recorded, and where EBUS did not achieve a definitive diagnosis, final diagnosis was determined through subsequent investigation, or a minimum of 6 months radiologic surveillance.

Results. Thirty-nine patients underwent EBUS-TBNA with 19G needle for evaluation of suspected lymphoma. Thirteen patients had a prior diagnosis of lymphoma (33%). Lymphoma was ultimately diagnosed in 23 patients (59%). Of these, ten had a prior diagnosis of lymphoma (43%). 19G EBUS-TBNA demonstrated lymphoma in 19 patients, with a sensitivity of 83% (95% CI 66-93) for detection of lymphoma. Of these, one patient required repeat EBUS-TBNA and four patients required surgical biopsy to definitively characterise lymphoma subtype. Therefore, sensitivity of 19G EBUS-TBNA for definitive diagnosis of lymphoma was 65% (95% CI 45-81). In patients with a prior diagnosis of lymphoma, sensitivity for definitive diagnosis of lymphoma was 80% (95% CI 48-95). Flow cytometry demonstrated a sensitivity of 78% (95% CI 44-95) for the detection of non-Hodgkin lymphoma.

Conclusions. EBUS-TBNA with 19G needle demonstrates similar diagnostic performance to standard 22G needle in the detection and definitive diagnosis of lymphoma. Further invasive testing remains necessary following non-diagnostic EBUS-TBNA procedures.

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PREVALENCE OF INCIDENTAL PULMONARY NODULES ON CT CORONARY ANGIOGRAM

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Introduction. Lung cancer is the leading cause of cancer-related death in Australia. Although annual screening with low-dose CT chest is associated with a relative mortality reduction,[1] a major barrier to implementation of population-based screening is the false positive rate due to the high prevalence of benign nodules. The purpose of this study was to identify the baseline minimum prevalence of pulmonary nodules that might be found incidentally in an Australian population with a similar age profile to those enrolled in a lung cancer screening program.

Methods.

This was a cross-sectional study based on CT coronary angiograms (CTCAs) performed at a private medical imaging centre in Liverpool, Sydney. All reports of CTCAs for patients aged 55 to 80 years during the year of 2018 were reviewed. The primary outcome (a 'positive' screening result) was defined as the presence of any lung nodule at least 6 mm in diameter.

Results. Results are available for 500 of 2004 scans performed during the study period. Mean (SD) age was 67 (6) years and 50% were male. 25% of participants had atherosclerosis. Pulmonary nodules were identified in 75 (15%) participants. 27 (5.4%) participants had a nodule at least 6 mm in diameter, of which 17 (63%) were solid and 10 (37%) were semi-solid in character. 20 (4%) had multiple (>3) nodules. Overall, 55 (11%) had a nodule at least 4 mm in diameter.

Conclusions. The prevalence of incidental pulmonary nodules on CTCAs was lower than reported in previous lung cancer screening studies.[1,2] This may be related to differences in the study population, and/or the incomplete views of lung parenchyma offered by CTCAs.

References:

1. The National Lung Screening Trial Research Team (2011). Reduced lung-cancer mortality with low-dose computed tomographic screening. *N Engl J Med*. 365:395-409.

2. Marshall HM et al (2014). *Eur Respir J*. 2015 45(6):1734-7.

THE UTILITY OF DISPOSABLE BRONCHOSCOPES IN EMERGENCY SITUATIONS – A CASE SERIES

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Introduction. Bronchoscopy is a common procedure rendering both diagnostic and therapeutic outcomes. In urgent cases, setup and preparation can lead to delays in the provision of timely intervention.

Aims. To describe 3 cases where using disposable bronchoscopes in emergent settings circumvented delays in intervention.

Case Series.

Case 1

A 54YO F aspirated an oesophageal speaking valve into the bronchus intermedius which could not be removed with nasoendoscopy. In ED under local anaesthetic, a disposable bronchoscope was inserted via the tracheostomy and the FB was removed using flexible forceps facilitating immediate hospital discharge.

Case 2

A 94YO M presented following an aspiration event and rapidly deteriorated with right lung collapse and severe hypoxaemia (SpO2 47%). With no time for transfer to theatre he underwent emergent bronchoscopy in the ED using a disposable bronchoscope under topical anaesthesia. Oats were found completely obstructing the right main bronchus and were suctioned which resulted in rapid clinical improvement.

Case 3

An 81YO M with small cell lung cancer and a covered left main bronchial metallic stent was admitted with chest sepsis and respiratory failure. The mucous-impacted stent had dislodged into the right main bronchus, causing near complete obstruction. He was booked for early bronchoscopy but deteriorated despite NIV. At midnight he was emergently intubated and a disposable bronchoscope was introduced through the

endotracheal tube at the bedside, facilitating removal of the stent with flexible forceps and clearance of copious sputum plugs.

Conclusion. The availability of commercially available disposable bronchoscopes allows swift and efficient management of airway emergencies and can be performed at the bedside. To date this relatively cheap intervention has helped us manage two life-threatening cases of central airway obstruction and facilitated immediate discharge in another patient who may otherwise have waited hours or days for an emergency theatre procedure.

EFFICACY AND SAFETY OF LUNG VOLUME REDUCTION WITH ENDOBRONCHIAL VALVES IN SEVERE COPD (NORTHERN ADELAIDE LOCAL HEALTH NETWORK)

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Introduction/Aim. There is robust international evidence regarding the safety and efficacy of bronchoscopic LVR with the use of EBV from randomised controlled trials, with data predominantly derived from clinical trial centres. We aimed to assess the generalisability of this data at a medium sized tertiary Australian teaching hospital.

Methods. LVR commenced at the Lyell McEwin Hospital (NAHLN) in 2016. All patients were assessed for eligibility through a state-wide interventional pulmonology multidisciplinary consensus. Pulmonary Function Tests (PFTs) and 6 minute walk tests (6MWT) were measured at pre-EBV insertion, 2 months and 6 months post-EBV insertion. We retrospectively assessed the pre- and post-EBV FEV_1, FVC, residual volume (RV), diffusion capacity for carbon monoxide (DLCO) and 6MWT. We evaluated safety on the basis of the rate of procedure-related complications.

Results. Eleven patients (7 males, mean age $\pm$ SD = 60.9 +/- 8 years) underwent the procedure. Results have been summarised in the following table:

	Pre-EBV	2 months post-EBV	6 months post-EBV
FEV_1 (litres)	0.80	0.94 ($P = 0.22$)	1.05 ($P = 0.13$)
FVC (litres)	2.57	2.61 ($P = 0.87$)	2.91 ($P = 0.29$)
RV (litres)	5.59	4.69 ($P = 0.08$)	5.97 ($P = 5.97$)
DLCO (ml/min*mmHg)	6.64	7.65 ($P = 0.51$)	8.85 ($P = 0.26$)
	Pre-EBV	Post-EBV	
6MWT (metres)	265	316 ($P = 0.25$)	

Treatment-related adverse events included one incidence of pneumothorax requiring chest drain insertion (9%), and one incidence of EBV removal secondary to recurrent chest infections (9%).

Conclusion. We found that LVR with EBV demonstrated improvement of 2 and 6 months lung function (FEV_1, FVC, DLCO) and exercise capacity (6MWT) in patients with severe COPD in NAHLN. There was a reduction in pulmonary hyperinflation (RV) post-procedure. However, all of these measurements are not statistically significant ($P > 0.05$). Complication rates are minimal including pneumothorax and infections.

Grant Support: None

TP 119

THE RISING UTILISATION OF ENDOBRONCHIAL ULTRASOUND AND THE CORRESPONDING DECLINE IN MEDIASTINOSCOPY

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Introduction/Aim. Historically mediastinoscopy has been the procedure of choice for the investigation of a mediastinal lymph node. This involves a general anaesthetic, relatively high cost and the complications can be serious. With the introduction of endobronchial ultrasound (EBUS) it was expected that the need for invasive mediastinoscopy would be reduced, however to the best of our knowledge this has not previously been reported as proven. We set out to explore the relationship between the numbers of mediastinoscopies and the number of EBUS procedures performed over a 13 year period at a regional tertiary referral centre.

Methods. Using clinical coding we retrieved the numbers of mediastinoscopies between the years 2005 and 2018. We then compared this annually with the number of EBUS over the same time period.

Conclusion. The rising utilisation of EBUS corresponds with a fall in the rate of mediastinoscopies performed. Whilst we cannot infer causation, this prompts further research into whether cases previously referred for mediastinoscopy are now referred for EBUS and the relative sensitivity and negative predictive values of these tests.

Grant Support: N/A

TP 120

THERAPEUTIC BRONCHOSCOPY FOR MALIGNANT CENTRAL AIRWAY OBSTRUCTION: A TEN-YEAR REVIEW OF OUTCOMES AND SURVIVAL

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Introduction. Central airways obstruction (CAO) in patients with primary lung and metastatic cancers is common and usually indicates advanced disease. Urgent therapeutic bronchoscopy is often required to relieve the malignant obstruction and palliate symptoms. Complex therapeutic interventions including rigid bronchoscopy, tumour debulking and stent placement can help restore lumen patency but are associated with high risks and morbidity.

Aim. To describe the outcomes, complications and survival following therapeutic bronchoscopy for treatment of malignant CAO in a single tertiary centre.

Methods. A retrospective review was performed of all patients with malignant CAO who underwent therapeutic bronchoscopy at Sir Charles Gairdner hospital, Perth during a ten-year period (2008-2017). Demographics, cancer type, symptoms, number and type of bronchoscopic interventions, outcomes, complications and survival data were recorded.

Results. 75 patients (Male 41; median age 65 years) with malignant CAO who underwent therapeutic bronchoscopy were identified from the bronchoscopy database. The most common primary aetiology was lung cancer (39 patients, 52%) and carcinoid (9 patients, 12%). Therapeutic bronchoscopic procedures were performed primarily by two experienced operators in the operating theatre with the patients under general anaesthesia and spontaneous ventilation. Rigid bronchoscopy was performed in 42 (56%) patients. Airway dilatation and tumour debulking by balloon, diathermy, electrocautery, laser and cryotherapy were the main bronchoscopic techniques used. Airway stent was placed in 34 (45%) patients. Rate of severe procedure-related complications was low. 7- and 30-day all-cause mortality following the initial bronchoscopic intervention was 2.6% and 14.6%, respectively and mainly due to cancer progression. Median survival after bronchoscopy was 97 days (range 3-2589). 30 (40%) patients required repeat bronchoscopy after median 28 days.

Conclusion. Therapeutic bronchoscopy is useful to relieve malignant CAO and is associated with a low complication and mortality rate in experienced hands.

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TP 121

PULMONARY CRYPTOCOCCAL INFECTION DIAGNOSED USING RADIAL PROBE ENDOBRONCHIAL ULTRASOUND BRONCHOSCOPY: A CASE SERIES

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Introduction. Radial probe endobronchial ultrasound (r-EBUS) bronchoscopy is widely used in the diagnostic evaluation of peripheral lung nodules. r-EBUS is safer than trans-thoracic needle biopsy and has a high diagnostic yield in malignant nodules, and to lesser extent, in benign lesions. Cryptococcal lung infection caused by Cryptococcus gattii and diagnosed by r-EBUS bronchoscopy has not been reported before.

Aim. To discuss two cases of pulmonary cryptococcosis caused by Cryptococcus gattii that were diagnosed by r-EBUS bronchoscopy.

Case 1. A 64 year old male, non-smoker, presented with persistent cough, weight loss and unsteady gait. CT scan of thorax revealed a large right lower lobe lung mass causing post-obstructive pneumonitis and hilar/mediastinal lymph nodes, suggestive radiologically of lung malignancy. r-EBUS bronchoscopy with guide-sheath technique was used to identify and sample the lesion. Histopathological evaluation of biopsy confirmed Cryptococcus gattii infection. Examination of cerebrospinal fluid (CSF) confirmed disseminated cryptococcosis. Subsequent investigations looking for underlying immune suppression identified a congenital CD4 count deficiency. He was treated with amphotericin, 5-flucytosine and oral fluconazole with early symptomatic and radiological improvement.

Case 2. A 69 year old asymptomatic male, previously a smoker, presented with a solitary pulmonary nodule in the lingula that was detected incidentally on CT scan of thorax. r-EBUS bronchoscopy with guide-sheath technique identified the nodule and allowed biopsy. Histopathology confirmed pulmonary cryptococcoma caused by Cryptococcus gattii. Disseminated cryptococcosis was diagnosed following identification of multiple cryptococcoma lesions in the brain on MRI and isolation of Cryptococcus gattii from CSF. No risk factors for immunosuppression could be identified despite extensive evaluation. Induction anti-fungal treatment has been commenced.

Conclusion. r-EBUS bronchoscopy is a useful technique to diagnose benign lung lesions including cryptococcal lung infections. We report here the first cases of pulmonary cryptococcosis caused by Cryptococcus gattii that were diagnosed by r-EBUS bronchoscopy.

TPL 010

DIAGNOSTIC STRIKE RATE AND COMPLICATION RATE OF CT GUIDED LUNG BIOPSY

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Introduction/Aim. Review diagnostic strike rate and complication rate of CT guided lung biopsy

Methods. Retrospective review of CT guided lung biopsies performed in the Hunter New England Local Health District from January 2017 to August 2019 inclusive.

Results. 399 CT guided lung biopsies were included. The diagnostic strike rate was 322/297 (81%). There was a total of 181 procedures with complications, which gives a complication rate of 45%. Out of those complications, 157 (87%) were pneumothoraces. Fortunately, the majority were small and did not require drainage or any intervention beyond observation. Only 28 (18%) required drainage. Only 34 complications resulted in a hospital admission >24 hours (19%). Using the Adverse Event classification published by the Society of Interventional Radiology, 132 of the 181 complications were Category 1 (73%), 15 were Category 2 (8%), 33 were Category 3 (18%) and there was only 1 death (Category 5, 0.5%). There were no Category 4. The strike rate was 322/397 (81%) (two cases did not have any histopathology recorded). In terms of referrers, 163 cases were referred from Respiratory, 73 from Cardiothoracics, 59 from Medical Oncology, and the rest were from a wide variety of medical and surgical specialties. The significant correlations were between complication rates and needle gauge, referrer specialty, depth from pleura, and day of week. The only significant correlation with strike rate was type of biopsy (core vs fine needle aspiration biopsy).

TP 123

CHANGING PATTERNS OF LUNG CANCER IN AN ASBESTOS EXPOSED POPULATION

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Introduction/Aim. The proportions of different histological subtypes of lung cancer have changed internationally over the last few decades, thought in part to be due to changes in tobacco consumption. This has not previously been examined in an asbestos exposed population.

Methods. Individuals exposed to asbestos at Wittenoom were identified through employment records (workers), official town records (ex-residents) and latterly through participation in an "Asbestos Review Program" (ARP) for subjects with other occupational asbestos exposure. Smoking status was ascertained through questionnaires and yearly review (if participating in the ARP). Data linkage with state cancer and death registries was available until December 2018.**Results.** There were 14,318 subjects identified (78.1% male, 42.9% ever-smokers). Between 1955-2018, there were 715 (4.9%) cases of lung cancer. Most cases were male (86.9%), median age 67.4 (IQR 60.5-75.0) years. Wittenoom workers comprised 505 (70.6%), ex-residents 121 (16.9%) and others 89 (12.4%). 452 (63.2%) of cases were in ever-smokers. Non-small cell lung cancer accounted for 478 (66.9%), small cell 68 (9.5%) and carcinoma not otherwise specified 146 (20.4%). The proportion of subtypes changed significantly over time: pre-1980 vs. post 2010: adenocarcinoma (20.5% vs. 42.7%), squamous (26.5% vs. 19.1%), small cell (16.7% vs. 6.1%), all $P < 0.0001$. Overall median survival was 158 (IQR 52-483) days.
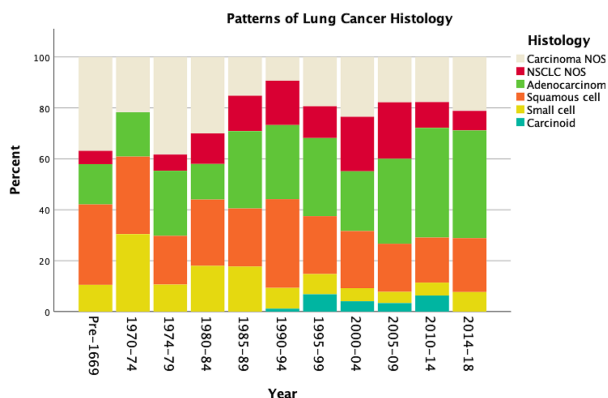
Conclusion. The histology of lung cancer in asbestos exposed subjects is similar to that reported in other populations. The fall in squamous and small cell lung cancer proportions reflects falling tobacco exposure in the community. The increase in proportion of adenocarcinoma may also be related to increasing use of thoracic CT and may represent some overdiagnosis.

TP 124

PULMONARY CARCINOIDS AND OBESITY: IS THERE AN ASSOCIATION?

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Introduction/Aim. Pulmonary carcinoids are uncommon malignant tumours arising from the neuroendocrine lineage. While the risk factors and pathogenic mechanisms driving these cancers remain poorly understood, there has been anecdotal experience suggesting obesity may be an unrecognised risk factor. Carcinoid tumours may also affect other organ systems including the gastrointestinal tract where an association with obesity has been reported. We performed a retrospective case control study to assess for any association between obesity and pulmonary carcinoid tumours in patients presenting to a tertiary Australian hospital.

Methods. The medical records of 64 patients who presented with a new diagnosis of pulmonary carcinoid tumour from September 2009 to September 2019 were retrospectively analysed. Comparative baseline population body mass index (BMI) data was collected from the Australian Institute of Health and Welfare.

Results. The patient cohort had a mean age of 56 ± 16(SD) years, 73% were female and 97% were Caucasian. A smoking history was present in 39% of patients with no significant difference in smoking rates between carcinoid grades (X^2(2, $N = 64$) = 5.5, $P = 0.06$). Typical carcinoids occurred in 55%, atypical 28% and not specified 17%.

BMI data was available for 58/64 cases. The average BMI of the carcinoid cohort was 31 ± 7 kg/m^2. No patients were underweight, 10/58(17%) were within the normal range, 19/58(33%) overweight, 11/58(19%) obesity class I, 9/58(16%) obesity class II and 9/58(16%) obesity class III. There was a higher proportion of overweight & obese (BMI > 25) and obese (BMI > 30) within the carcinoid cohort compared to the Queensland population (overweight & obese 83% Vs 66% and obese 50% Vs 32% respectively).

Conclusion. A higher proportion of patients with carcinoid tumour were overweight or obese compared with the general population. This suggests an association may be present between obesity and pulmonary carcinoid tumours. There was also an association with female gender & Caucasian ancestry. Further studies are warranted to confirm these associations.

Key words. pulmonary carcinoid, obesity, BMI

EVALUATION OF A RAPID ASSESSMENT CLINIC FOR LUNG MALIGNANCY

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Introduction/Aim. Survival with lung cancer in Australia is poor and 75% of patients are diagnosed with advanced disease. Guidelines recommend referral to specialist review ≤14 days and treatment within 42 days. We established a Rapid Lung Assessment Clinic (RLAC), located in the Cancer Therapy Centre of a metropolitan teaching hospital, to fast-track patients with suspected lung malignancy and to review patients with complications related to lung cancer treatments. This observational cohort study evaluates the performance of the RLAC in its first six months.

Methods. We retrospectively analysed patients reviewed in RLAC between July and Dec 2018. Patient demographics, reason for, and dates of referral, diagnosis, investigations, treatment and disposition were analysed (comparisons using Wilcoxon test).

Results. During the first six months, 42 patients were referred to the RLAC; 7 patients did not attend; one had incomplete data. Of 34 patients with complete data, 25 were male (74%), mean age 66 ($\pm$9.0) years [mean $\pm$ SD]; 14 (41%) were non-English speaking, and 21 (62%) were socially disadvantaged. Fifteen patients (44%) were referred with incidental radiological findings, the remainder for attributable symptoms. Median time from referral to review in the RLAC was 11.5 days (7–28)[IQR] with 23 patients (68%) seen within 14 days. Twenty-seven patients (80%) had lung malignancy with median time from referral to diagnosis 23 (13–52) days. There was no significant association between time to diagnosis with number of investigations required (P = 0.22), socioeconomic status (P = 0.24), or cultural and linguistic diversity (P = 0.70).

Conclusion. There was a high incidence of lung malignancy in our population with 68% of referrals meeting guidelines for time to specialist review. Preliminary data suggests delays in timeliness to diagnosis are not related to number of investigations, socioeconomic or cultural factors. Further analysis of 12 month data is in progress including referral time to treatment, and may elucidate factors associated with delays.

Grant Support:

PULMONARY NODULE REFERRALS TO A SPECIALIST RESPIRATORY OUTPATIENT CLINIC IN SOUTH AUSTRALIA. AN AUDIT OF REFERRAL PRACTICE AND OUTCOMES

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Introduction/Aim. Incidental observations are frequently observed in thoracic imaging. Increase in the sensitivity of the CT scanner has resulted in an exponential increase in the number of such observations. Pulmonary nodules are one such. There is a risk of a nodule being malignant, hence close evaluation and adherence to guidelines is recommended (e.g. Fleischner guidelines).

Methods. A retrospective audit was conducted of all referrals with mention of pulmonary nodules received by the Respiratory unit of Flinders Medical Centre from January to March 2018. Investigations and diagnostic outcomes were collected from paper-based and electronic records. The adequacy of detail on the referral, inclusion of relevant imaging reports and eventual outcome of the nodule evaluation was examined.

Results. Of 203 referrals during this period 48 (24%) had pulmonary nodules mentioned in the referral. Majority of these originated from external sources (27 external vs. 21 internal) and 90% underwent CT prior to referral. Only 31 (65%) included a copy of the relevant imaging report. CT imaging was performed by 6 different radiology providers. There was no systematic reporting template adhered to and there was no mention of the Fleischner guideline recommendation in any of the reports. The eventual diagnosis for the referred pulmonary nodules (n = 49) were *non-malignant* (n = 24, 50%), *non-small cell lung cancer* (n = 14, 29%), *unknown* (n = 4, 8%), *small cell lung cancer* (n = 3, 6%) and *other/metastases* (n = 3, 6%).

Conclusion. In a 3-month period 24% of all referrals to the Respiratory outpatient department had mention of pulmonary nodules. Whilst many of these lesions are benign, malignancy is diagnosed in 41% of this referred cohort. Inadequate detail in the referral and considerable variability in reporting of nodules from multiple providers was observed. There is a need to develop and streamline referral pathways with sufficient detail into speciality clinics.

Grant Support: Nil.

PROFILING OF 14-3-3 PROTEIN ISOFORM EXPRESSION IN NON-SMALL CELL LUNG CANCER

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Introduction/Aim. Non-small cell lung cancer (NSCLC) is a heterogenous disease driven by a diversity of oncogenic mutations. While driver mutations arise in many proteins, they tend to manifest within pro-proliferative and survival pathways, such as the epidermal growth factor receptor (EGFR) pathway and its down stream effectors Ras, Raf and PI3K. Signalling through the EGFR pathway is facilitated by the 14-3-3 proteins which, through binding dual phosphorylated client proteins, enhance signal transduction. The 14-3-3 protein family consists of 7 highly-homologous isoforms which function as dimers. 14-3-3 proteins have previously been shown to be more abundant in tumour vs normal lung tissue and their increased expression is associated with decreased patient survival, suggesting 14-3-3 proteins are a potential target for drug development. The aim of this study is to profile individual 14-3-3 isoform expression in NSCLC to better understand the role of 14-3-3 s in lung cancer development and as potential drug targets.

Methods. Antibodies raised against 14-3-3 protein isoforms were validated for isoform selectivity by immunoblot and immunofluorescence using recombinant proteins and protein lysates from cells overexpressing individual 14-3-3 isoforms. Validated antibodies were then employed to profile 14-3-3 isoform expression in a panel of NSCLC cell lines harbouring different driver mutations by immunoblot and immunofluorescence. Furthermore, tissue microarrays assembled from various NSCLC subtypes and tumour stages were assessed by immunofluorescence.

Results. Antibodies to each 14-3-3 isoform were validated for detection by immunoblot and immunofluorescence. Profiling of 14-3-3 isoforms indicated that isoform abundance varied between NSCLC tumours and cell lines.

Conclusion. Our preliminary work highlights that individual 14-3-3 isoform profiles may be linked to specific driver mutations. This information will prove useful in determining which NSCLC patients could benefit from 14-3-3 directed therapy.

Grant Support: Australian Government Research Training Program PhD scholarship

The Hospital Research Foundation postgraduate top-up scholarship

ATTITUDES OF AUSTRALIAN SPECIALISTS TO LUNG CANCER SCREENING WITH LOW DOSE COMPUTED TOMOGRAPHY

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Introduction/Aim. CT screening for lung cancer has been implemented internationally but has yet to become standard practice in Australia. We aimed to survey knowledge and attitudes of Australian lung cancer Specialists towards lung cancer screening.

Methods. Our survey was distributed via email to specialists identified by college memberships.

Statistics. Statistical analysis was performed using descriptive statistics, Mann-Whitney test for continuous variables, and Chi-squared test or Fisher's exact test for proportions. *P* values of <0.05 were used.

Results. Seventy-six completed surveys were analysed (37 incomplete or non-relevant specialty excluded). Most respondents were thoracic physicians (45%, n = 34) or cardiothoracic surgeons (22%, n = 17) with other participants from general medicine, medical and radiation oncology, nuclear medicine, radiology and pathology. The majority (84%, n = 64) were familiar with lung cancer screening research; 66% (n = 50) felt the evidence was strong. 88% (n = 67) were in favour of a national lung cancer screening program. Major cited barriers to implementation included geographic difficulties (74%, n = 56), high false positive rate (55%, n = 42), lack of 'buy in' from different specialties (55%, n = 42) and the lack of Australian guidelines (84%, n = 64). There was uncertainty regarding the optimal recruitment strategy (80%, n = 61), target population (62%, n = 47) and follow up protocol of positive scans (66%, n = 50). Most respondents felt the benefits of lung cancer screening outweighed potential harms from CT radiation exposure (83%, n = 63) and diagnostic procedures (71%, n = 54). 39% (n = 30) reported being referred patients in the last 6 months specifically for lung cancer screening.

Conclusions. The majority of surveyed specialists were familiar with the research literature and had positive attitudes to screening. Most were in favour of an organised lung cancer screening program within Australia but identified important local barriers to implementation. We found evidence that surreptitious screening is already common in Australia. Small sample size and selection bias will impact results.

Grant Support: Nil

Declaration/Conflict of Interest Statement. Drs Marshall, Fong, Bowman and Yang are Investigators for International Lung Screen Trial.

DIAGNOSTIC EFFICIENCY AND TIMELINESS IN STAGE IV LUNG CANCER

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Introduction/Aim. Prompt diagnosis, staging and initiation of treatment for lung cancer relies on timely coordination of investigations. The aim of our study was to evaluate the choice and number of invasive procedures required to achieve histopathological diagnosis and adequacy of tissue for molecular testing (diagnostic efficiency) and timeliness from referral to specialist review, maximal pathological diagnosis (no further diagnostic testing undertaken for histopathological purposes) and treatment in patients with newly diagnosed metastatic lung cancer within Alfred Health.

Methods. A retrospective audit of medical records and data from the Victorian Lung Cancer Registry was performed. All adult patients diagnosed with new stage IV lung cancer within Alfred Health between 1st January 2016 and 28th February 2019 were included. Medical records were reviewed to evaluate initial choice of biopsy target and number of procedures required to confirm review, diagnosis and treatment was also assessed.

Results. Patientshe primary was the first biopsy target in 25% in ear EBUS was performed 14% of patients A metastatic site of disease was the first biopsy choice in 59% of patients. One third (32%) of patients required more than one procedure for diagnosis confirmation or to obtain further tissue for molecular testing. Complications from invasive procedures were rare. Mean time from referral to specialty review, maximal pathological diagnosis and treatment was 4 days, 29 days and 43 days respectively.

First biopsy site	Histopathological confirmation	Molecular confirmation
Lung Primary (n = 28)	17 (60%)	16 (57%)
Linear EBUS (n = 15)	12 (80%)	6 (40%)
Lymph node (n = 9)	9 (100%)	8 (89%)
Metastasis (n = 59)	51 (86%)	43 (73%)

PULMONARY RECURRENCE OF RENAL CELL CARCINOMA 18 YEARS FOLLOWING CURATIVE SURGERY: A CASE REPORT

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The development of distant metastases is a common feature of renal cell carcinoma (RCC) with most cases occurring within 5 years. In a small minority of patients, recurrence can occur many years later. We report a case of a 62-year old man with positron emission tomography (PET)-negative pulmonary nodules on a background of radical nephrectomy for RCC. Biopsy of the pulmonary nodules revealed metastatic RCC 18 years after curative surgery. In the evaluation of pulmonary nodules in patients with a history of RCC, the possibility of metastatic lesions should be considered even if they are PET-negative (Figures 1 and 2).

Figure 1. CT scan of the chest demonstrating multiple pulmonary nodules (white arrows)
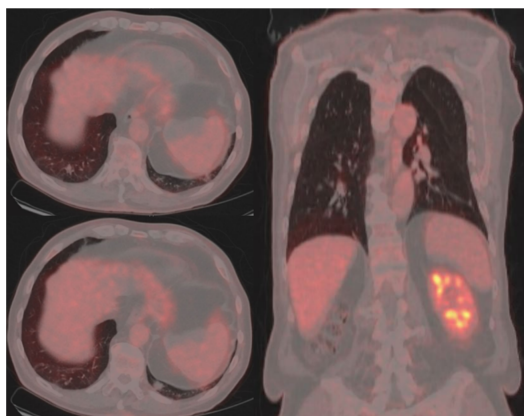

Figure 2. FDG PET showing no significant uptake in pulmonary nodules (white arrow heads) or right renal bed (white arrow)

ENDOBRONCHIAL ULTRASOUND AND LUNG CANCER - TISSUE IS THE ISSUE

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Introduction/Aim. Endobronchial ultrasound is a common bronchoscopic means of obtaining tissue of airway centric lesions via fine needle sampling. It is used to diagnose lung cancer, the fifth most common cancer in Australia and leading cause of death. Molecular testing for treatment target proteins, such as EGFR and ALK, are now mainstays in pathological diagnosis and increasing amounts of tissue are required. This study aims to assess whether conventional endobronchial ultrasound and fine needle techniques are adequate in obtaining the volume of tissue for complete molecular diagnosis.

Methods. All endobronchial ultrasound cases performed at Royal North Shore Hospital in Sydney between January 2017 and December 2018 were retrospectively reviewed. The pathology data of all the cases were extracted via the AUSLAB clinical information system. All non-diagnostic and non-malignant cases were subsequently excluded. The remaining cases were included in analysis only if the endobronchial ultrasound and biopsy was performed as the initial diagnostic test and not as staging. Each patient file was then reviewed to assess the specific malignancy diagnosis and associated stage based on pathology and imaging.

Results. There were 133 biopsies performed over the 24 month period that were diagnostic for malignancy. Of these, 17% were non-lung origin malignancy. Within the remaining lung origin malignancy group, 12% were small cell lung cancer. No repeat biopsies were required in either of these cohorts after initial diagnosis for further tissue.

Adenocarcinoma of the lung made up 67% of the overall diagnoses made, with over 95% being stage III or IV. Of all patients studied, only 8 required a repeat biopsy to complete molecular staging, all of which were adenocarcinoma.

Conclusion. Endobronchial ultrasound and biopsy is an efficient and adequate means of obtaining tissue for full molecular diagnosis of lung adenocarcinoma.

Grant Support: Nil

NON-MALIGNANT CAUSES OF FDG AVID PULMONARY NODULES

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Introduction/Aim. Incidental lesions in the lung such as a solitary pulmonary nodule (SPN) in a high-risk individual frequently needs to be monitored/investigated. Established guidelines assist the clinician in this process. Positron emission tomography (PET) with 18F-flourodeoxyglucose (FDG) has its place in the diagnostic algorithm. Histopathology is deemed a gold standard. We describe the non-malignant FDG avid focal lesions presenting to a rapid access lung clinic which evaluates patients for suspected lung cancer.

Methods. We performed a retrospective review of patients that underwent biopsy for evaluation of an FDG avid SPN. We report patient characteristics, investigation results, and treatment response of common non-malignant causes of focal FDG avidity.

Results. Of our 5 cases, 3 were consistent with cryptogenic organising pneumonia (OP) and 1 each of limited pANCA vasculitis and post-infectious focal inflammation. All demonstrated radiologic response of the SPN with steroid therapy. Mean (SD) age at presentation of our sample was 69.8 ± 16.4. The mean SUV Max (SD) on FDG PET was 4.3 ± 2.1.

One case received a prolonged, but very intermittent course of steroid treatment. Of the remaining 4 cases, mean steroid treatment duration was 8.5 weeks (range 8 – 12 weeks).

Conclusion. FDG PET cannot distinguish malignancy from focal inflammatory conditions. Organising pneumonia (OP) is characterised by intra-alveolar infiltrates of fibroblastic granulation tissue and may occur secondary to varied aetiologies. Post infectious inflammation is one of them. Steroid responsiveness is a cardinal feature of OP. An accurate diagnosis with histopathology and subsequent steroid responsiveness may lessen the need for ongoing surveillance of these lesions which present as solitary pulmonary nodules.

Grant Support: Nil

TP 133

CONVEX PROBE EBUS BRONCHOSCOPY GUIDED PLACEMENT OF FIDUCIAL MARKER IN OLIGO-METASTATIC MEDIASTINAL LYMPH NODES FOR CYBERKNIFE STEREOTACTIC BODY RADIOTHERAPY: SAFETY AND FEASIBILITY

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Introduction. CyberKnife stereotactic body radiotherapy (SBRT) is a recognised treatment for oligo-metastasis of mediastinal lymph nodes. A radio-opaque fiducial marker (FM) placed within the target node using convex probe endobronchial ultrasound (CP-EBUS) bronchoscopy allows dynamic tumour tracking during the respiratory cycle for safe, accurate delivery of CyberKnife SBRT.

Aim. To describe the safety and feasibility of placing FM in mediastinal and hilar lymph nodes using a modified real-time CP-EBUS bronchoscopy technique.

Methods. A retrospective review was performed of all patients who underwent CP-EBUS guided placement of FM in thoracic lymph nodes for CyberKnife SBRT at Sir Charles Gairdner Hospital, Perth (2014-2019). Demographics, tumour aetiology, tumour/node location, outcomes and adverse effects were recorded. A 4x0.035 mm straight gold FM, front-loaded into a standard 21G TBNA needle, was inserted into the target lesion under real-time EBUS guidance.

Results. 10 patients (females 6; age 58 years [IQR 41-78]) underwent CP-EBUS guided FM placement in 13 central nodes (4R - 7; 10R - 2; 11R - 2; 7 - 1; 2R - 1). Colorectal carcinoma (n = 6) and renal cell carcinoma (n = 3) were the most common primary malignancy. Two FMs were placed in the target node in four cases; in the remaining nine cases, one FM was placed in target node. One patient had three separate FM placement procedures for three malignant nodes over a four-year period. In another patient, FM was inserted in two separate nodes during a single bronchoscopy sitting. Post-insertion, the FM was displaced in two patients before commencement of CyberKnife SBRT; In one patient, it was successfully replaced by repeating the procedure. No other immediate or late local/systemic complication was recorded. CyberKnife SBRT planning/ treatment was successfully completed for 12/13 malignant nodes.

Conclusion. CP-EBUS bronchoscopy guided FM placement in oligo-metastatic mediastinal lymph nodes for CyberKnife SBRT is safe and feasible.

TP 134

USE OF "ARTIFICIAL INTELLIGENCE" TO AID PULMONARY NODULE ASSESSMENT

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Introduction/Aim. Pulmonary nodules are frequent incidental findings and appropriate follow up should facilitate early diagnosis of malignancy while minimising negative sequalae of investigation. Radiologist assessment of computed tomography (CT) images of pulmonary nodules in conjunction with guidelines (e.g. Fleischner Society Guidelines; FSG) are used to determine management. This study assess the use of autonomous software to aid radiologist assessment of pulmonary nodules. Preliminary results are reported.

Methods. CT chest scans performed for pulmonary nodule surveillance between October and November 2018 were retrospectively identified from the Gold Coast University Hospital imaging database. Data from the initial radiologist report (RAD) was collected. All CT scans were analysed by the Philips Pulmonary Nodule Analysis® autonomous software. Radiologists reviewed both the CT and the software-generated results and created a second report (AIRAD). FSG-recommended follow up was calculated based on both reports.

Results. Scans were obtained from 20 patients who were 45% female (n = 9) and had a median age of 69 years (IQR 59-75 years). The largest nodule's mean maximum diameter was 6.8 mm (SD 3.3 mm) as assessed by RAD and 7.8 mm (SD 3.3 mm) by AIRAD ($P = 0.011$). There was 5 (25%) disagreements regarding the lobar location of the largest nodule between RAD and AIRAD ($P = 0.214$) and 4 (20%) disagreements between RAD and AIRAD about the presence of spiculation ($P < 0.001$). FSG-recommended follow up was different between RAD and AIRAD in 8 cases (40%; $P = 0.047$) and FSG-recommend follow up based on AIRAD was earlier in 7 of these cases.

Conclusion. This study provides evidence that use of autonomous software may alter the opinion of radiologists performing pulmonary nodule analysis and lead to different follow up suggestions than conventional radiology assessment.

TP 135

A SERIES OF UNFORTUNATE EVENTS: A CASE OF THROMBOTIC AND HAEMORRHAGIC COMPLICATIONS IN METASTATIC NON-SMALL CELL LUNG CANCER

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Introduction/Aim. Malignancy often causes a haemostatic imbalance resulting in an increased risk of both thrombotic and haemorrhagic complications. We present the case of a 61 year old woman with a background of rheumatoid arthritis and vascular disease who developed symptoms of acute cholecystitis and dyspnoea, found to be secondary to metastatic lung adenocarcinoma with malignant pleural effusion and gall bladder metastasis. She subsequently developed multiple thrombotic and haemorrhagic complications in succession including ST-elevation myocardial infarction, pulmonary embolus, marantic endocarditis and subarachnoid haemorrhage. We describe the difficult balance between thrombosis and haemorrhage in the context of autoimmunity, malignancy and underlying vascular disease.

TP 136

A CASE REPORT OF A FATAL PULMONARY TUMOUR EMBOLI

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Introduction/Aim. Pulmonary tumour emboli are rare and establishing the diagnosis antemortem is difficult. The prevalence of PTE is unknown. The widespread tumour emboli involving multiple levels of microscopic pulmonary vascular can lead to pulmonary HTN. The clinical presentation is usually non-specific with progressive dyspnoea and patients may have features of cor pulmonale. Most reported cases occur with breast, lung and gastric carcinoma.

Method, Results. Our patient deteriorated few days into his admission from acute severe hypoxic respiratory failure with severe pulmonary HTN and the diagnosis was made post-mortem. He was a 76 yr/Male who presented with gradually worsening dyspnoea with a low-grade temperature and CXR changes of right lower lobe pneumonia and left hilar prominence. His CT chest showed a left hilar mass with invasion into the main pulmonary artery and widespread ground glass changes. He was planned for a diagnostic bronchoscopy once he had recovered from his acute illness. However, he acutely deteriorated from severe hypoxic respiratory failure. He had a CTPA which showed widespread peripheral ground glass changes, no PE. His ECHO showed severe pulmonary HTN, with RSVP of 50mmhg. He required intubation for ventilation, however continued to deteriorate despite resuscitation attempts. The cause for deterioration was unclear and felt to relate to the tumour rather than pulmonary embolization and a limited post-mortem was performed. The limited post-mortem conducted confirmed findings of widespread pulmonary tumour emboli resulting in acute right ventricular strain and pulmonary HTN. There was vascular invasion of the tumour in the myocardium and liver. Immunohistochemistry was suggestive of squamous cell carcinoma of lung origin. ECHOCARDIOGRAM findings of significant RV dilation and dysfunction.

Apical 4 chamber

17/05/2019   02/06/2019
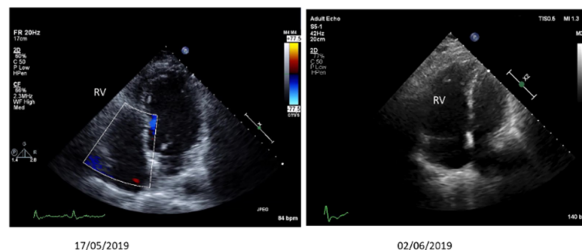
Histopathology showing pulmonary vascular involvement

Vascular invasion   Keratinising SCC
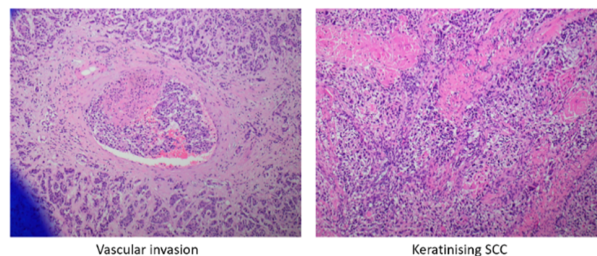
Conclusion. Pulmonary tumour embolization with hemodynamic compromise resulting in death is a rare complication of lung cancer. Microscopic pulmonary tumour embolism should be considered in differential diagnosis of unexplained dyspnoea in cancer patients. Treatment options are limited, with only some studies showing a response to TKI/chemotherapy.

Key words: Lung cancer, Pulmonary tumour emboli

TP 137

TREND OF LUNG CANCER REFERRALS AND EBUS PROCEDURES

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Introduction/Aim. The leading cause of cancer mortality is lung cancer and it is the fifth most common diagnosed cancer in Australia. Endobronchial ultrasound (EBUS) is a bronchoscopic technique that utilizes ultrasound to identify masses and nodes within the thorax. This allows for the diagnosis and staging in patients with suspected or proven lung cancers. Our aim was to investigate the trend of lung oncology, nodule and cancer clinic consultations and the relationship with the number of EBUS procedures performed.

Methods. Retrospective audit of the numbers of cases discussed at lung multidisciplinary meeting, lung oncology, lung nodule clinic consultations and EBUS procedures performed in a single Melbourne tertiary hospital between Feb 2017 to Sept 2019. The results were analyzed by yearly quartile (3 monthly).

Results. 1352 patients were discussed in Lung MDM, Median (quartile) = 129 (122 – 139), 786 patients were seen in Lung Oncology Clinic, 80 (68 – 89), 492 patients were seen in Lung nodule clinic. 50 (30 – 65) and 621 EBUS procedures were performed. 60 (55 – 65). The number of EBUS performed increased significantly with rising lung oncology attendances (P value = 0.04) using repeated measures ANOVA. Over the past 2 years, there was a 12% increase and 10% increase in the attendees to lung oncology outpatient, and increase of 25% and 12% of EBUS performed in the 2nd and 3rd quartile respectively.

Conclusion. EBUS is a vital tool in the diagnosis and staging of lung cancer. Increasing lung oncology clinic attendances have been paralleled by the number of EBUS procedures performed. This may be an important factor when considering resource allocation and planning in the future of lung cancer management.

Grant Support: Nil

TPL 011

EARLY DETECTION OF LOCALISED CHANGES IN LUNG FUNCTION FOLLOWING RADIATION THERAPY USING X-RAY VELOCIMETRY (XV)

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Introduction/Aim. Radiation pneumonitis (RP) is inflammation of the lung induced by high radiation dose associated with thoracic radiotherapy. Chronic RP can cause permanent damage, therefore early detection is essential. While global pulmonary function measures such as diffusing capacity of the lung for carbon monoxide (DLCO) are known biomarkers for RP, regional function measurements provide additional sensitivity that can enable earlier detection. Here, X-ray Velocimetry (XV), which quantifies spatial ventilation distribution throughout the breath, was used to compare local radiation dose with change of ventilation at over 10^4 locations within the lung.

Methods. XV was used to quantify lung function of patients receiving radiotherapy for various thoracic cancers. Patient data was collected pretreatment and 4- and 12-months post-treatment. Regional dose distribution used for planning was co-registered to XV-generated ventilation data, producing dose contour maps, allowing direct comparison of local ventilation changes with corresponding dose levels. DLCO, adjusted for blood haemoglobin concentration (DLCO-adj), was measured at each timepoint.

Results. Several patients had significant changes in ventilation throughout the study. In some cases, local changes were independent of dose magnitude, while in other cases they were dependent. In one case, ventilation heterogeneity (VH) increased from 59% pre-treatment to 67% 4-months post-treatment, however local ventilation changes were independent of radiation dose. DLCO-adj was stable, suggesting this patient did not develop RP. Conversely, another case showed a clear relationship between dose and lung function. This patient had significant VH pre-treatment (49%) which further increased post-treatment (VH = 68%). Notably, regions receiving higher radiation dose had larger decreases in ventilation 12-months post-treatment. DLCO-adj decreased from 61% to 46% expected, suggesting the increase in VH may be related to RP.

Conclusion. XV regional ventilation measurements are highly sensitive, as illustrated by their use for detecting both radiation-independent and radiation-dependent changes in lung function over time.

Grant Support: N/A

TPL 012

TELEMONITORING IN USERS OF LONG-TERM NON-INVASIVE VENTILATION: FEASIBILITY AND DETERMINING CLINICAL LIMITS

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Introduction/Aim. Accessing ventilator data remotely may allow identification of poor adherence, aberrant ventilator performance and clinical deteriorations in ventilator users. This is, however, associated with a potential increase in resource utilisation to manage and monitor large volumes of ventilator data, while there is currently no evidence of improved clinical outcomes. There is currently no normative data in stable patients on long-term ventilation. This study aims to determine the feasibility and utility of remote ventilator monitoring in a cohort of users of home non-invasive ventilation.

Methods. Single centre, prospective observational study, enrolling adults who are clinically stable on long-term non-invasive ventilation. Patients are switched to a ventilator with telemonitoring capabilities for two months. Ventilation settings are unaltered. Raw data are collected and stored using Philips Respironics' proprietary web-based platform, EncoreAnywhere. Raw xml data files were provided directly from Philips Respironics.

Results. Twenty-nine participants were recruited and raw data obtained for 15 of these. Of the 29, eight patients are awaiting final data collection. Four patients did not tolerate the new ventilator. Two patients had complete failure of data to upload and another four failed to upload in real time. The average daily usage across all participants has been 8.2 hours per day with an average coefficient of variance of 16%. The average minute ventilation was 8.2 litres/min with an average coefficient of variance of 7%. The average unintentional leak was 15 litres/min with an average coefficient of variance of 34%.

Conclusion. In a clinically stable population, several measures accessible remotely demonstrated significant variability. Technical challenges related to the reliability of remote uploads were also demonstrated. This initial study has demonstrated some of the challenges to the widespread use of telemonitoring of ventilator users.

Grant Support: Equipment support from Philips Respironics

TPL 013

RELATIONSHIP BETWEEN SMOKING STATUS AND POST-OPERATIVE COMPLICATION AFTER LUNG CANCER RESECTION SURGERY: FINDINGS FROM A MAJOR METROPOLITAN HOSPITAL IN MELBOURNE

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Introduction/Aim. There are many studies that show that smokers, whether current or reformed, do worse compared to never smokers in terms of post-operative pulmonary complications after lung cancer resection. There are, however, no published studies to date looking at this relationship in lung cancer resections performed in Australia. Post-operative pulmonary complications are linked to increased ICU admissions, longer length of stay, increased hospital mortality and poorer long-term survival. The primary aim of this study was to examine association between smoking and post-operative complications following lung cancer resection.

Methods. Retrospective analysis of the thoracic surgical database, looking at all patients who underwent lobectomy or pneumonectomy at the Austin Hospital for lung cancer from 1995 to 2018. Variables included demographic information, smoking status, respiratory function, type of lung cancer, type of surgery, staging, and complications.

Results. A total of 1013 patients were included for analyses. Most of them (60%) were males. Mean (±SD) BMI was 26.8 (5.2), and 40% of them (n = 374) were overweight (BMI 25.0-29.9). One-fifth of the patients (20%) were non-smokers, with 69% being current smoker or ex-smokers. One in two (49%) had COPD. Primary types of surgery included right upper lobectomy (29%), left upper lobectomy (22%), left lower lobectomy (14%) and right lower lobectomy (13%). More than half of the patients (53%) did not have any post-operative complications. In smokers and ex-smokers the respiratory complication rate was 26%, compared to 17% in non-smokers. Statistical analysis to follow.

Conclusion. This is the first study from an Australian centre describing the characteristics of those who have undergone surgical resection for lung cancer as well smoking status.

Grant Support: Nil

LUNG NODULE EVALUATION: AN AUDIT OF COMPLIANCE WITH FLEISCHNER GUIDELINE IN A LUNG NODULE CLINIC

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[1]*Austin Health*

Introduction/Aim. The evaluation of lung nodules may affect patient outcomes and healthcare costs. Guidelines for evaluating lung nodules for cancer exist, but little is known about how nodules are evaluated in a dedicated lung nodule service. International data shows poor compliance with international guidelines. Our audit will investigate the compliance with follow up of newly diagnosed lung nodules according to the Fleischner Society guidelines.

Methods. Retrospective analysis of the hospital's medical records, looking at all new patients who were seen at the Lung Nodule Clinic at Austin Hospital for pulmonary nodules from 1st of July 2017 to 31st December 2018.

Results. Two hundred and sixty patients were seen in our Lung Nodule Clinic from 1st of July 2017 to 31st December 2018. Hundred and three patients were excluded (not seen by respiratory physician (thoracic surgery or oncology), pleural effusions, mediastinal LNs only). As such, only 157 patients were included in the audit. Ninety-eight patients were male. The mean age was 66.6 years old. Thirty eight % were current smokers, 35% ex smokers and 27% non smokers. Most nodules were picked up incidentally (85%). The average nodule size was 19 mm. PET scan was performed prior to review in Lung Nodule clinic and were concordant with Fleischner guideline. Former smokers had higher risk (44%) of lung cancer compared with ex smoker (29%) and non smoker (14%). Compliance with the Flesichner guideline was high at 88%.

Conclusion. Our results show appropriate follow up recommendations by respiratory physicians in compliance with Fleischner guideline.

Grant Support:

CONVERSATIONS ABOUT PREVENTERS IN PHARMACY

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Introduction/Aim. Research shows that cost is an important factor in people's decisions about asthma medicines. Healthcare providers (HCPs) may be unaware that cost is an issue for their patients. Community pharmacists are well placed to assist with explaining or potentially reducing asthma medicine costs for patients. The aim of this study was to obtain input from pharmacists regarding: cost-related adherence issues with asthma medicines; opportunities for conversations with patients; and the suitability of proposed pharmacy-based resources to address adherence barriers, including cost, for asthma medicines.

Methods. Pharmacists took part in semi-structured interviews which were audio-recorded, de-identified and transcribed verbatim. Thematic content analysis was performed iteratively with each sequential interview.

Results. Interviews with six pharmacists (4 female) from diverse socio-economic regions in metropolitan Sydney, and ranging in practice experience from 4-15 years, revealed a number of emergent themes concerning script refilling and conversations about cost. Most pharmacies offered a script reminder service. Prescription refills were affected by medicine cost for patients on low incomes, access (location of pharmacy) and patient health literacy. Prescriptions were noted to be handled by pharmacy assistants, removing the opportunity for initial engagement between pharmacist and patient.

Cost conversations were influenced by the pharmacists' skills and comfort, and their perceived role regarding asthma management. Organisational factors such as commercial pressure to not reveal medicine cost until script handed out, and limited working relationships with general practitioners were evident barriers.

The proposed counselling resources were generally well received and pharmacists made suggestions for improvement such as providing a summary card.

Conclusion. Pharmacists felt confident to have conversations with their patients about asthma medicine costs but time, remuneration and situational issues need to be considered. Using tailored resources to facilitate conversations between patients and their HCPs, including their pharmacist, may enhance shared decision making around preventer treatment options.

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THE BENEFITS OF THE 'VILLAGE': A QUALITATIVE EXPLORATION OF THE PATIENT EXPERIENCE OF COPD IN RURAL AUSTRALIA

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Introduction/Aim. This study sought to explore patients' experiences of living with, and adapting to, COPD in the rural context. Specifically, our research question was 'What are the barriers and facilitators to living with and adapting to COPD in rural Australia?'

Methods. Qualitative, semi-structured interviews. Conversations were recorded, transcribed verbatim and analysed using thematic analysis following the consolidated criteria for reporting qualitative research (COREQ) guidelines. Patients with COPD, admitted to a sub-regional hospital in Australia were invited to participate in interviews between October and November 2016.

Results. Themes were identified that assisted with understanding of the barriers and facilitators to living with, and adapting to, COPD in the rural context. Four groups of themes emerged: *Internal Facilitators* (coping strategies; knowledge of when to seek help) and *External Facilitators* (centrality of a known doctor; health team 'going above and beyond'; and social supports) and *Internal/External Barriers to COPD self-management* (loss of identity, lack of access and clear communication, socio-cultural challenges), that were moderated by feelings of inclusion or isolation in the rural community or 'village.'

Conclusion. Our findings suggest that community inclusion enhances patients' ability to cope and ultimately self-manage COPD. This is facilitated by living in a supportive 'village' environment, and included a central, known doctor and a healthcare team willing to go 'above and beyond'. Understanding, or supplementing, these social networks within the broader social structure may assist people to manage chronic disease, regardless of rural or metropolitan location.

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PATIENTS' PERCEPTIONS OF PREVENTER REGIMENS FOR THE TREATMENT OF MILD ASTHMA

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Introduction/Aim. Guidelines recommend most mild asthma patients should receive inhaled corticosteroid-containing therapy to reduce severe exacerbation risk. This qualitative study explored patient perceptions/experiences of using one of two different preventer regimens.

Methods. Adults with mild asthma, taking only short-acting bronchodilators (Table), were randomized to twice-daily budesonide Turbuhaler plus as-needed salbutamol pMDI or as-needed budesonide-formoterol Turbuhaler in a 52-week open-label randomised controlled trial (Novel START-ACTRN12615000999538). Semi-structured interviews conducted after ≥10 months' treatment explored patient experiences and perceived treatment barriers/facilitators for their randomised fixed-dose (n = 39) or as-needed (n = 35) preventer regimen. Interviews were conducted until saturation by telephone, audio-recorded, transcribed and thematically analysed.

Results. Emergent themes depicted a range of barriers and facilitators for each regimen. USE BARRIERS: Themes specific to *Fixed-dosing* were "Treatment burden" i.e. twice-daily dosing, "Suboptimal adherence" e.g. due to forgetting or symptom-free periods, and "No perceivable treatment effect" e.g. in comparison to reliever therapy. *As-needed*-specific themes were "Concern about relief effectiveness" i.e. combination inhaler versus previous conventional reliever. Barriers common to *both* regimens were "Poor preventer medication effectiveness" e.g. no perceived improvement in symptoms, and "Low necessity for preventer medication" e.g. infrequent symptoms.

USE FACILITATORS: *Fixed-dosing*-specific themes were "Establishing medication routines" e.g. linking preventer use to daily behaviours, "Motivating attitudes" e.g. feeling of managing asthma better; and "Familiar/effective reliever". *As-needed*-specific themes were "Symptom-driven use" e.g. fits lifestyle and "Benefits of 2-in-1 inhaler" e.g. provides coincidental prevention with symptom relief. Themes common to *both* regimens were "Effective treatment" e.g. reduced symptoms, "Treatment safety" e.g. fewer side effects compared to conventional reliever therapy, and "Doctor-patient relationship" e.g. trust in doctor's prescribing.

Conclusion. Patients perceived similar symptom frequency and lower treatment burden with as-needed budesonide-formoterol versus maintenance budesonide+salbutamol, but greater concern about reliever effectiveness. Shared decision-making is recommended to increase acceptability of, and include patient preferences in, treatment choice for mild asthma.

Interviewee baseline characteristics	As-needed* n = 35	Fixed dosing[†] N = 39
Female	66%	44%
Age, years (mean: range)	43.5: 18.7-74.4	37.7: 19.0-69.0
Ethnicity, Caucasian / Other	75% / 25%	79% / 21%
Asthma Control Questionnaire 5-item score (mean ± SD) [‡]	1.09 ± 0.55	1.12 ± 0.71
FEV1 % predicted (mean: range)	88.5: 61-121	93.1: 65-128
≥1 Severe exacerbation in previous year	0%	8%
Ever prescribed inhaled corticosteroid[†]	71%	64%

*As-needed (budesonide-formoterol); [†]Fixed dosing (twice daily ICS plus as-needed salbutamol); [‡]Range 0-6; [§]Patients were not permitted to have taken inhaled corticosteroid in the 3 months prior to enrolment.

SLEEP HEALTH IN PEOPLE WITH ASTHMA: A QUALITATIVE STUDY

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Introduction/Aim. Emerging research suggests that people with asthma may have compromised sleep health, beyond that attributable to nocturnal asthma symptoms or the effects of asthma medications. This study aimed to understand the sleep experiences, and potential gaps in sleep management, in people with asthma.

Methods. Participants were recruited, using convenience sampling, in metropolitan Sydney. In depth, semi-structured interviews were conducted with 14 patients with self-reported doctor-diagnosed asthma, either face to face (n = 5) or via telephone (n = 9). Interviews explored patients' asthma and sleep experiences, and were audio recorded, transcribed verbatim and analysed using a framework approach to identify key themes.

Results. Four key themes emerged from analysis of interviews with 14 participants (54% female; 70% <35 years old; 46% Not well controlled on Asthma Control Questionnaire). "Sleep experience": poor sleep was often attributed to asthma in those with poorly controlled disease but attributed to factors outside asthma in those with well-controlled disease. "Living with Symptoms": poor sleep resulted in daytime functional deficits for interviewees and disruptions to their bed-partners. "Prioritizing sleep": Sleep disturbance was considered a low priority and less important than health issues like asthma. "Help Seeking for Sleep Problems": deterrents to help-seeking included the low priority of sleep problems and a concern that sleeping pills with unpleasant side effects may be prescribed. When doctors were rarely consulted about sleep, asthma care was given precedence over exploration of wider lifestyle factors which might facilitate strategies for improving sleep.

Conclusion. People with asthma experience night-time disruptions that they do not exclusively associate with their asthma. Sleep health is under-prioritised and people with asthma tend not to seek help for sleep problems. Further research is needed to explore the complexities of the sleep-asthma relationship. The clinicians' perspectives should also be considered as valuable input into the sleep and asthma health of patients.

Grant Support: None

CONCORDANCE OF LARYNGOSCOPY AND DYNAMIC COMPUTERISED TOMOGRAPHY LARYNX TO DIAGNOSE VOCAL CORD DYSFUNCTION

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Introduction/Aim. Vocal cord dysfunction (VCD) is characterised by inspiratory closure of the vocal cords leading to dyspnoea. Gold standard for diagnosis is laryngoscopy. In our previous studies (Low et al, AJRCCM 2011), we validated utility of dynamic computerised tomography (CT) larynx as a diagnostic tool for VCD. However, concordance between laryngoscopy and CT larynx was only demonstrated in healthy individuals.

Methods. Laryngoscopy and CT larynx were conducted sequentially in patients with suspected VCD. Video images obtained by laryngoscopy were compared to reconstructed virtual images obtained by dynamic CT. The diagnosis of VCD was first made by laryngoscopy and verified by implementation of a diagnostic algorithm developed and validated by our group (Low et al 2011). We illustrate concordance between the methodologies with and without VCD.

Results. Nine patients were analysed (5 female, 55%) with mean age of 49.5 years(SD18.4). Five patients were diagnosed with VCD. The concordance rate of laryngoscopy and dynamic CT was 100% for patients with or without VCD. We present the following cases.

Patient A (27 year old female) presented with dyspnoea, dysphonia and wheeze. Laryngoscopy and dynamic CT larynx were conducted sequentially for suspected VCD, findings for both were negative for VCD (Fig 1A, B – shown on poster). Normality was confirmed on CT diagnostic algorithm (Fig 1C). Nasopharyngeal swab was positive for respiratory syncytial virus.

Patient B (53 year old female) was referred to the VCD multidisciplinary team clinic. Her presenting symptoms were dyspnoea with dysphonia. CT larynx and laryngoscopy performed sequentially were both indicative of VCD (Figure 2A, B – shown on poster). VCD was confirmed on CT diagnostic algorithm (Fig 2C).The patient was referred for speech therapy.

Conclusion. Concordance of laryngoscopy with CT imaging validates dynamic CT larynx against current diagnostic gold standard – laryngoscopy. Dynamic CT can facilitate diagnosis of VCD, particularly when there is lack of access to timely laryngoscopy.

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A NOVEL METHODOLOGY FOR DIAGNOSIS OF VOCAL CORD DYSFUNCTION USING 320-SLICE DYNAMIC VOLUME CT LARYNX AND TRACHEA

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Background. Vocal cord dysfunction (VCD) is characterized by excessive inspiratory closure of the vocal cords leading to breathlessness. Laryngoscopy is the gold standard diagnostic test but cannot be quantified and may be false positive. Recent advent of 320-slice multi-detector CT (320-MDCT) with high temporal resolution as well as isotropic multiplanar and 3-D reconstruction capabilities can provide dynamic assessment of laryngeal and tracheal movement. The aim of this study was to illustrate development of technical and scanning parameters for CT during initial application of this novel imaging modality.

Methods. An imaging methodology was devised in patients with suspected VCD referred for dynamic 4-dimensional (4-D) CT. Patients who were unable to lie supine were excluded. Patients were asked to breathe in 'normal' manner. Dynamic volume CT of the larynx and trachea was done over 16 cm in the Z-axis over 6 seconds. Multi-planar images of 2 mm thickness and 3-D images using volume rendering were viewed in cine mode. Lateral diameter of the vocal cords was measured in axial views using electronic calipers and normalized to tracheal diameter. A diagnostic algorithm was applied (Low et al, AJRCCM, 2011) to generate a curve representing vocal cord width/aperture over time.

Results. Dynamic vocal cord, laryngeal and tracheal imaging by 4-D MDCT was feasible. The methodology allowed evaluation of vocal cord movements that could be accurately measured during both inspiration and expiration. Laryngoscopy video images and reconstructed CT images were compared and shown to be concordant (see images on poster). Imaging matched dynamic curves generated by the algorithm (see poster).

Conclusion. MDCT is a non-invasive and novel diagnostic tool for assessment of VCD. VCD can be accurately quantified whilst also excluding other disorders (excessive dynamic airway collapse, vocal cord paresis, tracheal stenosis, extrinsic compression). Studies to assess VCD in acute asthma and other conditions are feasible.

BRINGING EDUCATION TO THE PEOPLE

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Introduction. Chronic obstructive pulmonary disease (COPD) is the third most common respiratory condition among the Aboriginal and Torres Strait Islander (ATSI) population and is responsible for up to two thirds of ATSI respiratory deaths.

Western Sydney Local Health District (WSLHD) has one of the largest ATSI populations in Australia (4.6% as compared with the national average of 2.8%)

Acknowledging the burden of disease, the Greater Western Aboriginal Health Service (GWAHS) and WSLHD came together to deliver an Lung Health Education Day for patients with COPD.

Aim. To evaluate the acceptability of a Lung Health Education Day for ATSI people.

Methods. Patients of the GWAHS with a documented history of COPD were invited to attend the Lung Health Education Day on site, at the medical centre. Education sessions on What is COPD, COPD medications, The importance of exercise and pulmonary rehabilitation, Diet and swallowing and Smoking cessation were provided by WSLHD employees. Participants were provided with free spacer devices for use with pressurised metered dose inhalers and a range of nicotine replacement therapy based on individual assessment.

Results. 7 patients attended (58% of those invited). The education day was informal, participants interacted with each other sharing stories. Of the 7 participants, all required individualised inhaler device education to optimise drug delivery. Participants were all current or recently quit smokers and were also provided with individualised counselling to optimise success with smoking cessation.

Participants reported that following attendance, they felt 'more confident' (71%) and 'informed' (100%) in managing their COPD. All felt comfortable (100%) attending the day.

Conclusion. A Lung Health Day for ATSI was acceptable to attendees and provided information regarding COPD. The next step is to roll out the program more formally and evaluate long-term outcomes including maintenance of inhaler technique, continued smoking cessation and participation in pulmonary rehabilitation.

Grant Support: Nil

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PREVALENCE OF MALNUTRITION, LOW BMI AND LOW FFMI IN PATIENTS WITH COPD REFERRED TO THE WESTMEAD BREATHLESSNESS SERVICE

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Introduction/Aim. Chronic obstructive pulmonary disease(COPD) is a major cause of disability and poor quality of life. Malnutrition is an important, but often overlooked, factor in COPD. We aimed to determine the prevalence of malnutrition and to describe anthropometric and bioimpedance(BI) values of patients referred to the Westmead Breathlessness Service(WBS).

Methods. We conducted a retrospective chart review of 51 outpatients referred to the WBS between March 2016 and November 2018. Participants referred to the WBS have at least moderate COPD (FEV1/FVC < 0.7; FEV1 < 60% predicted) and Modified Medical Research Council Dyspnoea scale(mMRC) ≥ 2. Demographic and anthropometric data were collected for all participants. BI data was collected for 45 participants. Participants were screened for malnutrition using the Mini-Nutritional Assessment-Short Form(MNA-SF) which categorises participants as either malnourished, at risk of malnutrition or well nourished. Body mass index(BMI) was calculated and was regarded as low if <18.5gk/m^2(age < 65 years) or < 22 kg/m^2(≥65 years). Fat free mass index(FFMI) was calculated and regarded as low if <16 kg/m^2 for males or < 15 kg/m^2 for females. Data was analysed using Microsoft Excel and is reported as mean ± SD or median ± IQR as appropriate.

Results. Participants comprised 25 females and 26 males with a mean age of 71 ± 8.27 years, moderate to very severe COPD (mean FEV_1 0.72 ± 0.23 L (29.06 ± 8.65% predicted), mean FEV_1/FVC 0.35 ± 0.11) and severe breathlessness (mMRC median 3 ± 0.5). Malnutrition screening revealed 72% were either malnourished(29%) or at risk of malnutrition (43%) with 28% well nourished. Thirty-one percent had low BMI and 27% had low FFMI.

Conclusion. Almost three quarters of patients referred to WBS were either at risk of malnutrition or malnourished while nearly one third had low BMI and low FFMI. Adding MNA-SF to BMI and FFM assessment may indicate patients in need of dietetic intervention prior to significant weight and/or muscle loss. A prospective study evaluating nutrition intervention with WBS is underway.

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ACCURATE PCD DIAGNOSIS THROUGH IMMUNOFLUORESCENCE

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Introduction/Aim. The current 'gold standard' approach for definitively diagnosing Primary Ciliary Dyskinesia (PCD) is through the use of transmission electron microscopy (TEM). Emerging PCD cases have been reported where patients with an overwhelming clinical phenotype of the disease display normal TEM ciliary ultrastructure resulting in false negative diagnosis. These cases, estimated to account for up to 30% of total PCD cases, are due to subtle defects that are beyond the detection limit of TEM caused by the absence of certain key ciliary proteins. The Victorian Diagnostic Service for PCD recently employs immunofluorescence (IF) technique complementing established approaches to achieve more accurate diagnosis of complex cases.

Method. Brushing of the patients' inferior nasal turbinate are performed for sample collection. Samples are cultured using ALI method for several weeks, and assessed for cilia beating pattern (using high speed video microscopy), ciliary ultrastructure (TEM) and the presence of ciliary proteins (IF).

Results. 3 patients with complex history were seen at the service between March 2018 and March 2019. All patients were presented with non-seasonal ongoing wet cough, rhinosinusitis and recurrent otitis media. Additionally, Pt#1 has 4 sets of grommets and Pt#3 required O_2 immediately after birth despite born at term. TEM assessments of the ciliary cross-sections on all patients appeared unremarkable despite high speed video microscopy showing a gross immotile ciliary beating pattern. Extensive IF analyses showed a loss of DNAH11 protein in all patients.

Conclusion. Ciliary ultrastructural defects caused by mutations of certain ciliary proteins cannot be detected using conventional TEM. Immunofluorescence offers complementary approach to definitely diagnose complex PCD cases and should be included as part of the diagnostic work up for PCD.

Key Words. Primary Ciliary Dyskinesia diagnosis, DNAH11, immunofluorescence

UTILITY OF GUIDELINES AND RECOMMENDATIONS IN THE CLINICAL ASSESSMENT OF BRONCHIECTASIS IN REMOTE COMMUNITIES OF THE TOP END NORTHERN TERRITORY OF AUSTRALIA

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Introduction/Aim. In high-income countries including Australia, bronchiectasis is being increasingly recognised as a major contributor to chronic respiratory morbidity, more so in less affluent populations such as remote and regional communities in the Northern Territory (NT) of Australia. However, there is sparse knowledge in the usefulness of recommended guidelines in the clinical assessment among adult patients with bronchiectasis living in the remote communities.

Methods. In this is a retrospective study we evaluated whether diagnostic, monitoring and investigative standards are being met in patients with bronchiectasis in a remote community at NT visited by the specialist respiratory service from the Royal Darwin Hospital (RDH). The standard was assessed as per the recommendation of the Thoracic Society of Australia and New Zealand (TSANZ).

Results. Of the 147 patients, bronchiectasis was the primary diagnosis in 7 (4.8%) and secondary diagnosis in 19 (12.9%). In 23/26 (88%), 20/26 (77%), 11/26 (42%), 23/26 of patients with bronchiectasis had a chest CT, spirometry, trans-thoracic echocardiogram chest X-ray within the last 5 years respectively.

Conclusion. The overall assessment of patients with bronchiectasis as per the guidelines of TSANZ appears to be satisfactory in this study cohort. However, the usefulness of this guidelines and recommendations in other remote communities with less resources will be challenging that may need more specific or modified guidelines in this population.

SCREENING AND TREATMENT OF LATENT TUBERCULOSIS INFECTION IN NORTH QUEENSLAND: A 12 MONTH REVIEW

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Introduction/Aim. Identifying and managing latent tuberculosis (LTB) infection has a key role in the elimination of *Mycobacterium tuberculosis*. The Queensland Health Management of Latent TB Guidelines recommend testing with the intention to treat. Thus, the primary objective of this audit is to characterise the population screened and offered treatment for LTB.

Methods. We performed a review of all cases referred to the Townsville Tuberculosis Control Unit for LTB screening from 1 January to 31 December 2018. Source data was that collated routinely for the screening service.

Results. 958 individuals from 63 countries were referred for screening. 62.4% (n = 598) were female and 47.4% (n = 454) were Australian-born. The largest group (n = 409, 42.7%), were contacts of people with active tuberculosis. Healthcare students (n = 223) and healthcare workers (n = 76) together accounted for a further 31.2%. Approximately one-fifth (n = 202) were refugees.

Overall, 26.7% (n = 256) tested positive for LTB. Of these, 64.5% (n = 165) were referred for medical officer review and 43.0% (n = 110) went on to be offered treatment. 68.2% of these (n = 75) accepted treatment. Contacts comprise 44.1% of those offered treatment, followed by refugees (36.0%) and healthcare workers or students (17.1%). 11.4% (n = 19) were not offered treatment with the remainder yet to be seen or lost to follow up. 23.8% (n = 61) were referred directly to a chest xray surveillance program, and 10.5% were deemed to require no further follow up. 68.9% (n = 660) tested negative for LTB.

44.7% (n = 34) completed therapy. 19.7% (n = 15) of those who commenced treatment did not complete therapy. A significant proportion (n = 37, 14.5%) of LTB positive patients were lost to follow up.

Conclusion. While 43.0% of those screened positive for LTB were offered treatment, the high proportion of patients referred directly to a chest xray surveillance program or no follow up reflects suboptimal adherence to the Guidelines. Factors affecting follow up and treatment decisions could be further assessed.

EVALUATION OF HEALTH-RELATED QUALITY OF LIFE IN IPF: A SYSTEMATIC REVIEW AND META-ANALYSIS

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Introduction/Aim. Health related quality of life is an important endpoint in research and clinical management of IPF. Our study conducted a comprehensive review of existing literature and sought to assess how IPF affects HRQL and which instruments have been used in the assessment.

Methods. Databases were searched up to July 5, 2019. Data extraction was performed using pre-designed forms. A narrative synthesis approach was used to report results of the systematic review and a random effects model was used for the meta-analysis. A leave-one-out sensitivity analysis was performed, and a trim and fill method was used to assess publication bias.

Results. The review included 121 studies. The St George's Respiratory Questionnaire (SGRQ), Short Form 36 (SF36) and EuroQoL (EQ5D) were the most used instruments to measure HRQL. Standardised mean scores (95% confidence interval) for these instruments were as follows: SGRQ total score: 43.9 (42.0,45.8); SF36 physical component score (PCS): 37.2 (35.0,40.0); SF36 mental component score (MCS): 50.4 (48.7,52.1); and EQ5D utility: 0.7 (0.7 - 0.8). Analysis of standardised means for both SGRQ and SF36 confirmed worse scores in physical health domains as compared to mental health domains.

Conclusion. The results of the meta-analysis indicated that IPF negatively affected HRQL, mostly impacting the physical health domains. This study also established that a wide variety of instruments are used to evaluate HRQL and suggests that to improve comparability across studies, a standardised approach to the measurement of HRQL as a treatment outcome or endpoint for IPF, is important.

LUNG HEALTH IN THE SOLOMON ISLANDS

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Introduction/Aim. The spectrum of illness in the Solomon Islands is changing from communicable to non-communicable disease. Despite a total population of more than 600,000 people on over 900 islands, there is little data on the prevalence of lung disease in the Solomon Islands. We sought to identify the prevalence of obstructive lung disease in Gizo, Solomon Islands as well as risk factors and current management practices.

Methods. A single centre, cross-sectional study was conducted in Gizo, Solomon Islands. A random sample of the population underwent assessment with data collected on age, BMI, medical history, medications, smoking and wood-fire exposure. Spirometry was performed on each patient (including pre- and post-bronchodilator).

Results. 104 patients were assessed during the study period. The mean age was 46.9 years and 58% were female. Average BMI was 29.4. Current smoking rates were high (24.0% overall, 34.1% male, 16.7% female) as was regular (>10 h/week) exposure to indoor/enclosed wood fire ovens (65.0% female, 32.6% male). The prevalence of obstructive spirometry was 11.6% overall (13.5% female, 9.3% male) with reversibility seen in 6.3% of cases. Only 5 patients were on Ventolin and 2 patients on ICS.

Conclusion. There is a high burden of obstructive lung disease in the Solomon Islands. While much of this is attributable to high smoking rates, exposure to wood fire ovens remains an important contributor. Despite this, there is significant under-prescribing of inhaler medication.

INCIDENCE OF IDIOPATHIC PULMONARY FIBROSIS IN PEOPLE WITH TYPE 2 DIABETES: THE FREMANTLE DIABETES STUDY

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Introduction/Aim. Studies investigating the association between diabetes and idiopathic pulmonary fibrosis (IPF) have used administrative data, routinely collected clinical information or cohorts from tertiary centres. We estimated the incidence of IPF in a well-characterized community-based cohort of people with type 2 diabetes compared with a matched cohort without diabetes.

Methods. The Fremantle Diabetes Study (FDS) Phase I type 2 diabetes cohort and four randomly-selected, age-, sex- and postcode-matched individuals without diabetes were followed through the Western Australian Data Linkage System for hospitalisation for/with and death from/with IPF from study entry (1993-6) until end-2017. Incidence rates (IRs) and IR ratios (IRRs) were calculated. Cox regression models adjusting for age, sex and co-morbidities were generated to ascertain the cause-specific (cs) hazard ratios (HR) for incident IPF by type 2 diabetes status.

Results. Mean age of the pooled cohorts was 64 years (SD 11.2) and 49% were male. 8 participants with prevalent IPF were excluded. Mean follow-up was 16.6 (SD 7.6) years, during which 17 (1.3%) with type 2 diabetes and 57 (1.1%) without diabetes developed incident IPF. This equates to IR of 90.6 (95% CI 52.8-145.1) and 64.7 (95% CI 49.0-83.8) per 100,000 person-years respectively. The crude IRR for IPF in people with type 2 diabetes compared to those without diabetes was 1.40 (95% CI 0.76-2.44; $P = 0.22$). The cumulative incidence of IPF for people with type 2 diabetes compared to no diabetes with age as the time line was marginally higher(Figure 1). After adjusting for confounders, type 2 diabetes was associated with a csHR for IPF of 1.43 (95% CI 0.83-2.47).

Conclusion. In a cohort of community-based individuals with type 2 diabetes, few developed IPF during follow-up, due partly to the competing risk of death from other causes. With more intensive cardiovascular and diabetes management, it is possible that greater rates of IPF will emerge in future.

Figure 1. Cumulative incidence of idiopathic pulmonary fibrosis (IPF) stratified by type 2 diabetes status
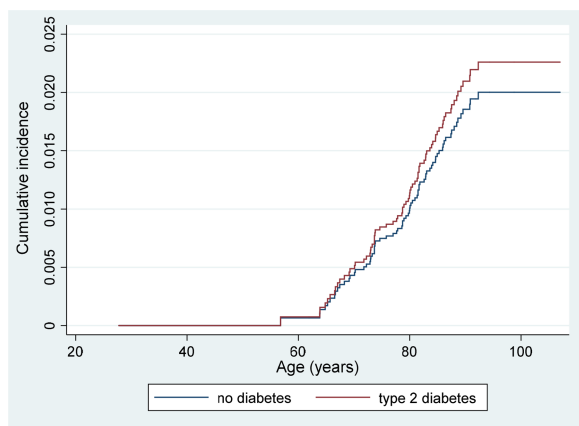
LUNG FUNCTION TRAJECTORIES FROM CHILDHOOD TO ADULTHOOD IN THE RAINE STUDY

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Introduction/Aim. Early lung function predicts later lung function and it has been shown that different trajectories exist. Genetic and environmental factors can alter baseline lung function resulting in trajectories that reflect impaired lung health. The aim of this study was to characterize lung function trajectories in the Raine participants and to investigate early-life predictors related to the low lung function trajectories.

Methods. This analysis included 2099 participants recruited from the Western Australian Pregnancy Cohort (Raine) study. Lung function trajectories for FEV_1 and FVC (z-scores) measured at 5,13 and 23 years of age were identified using a finite mixture model through group-based trajectory modelling. Associations between the trajectories and predictors was evaluated by Chi-square test. Multivariable analysis for childhood and parental risk factors was assessed using multinomial logistic regression.

Results. We identified three potential trajectories of FEV_1 and FVC. For FEV_1, 8.9% (n = 174) of the participants was assigned to the lowest trajectory, 81.23%(n = 1705) to the average trajectory and 10.48% (n = 220) to the highest. For FVC, 4% (n = 83) of the participants was assigned to the lowest trajectory, 88.1% (n = 1849) to the average trajectory and 8% (n = 167) to the highest. The table below shows the association between early-life factors and the trajectories identified.

Conclusion: We identified a group of individuals with persistently low lung function trajectories.

Childhood asthma, wheeze, low respiratory tract infections, atopy in the children and parents and mother smoking appeared to be important factors in determining lower lung function trajectories.

THP-1 DIFFERENTIATED MACROPHAGES INGEST SILICA WITH NO LOSS OF VIABILITY AS A MODEL OF THE INITIATION OF SILICOSIS

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Introduction & Aims. Silicosis, caused by inhalation of crystalline silica, has recently emerged as an epidemic of occupational lung disease in Australia. *In-vitro* assays to study disease processes are required for assessment of novel therapies. The aim of this study was to establish assays to measure silica ingestion by macrophages, and the potential pro-fibrotic effects of mediators released from these cells.

Methods. THP-1 monocytes were differentiated into macrophages, before treatment with silica (1-100 μg/mL) for up to 72 hr. Cell-Titer Glo 2.0 viability assays were performed. Silica particles in fixed macrophages were counted using polarizing microscopy. Collagen gel contraction assays were performed using primary human lung fibroblasts as an indirect assay of fibrosis. Changes in gel areas were measured over 72 hr after treatment with TGF-β or conditioned media (CM) from silica-treated macrophages.

Results. Silica did not reduce macrophage viability. Concentration-dependent ingestion of silica particles was evident. For 100 μg/mL silica, $57 \pm 14\%$ cells contained silica at 1-18 particles/cell (n = 3). Contraction of fibroblast gels was time- and cell-density dependent, with 1.25×10^6 cells/gel decreasing gel area by $41 \pm 5\%$ at 72 hr (n = 4; $P < 0.0001$). TGF-β or CM from silica-treated macrophages did not increase gel contraction.

Conclusion. An *in vitro* assay measuring the initiation of silicosis in macrophages was established. Further studies are required to optimise gel contraction assays since the lack of effect of TGF-β1 on fibroblast-mediated contraction was unexpected. Defining levels and identities of pro-fibrotic or other mediators released from silica-treated macrophages may define therapeutic targets to oppose progression of silicosis.

THE EFFECT OF IN UTERO EXPOSURE TO DIESEL EXHAUST PARTICLES ON THE POST-NATAL GROWTH AND IMMUNE CELL POPULATIONS

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Introduction/Aim. Air pollution is responsible for millions of deaths worldwide each year. Epidemiological and experimental studies have consistently shown a link between *in utero* exposure to air pollution and impaired post-natal health. One possible explanation for this is that exposure to air pollution in early life alter immune development. The aim of this study was to determine whether *in utero* exposure to diesel exhaust particles (DEP) alters somatic growth and immune development.

Methods. Eight-week-old pregnant C57BL/6J were exposed DEP intranasally in saline or saline alone at gestational days 7.5, 12.5 and 17.5. When offspring were 4 weeks post-natal age weight and length were measured. Mice were euthanised and spleen immune cell T cell populations (CD4+, CD8+ and CD4 + CD25+) were quantified by flow cytometry.

Results. *In utero* exposure to DEP did not alter weight or length in male (weight, $P = 0.6$; length, $P = 0.3$) or female (weight, $P = 0.7$; length, $P = 0.3$).. However, *in utero* exposure to DEP increased the percentage of CD4 T cells in the spleen ($P = 0.04$) while, decreasing the percentage of CD8 in the spleen ($P = 0.02$) in male mice. In contrast, in female offspring there was no effect of DEP exposure on T cell sub-populations ($P > 0.3$).

Conclusion. Exposure in utero to DEP did not alter somatic growth; however, *in utero* exposure to DEP did alter immune development characterised by altered ratios of CD4 and CD8 T cells; particularly in male mice. This suggest that offspring who are exposed *in utero* to an air pollutant such as DEP may have altered immune responses to post-natal stimuli and that the response is sex dependent.

	FEV$_1$				FVC			
	Low vs Average		Low vs High		Low vs Average		Low vs High	
Variables	**RRR (CI)**	***P*-value**	**RRR (CI)**	***P*-value**	**RRR (CI)**	***P*-value**	**RRR (CI)**	***P*-value**
Asthma ever	1.56(1.02-2.36)	**0.041**	1.97(1.11-3.47)	**0.020**	0.86(0.45-1.66)	0.660	0.77 (0.36-1.67)	0.513
Wheeze at age 5	1.47(0.96-2.24)	0.074	1.87(1.05-3.30)	**0.032**	1.02(0.55-1.93)	0.940	0.85 (0.40-1.78)	0.658
Eczema at age 5	1.38(0.92-2.08)	0.121	1.49(0.87-2.54)	0.145	0.89(0.47-1.70)	0.732	0.93 (0.44-1.95)	0.839
Allergies at age 5	1.28(0.71-2.32)	0.415	2.28(0.95-5.49)	0.066	2.08(0.99-4.38)	0.053	3.63 (1.27-10.3)	**0.016**
LRI in the first year	1.44(0.96-2.16)	0.075	1.73(1.00-2.98)	**0.049**	0.94(0.51-1.76)	0.858	1.10 (0.53-2.32)	0.794
Parental Asthma	1.49(0.82-2.70)	0.188	1.91(0.97-3.80)	0.063	1.74(0.81-3.74)	0.158	2.14 (0.90-5.08)	0.085
Parental Hay fever	0.87(0.59-1.28)	0.470	0.48(0.29-0.80)	**0.005**	0.74(0.43-1.28)	0.285	0.52 (0.27-1.00)	**0.050**
Mother Smoked until age 5	1.19(0.84-1.70)	0.331	1.69(1.06-2.68)	**0.026**	0.95 (0.57-1.59)	0.856	1.14 (0.62-2.10)	0.663

PYRITE CONTENT IS NOT ASSOCIATED WITH THE CYTOTOXIC OR INFLAMMATORY POTENTIAL OF COAL PARTICLES

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Introduction/Aim. As a result of the recent increase in reported cases of Coal Workers' Pneumoconiosis (CWP) in Australia, it is important to understand factors that contribute to the risk of CWP in order to prevent disease. International studies have suggested that the pyrite content of coal dust is a key determinant of CWP risk. However, this has not been addressed in the Australian context. The aim of this study was to determine whether there is a relationship between coal pyrite content and the inflammatory response in human lung cells *in vitro*.

Methods. A549 cells (alveolar epithelial cells), THP-1 derived macrophages and CRL-900 cells (fibroblasts) were exposed to one of 10 Australian coal particles (0 – 200 µg/mL) for 24 hours. For A549 and THP-1 cells, cytotoxicity and cytokine production were assessed by LDH assay and ELISA respectively. For the CRL-900 cells, proliferation (WST assay) and soluble collagen production were assessed. The size of the coal particles (electron microscopy), pyrite content and release of bioavailable Fe in simulated lung fluids were also quantified.

Results. Coal particles caused cytotoxicity and increased production of IL-8 in A549 and THP-1 cells. The particles also caused increased proliferation and collagen production in CRL-900 cells. There was no association between the pyrite content of the coals and any of these outcomes ($P > 0.24$). There was a positive association between Fe release and IL-8 production ($P = 0.01$), however, this was limited to A549 cells.

Conclusion. While bioavailable iron impacts on the epithelial cell response, this does not seem to be directly related to the pyrite content of the coal. Similarly, given this was only observed in one cell type, of the myriad of cells involved in CWP, it is unlikely to be the sole driver of CWP risk.

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COMPARISON OF PULMONARY ARTERIAL HYPERTENSION RISK ASSESSMENT MODELS USING THE PULMONARY HYPERTENSION SOCIETY OF AUSTRALIA AND NEW ZEALAND REGISTRY COHORT

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Introduction/Aim. Risk prognostication models are used in pulmonary arterial hypertension (PAH) to guide targeted treatment. The optimum model is yet to be determined. The aim of this study was to assess the performance of three contemporary risk models in an external cohort of PAH patients from the Pulmonary Hypertension Society of Australia and New Zealand (PHSANZ) registry.

Methods. The REVEAL 2.0 three-category (2019), French low-risk criteria (2017) and Swedish PAH Register (2017) models were applied to idiopathic, drug and heritable PAH patients with prospective follow up data from the PHSANZ registry ($n = 547$). For both models, Kaplan-Meier survival was estimated for each risk strata and discrimination was assessed using Harrel's c-statistic. **Results.** There were 547 eligible patients. With adjustment for missing variables, the REVEAL 2.0 and French low-risk criteria models performed similarly, with c-statistic 0.705 (95%CI 0.657-0.753; n = 514) and 0.707 (95%CI 0.662-0.753; n = 400) respectively. The SPAHR model c-statistic was 0.575 (95%CI 0.530-0.620; n = 544). REVEAL 2.0 three-category survival strata clearly separated (all risk comparisons $P < 0.001$). In the French model, patients maintaining 3-4 low risk criteria had distinctly superior survival to those with fewer criteria ($P < 0.001$). In the SPAHR model, high risk survival overlapped with low and intermediate risk strata. **Conclusion.** The REVEAL 2.0 and French low-risk risk prognostication models demonstrate similar discrimination of risk in a large external cohort of patients with PAH. The SPAHR model performed poorly. Choice of model may depend on availability of individual prognostic parameters and clinician familiarity. Prospective validation of models is needed.
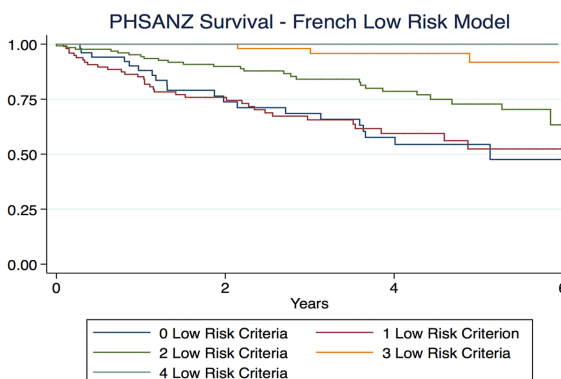
PHSANZ Survival - French Low Risk Model

THE INTERSTITIAL LUNG DISEASE MULTI-DISCIPLINARY MEETING: A RETROSPECTIVE 12-MONTH REVIEW OF PRACTICE AT A TERTIARY HOSPITAL IN PERTH, AUSTRALIA

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Introduction/Aim. Interstitial lung disease (ILD) is a heterogeneous group of respiratory diseases manifesting in inflammation and/or fibrosis of the lung interstitium as a consequence of many potential aetiologies. Accurate diagnosis is pertinent with the availability of survival enhancing anti-fibrotic agents with a focus on utilising ILD multi-disciplinary meetings (MDM) to provide expertise and improve diagnostic confidence. Basing standards on the TSANZ position statement on ILD MDMs (Prasad et al) published in 2017, we measure our practice at Fiona Stanley Hospital, WA.

Methods. A retrospective review of MDM outcome proformas from 20 consecutive meetings between July 2018 and June 2019 was performed. Collated data included patient demographics, MDM attendees, consensus diagnosis with diagnostic confidence and recommended management. Note was made of the referrer diagnosis and available investigations (autoimmune serology, CT imaging, pulmonary function tests +/- biopsy).

Results. In this 12-month period 153 cases were presented (125 new, 28 re-discussion) with a mean caseload of 7.65 cases per meeting and 96% of cases presented by the original referrer. Mean age was 66.7 years (range 17-92) and 58.2% were male. All meetings met recommendations for minimum attendance by requisite specialists. Diagnostic confidence was stated in 100% of cases. Despite a confidence rate of >90% in only 40 cases (26.1%), differential diagnoses was only provided in 69 (45.1%). Twenty-nine (18.9%) patients underwent biopsy prior to MDM discussion with 9 (5.9%) post discussion. The most prevalent diagnosis was IPF (35.5%), followed by idiopathic NSIP (9.9%). An unclassifiable diagnosis occurred in 14.2%. Sixty-one (39.9%) discussions resulted in a change from referral diagnosis and all cases proffered a management plan.

Conclusion. The ILD MDM is pivotal in providing expertise and in this instance changed the referrer's diagnosis in nearly 40% of cases. Standardised proformas were used in all cases as recommended in TSANZ position statement. Diagnoses prevalence was similar to other Australian cohorts but with a surprisingly high incidence of pre-discussion biopsies.

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A REVIEW OF POST-OPERATIVE PAIN MANAGEMENT IN LUNG TRANSPLANT RECIPIENTS

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Introduction/Aim. Effective management of post-operative pain in lung transplant recipients (LTR) can be challenging. LTR are vulnerable to the development of retained secretions due to deconditioning, poor cough and denervated lungs especially if they have inadequate pain relief. Conversely, they are also most vulnerable to opioid related side effects. There is no consensus regarding the optimal approach to analgesia in LTR and therefore there is wide variation in practice. This study examined the prescribing patterns at our centre including the type of analgesia used, the length of use and rates of opioid associated adverse effects following lung transplant (LT).

Methods. Retrospective analysis of all patients undergoing lung transplantation at Auckland City Hospital, New Zealand Heart and Lung Transplantation Service between January 2016 and January 2019. Baseline demographics were collected. Pre-transplant use of opiates and post-operative pain relief regimens were documented including opioid and non-opioid modalities used in the ICU, at hospital discharge, at 6 weeks, 3 months and 6 months. Serious opioid related adverse effects were documented.

Results. 56 patients were included in the analysis. The mean age was 48.3 years (SD 12.4) and 53.6% were male. The most common indication was COPD (50%). Clamshell bilateral thoracosternotomy was the most common type of surgery (71.4%). 12.5% of patients had prior opioid use. Thoracic epidural analgesia (TEA) was used in 37.5% and IV patient-controlled analgesia (IV-PCA) was used in 32.1%. The use of opioid analgesia was 100% in the ICU, 66.1% at discharge from hospital, 46.4% at 6 weeks, 8.9% at 3 months and 1.8% at 6 months. Opioid related adverse effects occurred in 17.9%.

Conclusion. There was a large variation in analgesic modalities used and the use of TEA and IV-PCA was low. The incidence of opioid related adverse effects was significant. The majority of LTR have ceased opioid use at 3-6 months.

Grant Support: None

IMPULSE OSCILLOMETRY CORRELATES WITH SPIROMETRY IN BRONCHIOLITIS OBLITERANS SYNDROME

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Introduction/Aim. Bronchiolitis obliterans syndrome (BOS) is a major cause of death in lung transplant recipients and is characterised by fibrotic obstruction of small airways. Spirometry is currently employed to monitor for BOS but has limitations in detecting early disease. Impulse oscillometry (IOS) is a practical test which may add value to spirometric monitoring, particularly given its sensitivity for small airway obstruction. We hypothesised (a) BOS will cause predictable abnormalities in IOS and (b) IOS will identify BOS before spirometry.

Methods. We performed a single-centre prospective longitudinal diagnostic study on a consecutive sample of adult bilateral lung transplants recipients. Patients with non-BOS causes of allograft dysfunction were excluded. IOS was performed with spirometry approximately three-monthly. Linear mixed-effects models and Pearson correlation coefficients were used to test associations between spirometric and IOS parameters both as static values and when changing over time. Univariate binary logistic regression models were used to assess the predictive value of static and dynamic IOS parameters in foretelling the development or worsening of BOS, with spirometry as the comparator. The study received ethics approval and was prospectively registered.

Results. This interim analysis includes 232 tests on 62 patients, with new or worsened BOS observed on 15 occasions. Linear mixed-effects models showed IOS parameters (resistance at 5 Hz [R5], reactance at 5 Hz [X5] and resonant frequency) were associated with FEV1, both as static and dynamic values ($P < 0.05$). Pearson correlation coefficients demonstrated moderately strong statistically significant associations between R5 and FEV1 (r -0.54) and X5 and FEV1 (r 0.70). Neither IOS nor spirometry demonstrated predictive value in foretelling the development or worsening of BOS.

Conclusion. IOS correlates well with spirometry in BOS. This interim analysis is underpowered to assess the value of IOS in predicting new or worsening BOS. Data collection is continuing to address this.

EVALUATING OUTCOME MEASURES FOR AIRWAY CLEARANCE IN BRONCHIECTASIS: IT'S MURKY!

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Introduction/Aim. Whilst airway clearance techniques (ACTs) are recommended for individuals with non-cystic fibrosis (CF) bronchiectasis, there is no clear evidence to suggest one technique is better than another. The aim of this narrative review was to determine the most common clinically-related and patient-related outcome measures used to evaluate the efficacy of ACTs in non-CF bronchiectasis.

Methods. A literature search on the PubMed and MEDLINE databases using the keywords "non-cystic fibrosis bronchiectasis", "bronchiectasis", "airway clearance", "airway clearance techniques", "physiotherapy" and "chest physiotherapy" and filtering for studies published in English, up until August 2019, was completed. Studies included randomised controlled, crossover or any other trial design, and abstracts. Studies were included where the control was placebo, no intervention, standard care, usual care or an active comparator. Subjects over 18 years of age with bronchiectasis not related to cystic fibrosis were included. Extracted data comprised study authors, design, duration, intervention, outcome measures and results.

Results. The search identified 27 published studies and 1 abstract. The most common clinically-related outcome measures were sputum volume (n = 23), lung function (n = 17) and pulse oximetry (n = 9). The most common patient-related outcomes were health-related quality of life (St George Respiratory Questionnaire, n = 4), cough-related quality of life (Leicester Cough Questionnaire, n = 4) and dyspnoea (Borg / modified Borg scale, n = 8). There were significant variations in trial design and outcome measures used in airway clearance studies in non-CF bronchiectasis, leading to large variation in study findings.

Conclusion. The limited number of studies and heterogeneity in study design and outcome measures make it difficult to recommend any specific clinically-related or patient-related outcome measure for use in non-CF bronchiectasis airway clearance research. Based on this review, sputum volume, dyspnoea and health-related and cough-related quality of life appear to be the most relevant and useful measures of airway clearance treatment efficacy.

improve trial design, reproducibility and

EVALUATING THE BONE MORPHOGENETIC PROTEIN PATHWAY IN PULMONARY FIBROSIS

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Introduction/Aim. Idiopathic pulmonary fibrosis (IPF) is a lethal lung disease. Bone morphogenetic protein (BMP) signalling is reported to have an anti-fibrotic effect by inhibiting tissue growth factor beta (TGF-β) signalling in IPF. However, the effect of the manipulation of type 2 BMP receptor (BMPR2) has never been evaluated. In this preliminary study, we attempted to assess the BMPR2 expression status in pulmonary fibrosis and in cells stimulated by TGF-β.

Methods. We evaluated BMPR2 in bleomycin-induced rat pulmonary fibrosis model (BLM-PF). The lungs were harvested 14 days after intratracheal administration of bleomycin. BMPR2 levels were also evaluated in some types of cells constituting lungs from human and rat, incubated with or without TGF-β.

Results. BMPR2 mRNA was lower in BLM-PF than in control. BMPR2 was mainly detected in airway epithelium and vascular endothelium in rat lungs by immunohistochemistry, and was negative in fibroblasts in the fibrotic lesions. BMPR2 mRNA level did not differ between lung fibroblasts from IPF and that from healthy control, and tended to be elevated by stimulation with TGF-β in lung fibroblasts and alveolar epithelial cells. Neither the extent of BMPR2 increase nor the extent of elevation of profibrotic markers (e.g. fibronectin, α-smooth muscle actin, etc.) did not differ between lung fibroblasts from IPF and that from healthy control.

Conclusion. BMPR2 was decreased in lungs of BLM-PF. It was high in epithelial and endothelial cells and low in fibroblasts. Conversely, it was elevated by stimulation with TGF-β in cells isolated from lungs. If the proliferation of fibroblasts originally low in BMPR2 results in the decrease of total BMPR2 in fibrotic lungs, BMPR2 upregulation in fibroblasts may have possibility of preventing progression of pulmonary fibrosis.

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OUTCOMES OF A NEW PULMONARY EMBOLISM RESPONSE TEAM (PERT) MODEL OF CARE FOR INTERMEDIATE TO HIGH RISK PULMONARY EMBOLISM IN AN AUSTRALIAN TERTIARY REFERRAL HOSPITAL: A 12 MONTH RETROSPECTIVE STUDY

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Introduction. The 2019 European Society of Cardiology (ESC) Pulmonary Embolism (PE) Guidelines suggest formation of PE Response Teams (PERT) for management of high and intermediate-risk PE. We formed a PERT at Westmead Hospital in 2018 to provide rapid PE multidisciplinary coordination and management. We aimed to review demographic data, efficacy and complications associated with our PERT model.

Methods. We performed a retrospective chart review of 28 patients with PERT involvement at Westmead Hospital from August 2018-July 2019. We stratified patients into high, intermediate-high and intermediate-low risk according to 2019 ESC guidelines. We collected anthropomorphic data, 7 and 30 day mortality, modality of reperfusion [systemic or catheter-directed thrombolysis (EKOS)], troponin elevation as a surrogate for myocardial injury, RV:LV ratio before and after EKOS, and complications of treatment. Continuous data were presented as mean (SD) or median (IQR). We compared results before and after intervention with paired t tests or Mann-Whitney tests.

Results. Mean age was 63 (15.3) years. 19 patients (68%) were male and 9 were female (32%). 6 were high risk (21%), 17 were intermediate-high risk (61%) and 5 were intermediate-low risk (18%). Mean simplified PE Severity Index was 1.6 (1.1) units. 25 patients (89%) had elevated troponin and median troponin was 299 (151 to 739) μmol/L. Median ICU/HDU stay was 2 days (range 0 to 29 days). 20 patients underwent EKOS and 3 had systemic thrombolysis. RV:LV ratio improved in 16 of 17 patients following EKOS from 1.41 (0.25) to 1.07 (0.14); $P < 0.0001$. There were 4 deaths, all occurring within the first 7 days, and 1 major bleeding complication.

Conclusion. Our PERT 12 month data is consistent with international published outcomes for mortality, complications and successful reperfusion. Due to rapid multidisciplinary input and accessibility in providing expert advice, the PERT model has become standard practice in our institution.

INCREASED SENESCENT PRO-INFLAMMATORY LYMPHOCYTES IN THE SMALL AIRWAYS IN BOS

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Introduction/Aim: Immunosuppression therapy is ineffective at preventing bronchiolitis
obliterans syndrome (BOS), primarily a disease of the small airways. Our previous
reports show increased senescent CD28null T and NKT-like cells in the peripheral blood in patients with BOS. We further showed an increase in cytotoxic pro-inflammatory lymphocytes in the small airways in BOS, and hypothesized that these cells would also be steroid resistant, senescent CD28null lymphocytes.

Methods: The intracellular cytotoxic mediator granzyme b, pro-inflammatory cytokines
IFNγ and TNFα, and CD28 were measured in blood, bronchoalveolar lavage and large
and small airway brushing-derived T and NKT-like cells, from 10 patients with BOS, 11
stable lung transplant patients and 10 healthy aged-matched controls. Small airway
brushings were cultured in the presence of ±1 μM prednisolone ±5 mg/L theophylline
± 2.5 ng/mL cyclosporine A, and pro-inflammatory cytokines assessed using flow
cytometry.

Results: Increased small airway CD28null T and NKT-like cells were identified in
BOS compared with controls and stable transplant patient. Loss of CD28 was
associated with an increase in T and NKT-like cells expressing granzyme b, IFNγ and
TNFα. Loss of CD28 expression by CD8 + T cells was significantly associated with
FEV1 (R = .655, P = .006) and with time post-transplant (R = -.552, P = .041). Treatment
with prednisolone + theophylline + cyclosporin A additively inhibited IFNγ and
TNFα production by small airway CD28null T and NKT-like cells.

Conclusion: BOS is associated with loss of CD28 in small airway cytotoxic, proinflammatory, senescent T and NKT-like lymphocytes. Treatment options that target
the pro-inflammatory nature of these cells in the small airways may improve graft
survival.

PROGRESSION AND PROGNOSTIC SIGNIFICANCE OF HYPOXAEMIA IN FIBROTIC INTERSTITIAL LUNG DISEASE

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Introduction/Aim. Patients with fibrotic interstitial lung disease (ILD) can develop hypoxaemia as their disease progresses. This study aimed to evaluate the rate of progression and prognostic significance of hypoxaemia in patients with fibrotic ILD.

Methods. We identified patients with idiopathic pulmonary fibrosis (IPF), chronic hypersensitivity pneumonitis, connective tissue disease-associated ILD, idiopathic nonspecific interstitial pneumonia, and unclassifiable ILD from three prospective ILD registries (Australia: Austin and Alfred Health; Canada: Providence Health Care). The cumulative incidence of exertional and resting hypoxaemia from the time of diagnosis, adjusted for the competing risk of death and lung transplantation, was estimated at 1-year intervals in patients with at least one 6-minute walk test. Likelihood ratio tests were used to determine the prognostic significance of exertional and resting hypoxemia for 1-year mortality, when added to the ILD-GAP index.

Results. Of the 573 patients (166 with IPF) with a median follow-up duration of 4 years (interquartile range: 2-7 years), 40% and 12% developed exertional and resting hypoxaemia, respectively. The 1-, 2- and 5-year cumulative incidence was 4%, 16% and 40% for exertional hypoxaemia, and 1%, 2% and 7% for resting hypoxaemia. Comparing IPF and non-IPF patients, the 1-, 2- and 5-year cumulative incidence was 6% vs 2%, 23% vs 9%, 62% vs 30% for exertional hypoxaemia ($P < 0.00001$), 1% vs 0.6%, 2% vs 1%, 11% vs 6% for resting hypoxaemia ($P = 0.31$; Figure). Addition of exertional or resting hypoxaemia to the ILD-GAP index was statistically significant for prognostication based on the likelihood ratio tests (exertional hypoxaemia: $P = 0.0001$; resting hypoxaemia: $P = 0.0003$).**Conclusion.** IPF patients have higher cumulative incidence of exertional and resting hypoxaemia than non-IPF patients, although only statistically significant for exertional hypoxaemia. The development of exertional and resting hypoxaemia provides additional risk stratification for prognosis in fibrotic ILD.
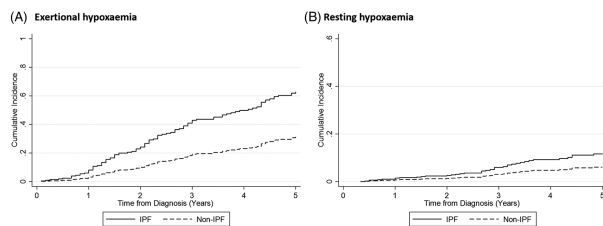
(A) Exertional hypoxaemia (B) Resting hypoxaemia

COUGH IS A POORLY CONTROLLED SYMPTOM IN INTERSTITIAL LUNG DISEASE

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Introduction/Aim. Cough is a common symptom in interstitial lung disease (ILD) often with treatment dissatisfaction for patients and physicians. The objective of this study was to identify the prevalence and subjective adequacy of control of cough in patients with ILD.

Methods. A cross-sectional study of patients with ILD attending a tertiary ILD clinic in Perth was undertaken by a pre-designed questionnaire that patients were invited to complete when attending clinic. Cough severity and impact on quality of life was assessed using a visual analogue scale and validated Leicester cough questionnaire. Participants were asked to list triggers to their cough and strategies or medications trialled to control cough.

Results. Of 164 respondents, 118 (72%) had cough with prevalence common in all ILD subtypes. A lower FVC was found in the cough versus non-cough group (74.6 ± 18.7 vs 87.0 ± 15.9, *P*-value<0.0001). Common reported triggers were lung irritants, exertion and doing routine daily activities. Avoidance of triggers was a common strategy to control cough. A high prevalence of non-ILD causes of cough was recorded in both groups. A variety of medications have been trialled, including anti-fibrotics, immunosuppression drugs, inhalers and proton pump inhibitors, with moderate benefit reported by 18% of participants.

Conclusion. Cough is prevalent in ILD but is not adequately suppressed. Cough has significant impact on quality of life leading patients to adopt their own strategies to control their cough. More study is needed to understand cough mechanisms in ILD and the interplay of other potential co-pathologies.

INCOMPLETE HEERFORDT SYNDROME AS AN INITIAL PRESENTATION OF SARCOIDOSIS IN A PATIENT WITH PRE-EXISTING SYSTEMIC SCLEROSIS

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Introduction/Aim. We report the case of a patient with longstanding limited cutaneous systemic sclerosis who presents with symptoms found to be due to a new diagnosis of sarcoidosis.

Case report. A 53-year-old Caucasian woman with a longstanding history of limited cutaneous systemic sclerosis presented to the emergency department with bilateral blurred vision over two weeks and dyspnoea, dry cough, facial swelling, and malaise over preceding months. Previous manifestations of her systemic sclerosis included digital infarcts, Raynaud's phenomenon, gastroesophageal reflux disease, and elevated anti-centromere antibody titres. Physical examination confirmed bilateral anterior uveitis and parotitis (without facial nerve involvement). Computed tomography (CT) of the chest revealed mediastinal and bilateral hilar lymphadenopathy and multiple lower lobe predominant pulmonary nodules.

During flexible bronchoscopy, endobronchial mucosa appeared cobblestoned. Subsequent endobronchial ultrasound-transbronchial needle aspiration (EBUS-TBNA) of the subcarinal lymph node demonstrated non-necrotising granulomas. Spirometry showed moderate, fixed, airflow obstruction.

With biopsy evidence of non-necrotising granulomas, the presence of uveitis, parotitis (without facial nerve palsy), and subjective fevers conferred a diagnosis of sarcoidosis and incomplete Heerfordt syndrome. From the outset, it was acknowledged that corticosteroid therapy to treat sarcoidosis may complicate systemic sclerosis, most importantly by precipitating scleroderma renal crisis. Tests to quantify excess scleroderma renal crisis risk were performed including anti-RNA polymerase III titre and urinary protein/creatinine ratio. The extent of sarcoidosis involvement was also quantified via positron emission tomography-magnetic resonance imaging (PET-MRI). With a favourable renal crisis risk profile and no evidence of cardiac sarcoidosis, the patient was commenced on oral prednisolone (25 mg daily) and mycophenolate (500 mg twice daily), with close follow up of renal function and blood pressure and a view to a rapid wean of prednisolone.

Conclusion. This case of co-existing sarcoidosis and systemic sclerosis describes a management dilemma requiring risk assessment of potential adverse outcomes prior to commencing corticosteroid therapy.

Grant Support: Nil

BLEOMYCIN-INDUCED LUNG INJURY IN PATIENTS WITH ADVANCED GERM CELL TUMOURS: THE ROLE OF ROUTINE PULMONARY FUNCTION TESTING

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Introduction/Aim. Pulmonary function testing (PFT) plays a role in the detection of bleomycin-induced lung injury although its utility has come under recent scrutiny. We describe the impact of routine PFT in patients receiving BEP (bleomycin, etoposide, cisplatin) for advanced germ cell tumours at our institution.

Methods. Patients with advanced germ cell tumours who received at least two doses of bleomycin at the Princess Alexandra Hospital, Queensland between January 1st, 2016 and December 31, 2018 were included. A patient had bleomycin-induced lung injury if the diagnosis was documented on their electronic medical record and effected a reduction in bleomycin dose.

Results. 30 patients were included in the audit. Median age of the group was 33.8 years (range 16.7 – 53.7 years). One-third of patients (10) were active smokers, while another third (9) were past smokers. 9 (29%) had pulmonary metastases. The majority (79%) had good prognosis disease.

A physician diagnosis of bleomycin-induced lung injury was made in 8 out of 30 patients (27%) and most commonly presented as asymptomatic reductions in DLCO (63%). In one patient, the diagnosis was made on respiratory symptoms alone. No radiological abnormalities were detected. The diagnosis of bleomycin-induced lung injury resulted in the omission of 34 of 270 planned doses (13%) with half the patients receiving less than two-thirds of their planned doses.

The median decrement in DLCO resulting in reduction of bleomycin dosage was 30% (range 11 – 65%). The decision to withdraw bleomycin was made in three patients with $\leq$25% reduction in DLCO. Conversely, a decision to continue bleomycin was made in seven patients despite a fall in DLCO >25%. One patient continued bleomycin therapy despite a fall in DLCO of 50%.

Conclusion. A decrement in DLCO remains the most sensitive and commonly used metric for the diagnosis of bleomycin-induced lung injury. However, considerable practice variation was observed.

Grant Support: Nil

THE EFFECT OF PAH AND CONTROL OUTGROWTH ENDOTHELIAL CELL EXOSOME TREATMENT ON ENDOTHELIAL CELL PROTEIN EXPRESSION

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Introduction/Aim. Pulmonary arterial hypertension (PAH) is a devastating lung condition characterised by pulmonary vascular remodelling and excess proliferation of vascular cells. Mutations in BMPR2 are causally linked to PAH. Exosomes are vesicles that play a role in cell communication and have been attributed to the pathogenesis of a number of different conditions. We hypothesised that exosomes isolated from PAH and control cell cultures would differentially alter the protein expression of target endothelial cells and that modulation of BMPR2 in the exosome donor cells has the ability to alter these effects.

Methods. Outgrowth endothelial cells (OECs) were cultured from PAH patient and healthy control peripheral blood. Exosomes were collected from OEC cultures with and without adenoviral transduction to upregulate BMPR2 levels and applied to cultures of human lung microvascular endothelial cells. Protein analysis was performed with mass spectrometry.

Results. There were 269 proteins upregulated by PAH OEC exosome treatment compared to control OEC exosome treatment. In contrast, 168 proteins were downregulated by PAH OEC exosome treatment compared to control exosome treatment. Interestingly, treatment with exosomes from PAH OECs with upregulated BMPR2 induced a protein expression profile that more closely resembled the control exosome treatment than the PAH only exosome profile. Of note, this population of proteins whose expression was comparable to control exosome treatment levels includes those involved in endothelial function as well as regulation of the cell cycle and apoptosis.

Conclusion. Exosomes derived from PAH OEC cultures have a differential effect on the protein expression of endothelial cells compared to exosomes derived from control OECs. Upregulation of BMPR2 within donor cells can alter the protein expression profile induced in target cells. These findings suggest exosomes may play a role in cell-cell signalling in PAH and that these exosomes are amenable to alteration that could improve their viability as a therapeutic option.

Grant Support:

REAL WORLD INTERSTITIAL LUNG DISEASE EXPERIENCE – DATA FROM THE AUSTRALASIAN INTERSTITIAL LUNG DISEASE REGISTRY (AILDR)

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Introduction/Aim. The Australasian Interstitial Lung Disease Registry (AILDR) is a bi-national registry of ILD patients across Australia and New Zealand providing much needed longitudinal data on these rare and, often fatal, diseases of lung interstitium. Following success in Phase 1 AILDR is now in its second phase with a further 16 sites involved aiming to ensure completed data sets facilitating collaboration and research to enable standardised care.

Methods. Patients attending ILD centres are consented to obtain prospective information inclusive of demographics, clinical data, investigations and management. For inclusion in this study, tertiary referral (larger) sites were asked to provide >50 completed case entries and regional (smaller) sites >10. We investigated differences in baseline demographics, physiology and ILD diagnosis between sites using comparative statistics.

Results. A total of 1312 participants are registered with AILDR. Of these 705 patients (from 9 centres) had complete data entry at 1st August 2019. Mean age was 69.3 ± 12.1 years with 53.3% male. At baseline, mean FVC predicted (%) was $84.2 \pm 21.7\%$, mean DLCO (%) $58.2 \pm 19.5\%$ and mean 6MWT distance (m) 421 ± 126.5 m. Idiopathic pulmonary fibrosis was the most prevalent ILD diagnosis (n = 256, 36.3%), followed by CTD-ILD (n = 125, 17.7%) and chronic hypersensitivity pneumonitis (n = 63, 8.9%).

Baseline demographics and physiology did not significantly differ between centres overall, or between tertiary and regional centres. There was also no significant difference between the prevalence of ILD subgroups between tertiary referral and regional sites overall, but there was a higher prevalence of sarcoidosis in New Zealand (n = 12, 18.5%) versus Australia (n = 32, 5%).

Conclusion. The AILDR is proving to be a useful clinical research tool enabling accurate and timely data collection. We plan to assess the variability in care of ILD patients, with a purpose to standardise investigation and management of ILD patients in Australasia.

DOES A PULMONARY EMBOLISM RESPONSE TEAM (PERT) CHANGE CLINICAL PRACTICE? AN ASSESSMENT OF PATIENT OUTCOMES BEFORE AND AFTER THE INITIATION OF A PERT AT AN AUSTRALIAN TERTIARY HOSPITAL

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Introduction. High and intermediate-risk pulmonary embolism (PE) is a common respiratory condition and confers a high risk of morbidity and mortality. Recent European Society of Cardiology (ESC) 2019 PE guidelines recommend formation of a pulmonary embolism response team (PERT) for rapid multidisciplinary management of high/intermediate-risk PE. Our PERT was created in 2018 to facilitate prompt multidisciplinary evidence-based management of patients with high/intermediate-risk PE

Aim. To compare outcomes of patients with high/intermediate-risk PE before and after PERT creation regarding patient location at time of referral for intervention, risk-stratification, and treatment type

Methods. Uncontrolled before-and-after study. We included 28 consecutive patients with high/intermediate-risk PE with PERT involvement from August 2018 to July 2019 and 28 consecutive high/intermediate-risk pre-PERT patients between August 2017 to July 2018 using ICD-10 criteria and medical records. We compared PERT versus pre-PERT continuous variables using Mann-Whitney test or unpaired t test and Fisher's exact test for categorical variables. $P < 0.05$ was considered significant

Results. More PERT patients were referred for intervention from the Emergency Department (57% vs 28%; $P = 0.06$), compared with pre-PERT patients who were referred from monitored wards (60% pre-PERT vs 25% PERT; $P = 0.01$). There were more central (saddle/main pulmonary artery) PE identified in PERT patients (82% vs 29%; $P < 0.01$). PERT patients had higher numbers of high/intermediate-risk patients (64% vs 14%; $P < 0.01$). Risk stratification was poor or incomplete in pre-PERT patients, with fewer echocardiographic assessment for RV dysfunction (64% vs 100%; $P < 0.01$). Catheter-directed thrombolysis treatment was higher in PERT vs pre-PERT group (75% vs 4%, $P < 0.01$)

Conclusion. A multidisciplinary PERT approach in high/intermediate-risk PE resulted in earlier recognition and referral of high/intermediate-risk PE for intervention, and improvement in accurate risk stratification of PE severity, including assessment for right heart dysfunction. PERT involvement resulted in higher number of referrals for catheter-based thrombolysis over systemic thrombolysis or standard anticoagulation

SIT-TO-STAND TEST IS PSYCHOMETRICALLY ROBUST IN ACUTE LUNG TRANSPLANT RECIPIENTS

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Introduction/Aim. Measurement of physical function is important to guide physical therapy for patients post-lung transplantation (LTx). The sit-to-stand (STS) test has proven utility in chronic disease, but psychometric properties post-LTx are unknown. We aimed to assess the reliability, validity, responsiveness and feasibility of the 60-second STS test post-LTx.

Methods. This measurement study was conducted on 62 inpatients post-LTx (31 acute postoperative; 31 medical readmissions). Inter-rater reliability was assessed with two STS tests undertaken by different assessors at baseline (STS1,2). Known groups validity was assessed by comparing STS repetitions in postoperative and medical participants. Content validity was assessed using comparisons to quadriceps and grip strength, measured with hand-held dynamometry (HHD). Criterion validity was assessed by comparison of STS repetitions and six-minute walk distance (6MWD) postoperatively. Responsiveness was assessed using effect sizes over inpatient admission, via repeated STS on inpatient discharge (STS3).

Results. Median age was 62 years (range 21-80); time post-LTx was 5(3-8) days postoperative and 696(99-7940) days for medical readmissions. Inter-rater reliability was excellent ($ICC_{2,1}$ 0.957) with a mean learning effect of 2 repetitions. Repetitions were greater for medical compared to postoperative participants at baseline only (baseline mean 18.42 ± 9.00 vs. 8.65 ± 6.01, $P < 0.01$; discharge 19.17 ± 11.11 vs. 14.29 ± 7.86, $P = 0.05$). More STS repetitions was associated with greater quadriceps strength (postoperative r = 0.57; medical r = 0.47) and 6MWD (postoperative r = 0.68). Effect sizes were 0.94 and 0.09, with a floor effect of 23% and 3% at baseline (postoperative/medical), improving to 10% at discharge. Patients incapable of attempting a STS test at baseline were excluded, reducing generalizability to critical care. Physical rehabilitation was not standardized, possibly reducing responsiveness.

Conclusion. The 60-second STS test demonstrated excellent inter-rater reliability, moderate validity and was responsive to change postoperatively. The 60-second STS represents a safe, feasible physical outcome for post-LTx inpatients. Two tests should be completed at each time point.

Reliability	Medical n = 31	Postop n = 30	Combined n = 61
Mean difference $\pm$ SD (STS2-STS1)	1.90 ± 2.39	1.90 ± 2.82	1.90 ± 2.59
Limits of agreement	4.68	5.53	5.07
ICC $_{(2,1)}$	0.963	0.868	0.957
95% CI of ICC	0.925–0.982	0.741–0.935	0.930–0.974
Responsiveness	n = 30	n = 31	n = 61
Mean difference $\pm$ SD (STS3-best baseline)	0.80 ± 5.42	5.65 ± 5.25	3.26 ± 5.82
95% CI	-1.22 to 2.82	3.72 to 7.57	1.77 to 4.75
Standard error measurement	1.56	1.88	1.64
Minimum detectable change$_{95}$	4.32	5.22	4.56

INTERSTITIAL LUNG DISEASE MULTIDISCIPLINARY MEETING STANDARDIZATION: FIRST ROUND OF AN INTERNATIONAL MODIFIED DELPHI SURVEY

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Introduction/Aim. Current international guidelines indicate that multi-disciplinary meetings (MDM) are the 'gold standard' for the diagnosis of interstitial lung diseases (ILD. However, there is significant variability in the conduct of ILD MDMs and there is no international consensus on best practice. We aimed to identify key aspects of ILD MDMs from the perspective of ILD clinicians.

Methods. We conducted qualitative phone interviews with international experts in the field of ILD. Experts were selected based on their clinical and research expertise in ILD. Participants provided verbal consent and the interviews were digitally-recorded. The interviews contained open-ended questions designed to generate discussion. Major themes were extracted from interview responses and organised into a list of items to be used in subsequent rounds of a modified Delphi survey.

Results. 15 international ILD experts participated in telephone interviews. Major thematic domains identified from the interviews included MDM team structure, logistical infrastructure, organization and administration, clinical decision-making process as well as future direction and concepts. Most participants proposed the need for several clinicians to be involved in an MDM but perspectives on the optimal MDM team and the need for an 'expert' were variable. All participants reported that adequate visual projection equipment was essential to view radiological and pathological images during the MDM. Although participants reported that a minimum set of data was required for each case to be presented at the MDM, there was no standardized list of items or method of presentation. There was also heterogeneity in the recommended MDM outputs.

Conclusion. This qualitative study with ILD experts identified key aspects of an ILD MDM requiring further assessment and standardisation. These items will be used in an online Delphi survey, with the aim of achieving consensus amongst international ILD experts for the key aspects of ILD MDM.

NUMEROUS BIOMARKER'S DIAGNOSTIC EFFICACY ON PULMONARY EMBOLISM: A SYSTEMATIC REVIEW

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Introduction/Aim. Number of diagnosed pulmonary embolism (*PE*) cases are extremely small. Whereas, an early diagnosis can decrease the mortality rate for 17-22%. So far, the golden standard in diagnosing *PE* is computed tomography pulmonary angiography (*CTPA*). However, limitation in facilities and high cost make *CTPA* quite disadvantageous. Biomarkers could become an alternative *PE* diagnosis method to reduce the usage of *CTPA*.

Method. Systematic review was conducted through databases of PubMed and Proquest. Eleven papers were found and further assessed using STROBE's criteria for observational studies.

Results. Several studies showed that D-dimer has high sensitivity range of 95%-99%. The threshold is interchangeable based on treatments, including age and quantitative or qualitative measures. Alternatives to D-dimer are starting to be discovered. These include uF1 + 2 (Sensitivity 82%; Specificity 34%), MPV (Sensitivity 82,2%; Specificity 52,3%), Apelin 13 (No sensitivity nor specificity measured), NT-proBNP (Sensitivity 93%; Specificity 63%), Troponin I (No sensitivity nor specificity measured), dan Haptoglobin (Sensitivity 62%; Specificity 83%). Some of the aforementioned alternatives are beneficial on certain areas, such as uF1 + 2's non-invasive urine test, NT-proBNP's retained effectiveness even when used on post-operative patients, Haptoglobin's high specificity rate, and MPV's practicality.

Conclusion. Usage of biomarkers in the diagnosis of *PE* is dominated by highly sensitive but less specific biomarkers. For now, D-dimer emerges as the best amongst said biomarkers. However, alternatives are still promising on some condition, such as uF1 + 2 towards patients with contraindication on drawing blood and NT-proBNP towards post-operative patients. Conversely, Haptoglobin could become a less invasive alternative of *CTPA*.

Key Words: pulmonary embolism, biomarkers, *CTPA*, diagnosis
Nomination for New Investigator Award

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TPL 017

VASCULAR REMODELLING IN IDIOPATHIC PULMONARY FIBROSIS (IPF)- POTENTIAL ROLE OF ENDOTHELIAL TO MESENCHYMAL TRANSITION (ENDOMT)

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Introduction/Aim. Idiopathic pulmonary fibrosis (IPF) is highly progressive and irreversible fibrotic interstitial lung disease. Although origins are yet undeciphered, injury to the alveolar region and consequential impairment of repair mechanisms remains the mainstay in IPF pathogenesis. In IPF patients, alveolar-capillary membrane breakdown, vascular and fibrotic lesions. deleteriously affect gas exchange and lung capacity. Associated comorbidities such as pulmonary hypertension (PH) enhance mortality in IPF patients. Endothelial cell transformation via EndoMT could be the vital link to both vascular remodelling and PH. Here, we provide evidence linking EndoMT, vascular remodelling and their effect on IPF physiology.

Methods: Lung resections from thirteen IPF patients and twelve healthy subjects (HS) underwent Movat Pentachrome staining technique. Pulmonary arterial sizes were classified using HS controls. Comparable arterial length and luminal diameters were used to calculate thickness ratios. Immunohistochemical staining for EndoMT markers such as S100A4 and Vimentin, was performed. Tissue analysis was done using Image-Pro Plus 7.0 software.

Results. All IPF patients had diminished arterial luminal space and thickened intima, media and adventitia layers. Six size ranges were determined based on the arterial length in HS. Arterial thickness ratio was significantly higher across all ranges in IPF patients ($P < 0.001$) compared to HS; however, 30-39micron were found to be greatest ($P < 0.0001$). Thickness ratio showed negative correlation trend towards %DLCO, and % FVC predicted. The smaller arterial size impacted gas exchange in IPF patients, 10-19micron (Pearson's r', -0.5, $P = 0.07$), 20-29micron (Pearson's r', -0.39, $P = 0.1$) and 30-39micron (Pearson's r', -0.48, $P = 0.07$). Further, we observed increased S100A4 and vimentin expression in the intima layer of IPF compared to HS suggesting EndoMT activity.

Conclusion. This study is the first comprehensive analysis of vascular changes in IPF. Arterial thickening was detrimental to physiology, although limited due to fewer patient numbers. EndoMT found to be crucial to this pathology.

TPL 018

ANNEXIN A1 AND A3 GENE EXPRESSION ARE ELEVATED IN WHOLE BLOOD OF PATIENTS WITH IDIOPATHIC PULMONARY FIBROSIS (IPF)

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Introduction/Aim. Annexins are a group of widely distributed calcium-dependent membrane binding proteins that have been implicated in the regulation of lung injury and fibrosis. In sera of patients with IPF and bronchoalveolar lavage of patients with interstitial lung disease, annexins A1 (ANXA1) and A3 (ANXA3) are reportedly elevated. However, other studies have reported decreased annexins (A1, A2, A3) in IPF lung tissue compared to controls. We hypothesise that increased annexins in the blood may be derived from dysregulated immune cells of IPF lungs.

Methods. Whole blood from 27 IPF patients and 34 age-gender matched healthy donors was collected and total RNA was extracted using the PAXgene blood RNA Kit. Longitudinal samples (up to 6 samples, at three months apart) from IPF patients was also collected. RNA sequencing was performed using Illumina platform on a total of 158 samples. Sequencing reads were aligned to the human reference genome GRCh37p11 and summarized into a count matrix using *featureCounts*. Differential expression analysis was carried out using *limma* workflow[1].

Results. Expression of 14,568 genes was measured in whole blood and 328 genes were differentially expressed in IPF compared to matched healthy donors (false discovery rate (FDR) < 0.05, |log$_2$ fold change| > 1.5). 187 genes were up-regulated and 141 genes were down-regulated. Eight out of twelve annexin family members in humans were identified but only ANXA1 and ANXA3 were up-regulated in IPF when compared to healthy donors.

Conclusion. Elevation of annexins A1 and A3 expression in the blood suggests there are perturbations in circulating immune cell regulation of IPF patients as annexins regulate leukocyte trafficking/ transmigration in inflammation. Our study supports the continued investigation of ANXA1 and ANXA3 as blood-based biomarkers of IPF.

Reference:
1. Law CW, Alhamdoosh M, Su S, Dong X, Tian L, Smyth G, Ritchie M, *F1000Research* 2018, 5, 1408

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IN-SILICO AEROSOL DELIVERY TO SPONTANEOUSLY-BREATHING PEDIATRIC PATIENTS ON VENTILATORY SUPPORT VIA ORAL (SOUTH-FACING) RAE ENDOTRACHEAL TUBES

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Introduction/Aim. In order to potentially improve aerosol delivery emitted by either a pressurised metered dose inhaler (pMDI) or nebuliser device to paediatric patients using oral (south facing) RAE endotracheal tubes (ETTs), an *in-silico* solid and liquid-particle computational fluid-particle dynamic model was validated.

Methods. A elbow-tube geometry, designed to mimic a paediatric oral RAE ETT was created using Python software and imported into computational fluid dynamic software, OpenFOAM. The geometry was split into parts allowing accurate computational tracking of aerosol particles. A single dose of aerosol was injected into the elbow-tube at the devices reported speed, superimposed on a paediatric patient inhalation sinewave. An identical study was completed *in vitro* using the actual devices. Particles were deemed to deposit computationally when within a radius width of the tube lumen, or as quantified by high performance liquid chromatography *in vitro*. The software solved for conservation of momentum, and mass (Navier-Stokes equations), coupled with discrete particle tracking. The Pawsey Supercomputing Centre was used to process the simulation. Simulated deposition in the tube was matched by weight to *in vitro* results within ten percent.

Results. Computational simulation showed almost all the aerosol will deposit in the elbow-tube, either for a solid or liquid-particle of the same size. The simulated result was successfully validated by the laboratory result for both solid and liquid particles. The high deposition was due to the high velocity of introduced aerosol generating turbulent flow. The small percent of aerosol exiting the tube was respirable.

Conclusion. Little drug will exit an oral RAE ETT via nebuliser or pMDI. *In silico* methods validated here can be used to optimise aerosol delivery in ETTs for solid and liquid particles.

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PREDICTING CLINICAL COURSE IN CHILDREN WITH COMPLICATED PNEUMONIA

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Introduction/Aim. Pneumonia remains one of the most significant infections in children worldwide. Whilst rates of pneumonia have been decreasing since the introduction of pneumococcal vaccination, complicated disease including empyema and necrotising pneumonia (NP) have increased. Treatment of complicated disease can be difficult and markers to predict clinical outcome are lacking.

We aimed to assess the change in rate of pleural effusion and NP in the PCV13 era and to identify markers that may predict clinical course and need for surgical intervention.

Methods. A retrospective analysis of patients admitted to Monash Children's Hospital between January 2012 and July 2018 with simple parapneumonic effusions (PPE), empyema and NP was undertaken.

Clinical characteristics, microbiological results and biochemical markers were analysed and correlated with clinical outcomes.

Results. Fifty PPE, 100 empyema and 12 NP cases were included. Rates of NP and empyema increased during the study period from 0.00 to 1.57 and 6.00 to 9.03 per 10,000 admissions, respectively. *Streptococcus pneumoniae* was the most commonly identified pathogen (26.5%) and was associated with complicated disease. Patients with empyema and NP were more like to require a drainage procedure, have a LOS >10 days and require admission to PICU, than PPE ($P < 0.001$).

Serum albumin <20 g/dL was associated with the need for a drainage procedure, LOS >10 days and PICU admission. Viral co-infection was associated with a LOS > 10 days and PICU admission. C-reactive protein (CRP) > 140 mg/dL was associated with need for a drainage procedure.

Conclusion. This retrospective review confirms the increasing rates and incidence of empyema and NP in the PCV13 era. Markers associated with poorer outcomes and need for surgical intervention have been identified and warrant further investigation in a prospective trial to assess their utility in directing management of children with parapneumonic effusion.

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PAEDIATRIC PATIENTS OF OUTREACH SPECIALIST QUEENSLAND CLINICS HAVE SPIROMETRY IMPROVEMENT COMPARABLE TO THAT OF TERTIARY PAEDIATRIC PATIENTS

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Introduction/Aim. Outreach services are a strategy to deliver effective healthcare directly to regional/remote communities. However, there is little objective data on how effective respiratory outreach services are, compared to city-based services. Our aim was to compare the lung function changes of children living in regional and remote Queensland seen in Indigenous Respiratory Outreach Care (IROC) clinics to that of children treated at paediatric tertiary hospitals.

Method. The spirometry of children seen at IROC and Brisbane paediatric hospitals between October 2010 and July 2019 were compared using the difference between baseline and follow-up spirometry. Lung function impairment as outlined in the prospective urban rural epidemiology (PURE)[1] study was described.

Results. Spirometry of 253 children treated at IROC were compared to 2743 children contemporaneously treated at outpatients of paediatric tertiary hospitals in Brisbane. In both groups, spirometry values significantly improved. There were no significant differences in the improvements of FEV_1 or FVC for the whole cohort of children between IROC (change in z-scores (Δz) of $FEV_1 = 0.35$; $\Delta FVC = 0.40$) and hospital ($\Delta zFEV_1 = 0.28$; $\Delta FVC = 0.28$) groups ($P = 0.38$; $P = 0.11$). For children with asthma IROC ($\Delta z\ FEV_1 = 0.41$; $\Delta FVC = 0.47$) and hospital ($\Delta zFEV_1 = 0.45$; $\Delta FVC = 0.40$) groups ($P = 0.66$; $P = 0.47$), and for children with bronchiectasis between IROC ($\Delta zFEV_1 = 0.35$; $\Delta FVC = 0.33$) and hospital ($\Delta zFEV_1 = 0.45$; $\Delta FVC = 0.53$) groups ($P = 0.59$; $P = 0.26$). There were significant increases in the number of children tested at IROC with no FEV_1 impairment by PURE criteria ($zFEV_1 > 0$) for asthma ($P = 0.016$) and bronchiectasis ($P = 0.027$) sub-groups; and for children tested at paediatric hospitals with a diagnosis of asthma ($P < 0.0002$), but not the bronchiectasis sub-group ($P = 0.19$).

Conclusion. The comparable significant improvements in spirometry values of children treated in IROC clinics to those contemporaneously treated at paediatric tertiary hospitals in Brisbane, suggests that respiratory outreach services using the IROC model can be as effective as city-based specialist hospitals.

Key Words. Paediatric, respiratory function, outreach

Reference:

1. Duong M, et al. Mortality and cardiovascular and respiratory morbidity in individuals with impaired FEV1 (PURE): an international, community-based cohort study. *Lancet Glob Health*. 2019;7(5): e613-e623.

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SUBSEGMENTAL LOBAR COLLAPSE AS AN EARLY RADIOLOGIC SIGN OF PRIMARY CILIARY DYSKINESIA

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Introduction/Aim. Establishing the underlying cause in a child with chronic suppurative lung disease (CSLD) is beneficial. allowing for targeted treatment and screening for associated complications. One cause of CSLD is Primary Ciliary Dyskinesia (PCD), however testing for PCD requires specialist expertise which is not widely available. Computed Tomography (CT) scans are commonly performed when assessing CSLD. If PCD specific signs on CT were identified it would help clinicians in deciding when to refer for specialist testing. One potential PCD specific sign we have observed is subsegmental lobar collapse, in excess of the severity of other changes noted on CT. We aimed to assess if subsegmental lobar collapse is commonly found in CT of PCD patients

Methods. Fifty-eight CT scans from 42 adult and child PCD patients were analyzed, looking for the presence of this feature, and its association to other signs commonly seen in PCD and CSLD: bronchiectasis, atelectasis, bronchial wall thickening, air trapping and mucous plugging. A sub segmental lobar collapse was noted as present or absent. The five other features were marked together as minimal, moderate or severe, according to their extent and severity.

Results. Subsegmental lobar collapse was found in 25/58 CT scans. The associated changes were mild in 8/25, moderate in 13/25 and severe in 4/25.

Conclusion. Subsegmental lobar collapse, in excess of the severity of other changes was found in 43% PCD CT scans, and frequently in patients with minimal or moderate associated changes. This data shows this sign is commonly found in PCD and future work will determine if it is a PCD specific sign by assessing whether it is also found in other CSLD processes, as well as analysing more scans from children with PCD to determine how early this sign develops.

COST OF HOSPITALISATION FOR BRONCHIECTASIS EXACERBATION IN CHILDREN

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Introduction/Aim. Despite paediatric bronchiectasis being recognised increasingly worldwide, prior reports of hospitalisation costs for bronchiectasis in children are lacking. This study aimed to: (a) identify health service costs of hospitalisations and (b) factors associated with these costs in children admitted to an Australian paediatric hospital following an acute exacerbation of their bronchiectasis.

Methods. Demographic and hospital resource use data were prospectively recorded for 100 children aged <18-years admitted consecutively to the Queensland Children's Hospital, Brisbane, Australia. Costs (2016 Australian dollars [AUD]) were obtained from the hospital's Finance Department. Linear regressions, with bootstrap resampling to quantify uncertainty, were used to estimated factors affecting cost of hospitalisation.

Results. The 100 hospitalisations (48 males) had a median (interquartile range) age of 6.04 (4.04 to 9.85) years. Their mean (standard deviation [SD]) length-of-stay (LOS) was 12.30 (4.60) days. The mean (SD) direct health service cost was AUD30,182 (13,998) per hospitalisation. The greatest contributor to costs was health professional wages, accounting for 70% of the cost per episode. The four explanatory factors independently associated with the cost of hospitalisation were LOS, age at admission, number of affected lobes and treatment using HITH. Each extra day in hospital cost AUD2,487.46, younger age increased the cost by AUD534.88 for every year, and for each additional lobe of lung affected by bronchiectasis there was a mean increase of AUD967.28 per hospitalisation respectively. Where HITH was used, it resulted in an average saving of AUD7,766.19/episode (USD5,765). The cost to families on average was AUD2,669.50 (SD 991.50) per hospitalisation when accounting for lost wages and opportunity cost.

Conclusion. The per episode healthcare cost burden of hospitalisations for paediatric bronchiectasis exacerbations is substantial. Interventions that prevent hospitalised exacerbations and reduce severity of childhood bronchiectasis with even moderate effectiveness are likely to result in substantial hospital costs savings.

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HOME CONTINUOUS POSITIVE AIRWAY PRESSURE TREATMENT FOR OBSTRUCTIVE SLEEP APNOEA IN INFANTS: A SINGLE CENTRE EXPERIENCE

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Introduction/Aim. There is limited data on management and outcomes of obstructive sleep apnoea (OSA) in the first year of life. We aimed to analyze the clinical, demographic and polysomnographic (PSG) characteristics of children who were initiated on home continuous positive airway pressure (CPAP) for treatment of OSA in the first year of life.

Methods. Children started on CPAP for OSA in the first year of life at the Queensland Children's Hospital were retrospectively studied. Data evaluated included: clinical & demographic parameters, underlying diagnoses, respiratory support prior to CPAP therapy, airway surgical intervention if any and PSG results at baseline and on CPAP.

Results. From November 2011-October 2018, 29 infants [median age(IQR) 182 days(126-265.5)] 12F; were initiated on CPAP. Underlying aetiology included craniofacial syndromes [Trisomy 21(n = 6), Crouzon's syndrome(n = 2), Phelan- McDermid syndrome, Goldenhar Syndrome, Smith-Magenis syndrome, Poland-Moebius syndrome, Pfeiffer's syndrome, Pierre-Robin syndrome (1 of each), others(n = 5)], skeletal dysplasia(n = 2) and airway malacia (n = 8). 18(62%) infants required respiratory support (supplementary oxygen in 14, NPT in 1 and both in 3) prior to CPAP initiation. The median(IQR) Obstructive Apnoea-Hypopnea Index was 14(6.2-31) at CPAP initiation, which improved to 3.4(1.4-6.4) on CPAP. Median(IQR) $TcCo_2$ max was 56.6(49-66.5)mm at CPAP initiation, which with no significant change on CPAP [54.9(47-62 mm)]. 17 children needed surgical airway intervention (13 pre-CPAP initiation and 4 post). 15(52%) children were still using CPAP therapy with 9 successfully weaned, 2 tracheostomized, 2 were non-tolerant and 1 child with Poland-Moebius syndrome had died.

Conclusion. Home CPAP therapy is an effective way management strategy in severe OSA in infancy. CPAP therapy can be weaned even if initiated early. Prospective studies with pre-defined criteria for CPAP initiation and cessation would help ascertain long term outcomes in this poorly researched group.

Key Words. OSA, CPAP, Cranio-facial syndromes
Grant Support: None

ASSESSMENT OF NEURAL RESPIRATORY DRIVE IN PRETERM INFANTS USING TRANSCUTANEOUS ELECTROMYOGRAM OF THE DIAPHRAGM

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Introduction/Aim. Diaphragm electromyography (EMGdi) reflects the neural respiratory drive of the diaphragm. EMGdi measured using an invasive electrode-embedded catheter is increasingly being used to monitor and manage respiratory support. We aimed to investigate the feasibility of measuring EMGdi using transcutaneous electrodes (tcEMGdi) in preterm infants.

Methods. This was a prospective observational cohort study of clinically stable preterm infants breathing in room air. Transcutaneous electrodes were placed on the skin overlying right lower chest wall to record tcEMGdi over a minimum of 5 minutes during sleep. Good quality tcEMGdi were manually analysed to determine the magnitude of tcEMGdi (peak-to-trough) over 10 consecutive stable breaths in three separate time periods (T1, T2, T3) at least 30 seconds apart.

Results. Good quality tcEMGdi were recorded from 13 out of 19 infants recruited (68.4%; 9 male infants; mean corrected gestational age (CGA) $36 + 2$ weeks (range $35 + 2 - 37 + 2$ weeks), weight 2.29 (0.19) kg). Mean (SD) tcEMGdi was 13.1 (4.6) μV, which was not significantly associated with CGA ($P = 0.77$) and weight ($P = 0.85$). Intra-class correlation coefficient (ICC) of tcEMGdi between T1 and T3 was high (0.94; 95% CI 0.86-0.98, $P < 0.01$). There was also a high degree of correlation between mean tcEMGdi over 10 breaths compared to 30 breaths (ICC 0.99, 95% CI 0.96-0.99, $P < 0.01$). Bland-altman analysis also demonstrated good agreement between tcEMGdi within occasions (T1 and T3), and measured over 10 vs 30 breaths.

Conclusion. Recording EMGdi using transcutaneous electrodes from preterm neonates was feasible. Reliable tcEMGdi was recorded within occasions, and measurement of tcEMGdi over 10 breaths has good agreement with measurement over 30 breaths.
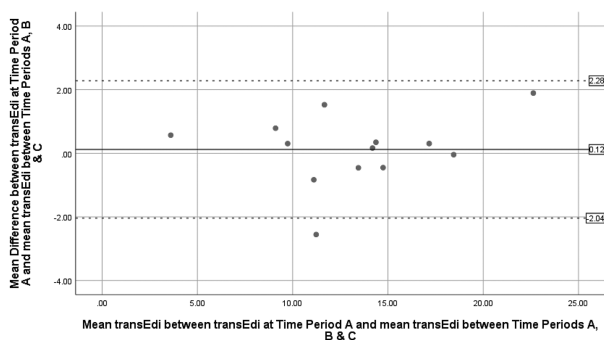
IMPROVING BRONCHIECTASIS EDUCATION FOR INDIGENOUS POPULATIONS THROUGH A MULTI-LINGUAL CULTURALLY APPROPRIATE MOBILE APPLICATION (APP)

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Introduction/Aim. Bronchiectasis is a major contributor to chronic lung morbidity and mortality, particularly among Indigenous people in the Northern Territory (1 in 68). To address this, culturally-appropriate and innovative interventions are needed. Our aims were to i) develop an Indigenous-specific multi-lingual digital platform (smartphone App and web-based) for bronchiectasis education; and to ii) evaluate whether a digital platform improves knowledge and understanding of bronchiectasis among Indigenous carers of children who have bronchiectasis.

Methods. Developing the digital platform involved (1) agreement on functionality, features of the app and content using graphics from our previous flipchart; (2) mapping out the application, functionality and content with user experience and interface designs, followed by; (3) wireframe and high-fidelity mock-up; (4) inclusion of voice recordings from 7 Aboriginal languages and; (5) ongoing user testing and feedback, stabilisation, alpha and beta testing prior to publishing to App stores (Apple app and Google store).

Evaluating the App involves a before and after study. Thirty Indigenous carers from Darwin will be enrolled. Carers will undertake a pre-education questionnaire, followed by bronchiectasis education using the App. A post-education questionnaire will be administered after going through the App. Urban carers who consent, will repeat the post-education questionnaire two weeks later to assesses further knowledge retention.

Results. The digital App is in the final stages of development and testing. Recruitment for the evaluation component will commence in November 2019.

Conclusion. Education in the form of mobile Apps is an innovative method of communicating health messages to culturally and linguistically diverse groups. The bronchiectasis App has the potential to improve community knowledge by increasing access and usability of health education once only delivered in health centres.

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EXPLORING THE RELATIONSHIP BETWEEN THE GUT MICROBIOME AND OBSTRUCTIVE SLEEP APNOEA IN CHILDREN

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Introduction/Aim. Recent animal models of obstructive sleep apnoea (OSA) have suggested the presence of gut dysbiosis in patients with OSA, which has not been explored in children with OSA. Here, we aim to establish whether gut inflammation and gut dysbiosis exist in children with OSA compared to age- and gender-matched, healthy controls (HC).

Methods. This is a single-center, prospective cohort study conducted at Sydney Children's Hospital (SCH) in Randwick. Children diagnosed with moderate-severe OSA (obstructive apnoea hypopnea index (OAHI) > 5/h) and HCs completed a clinical survey (including athropometric data, symptoms of sleep-disordered breathing and gastrointestinal symptoms) and provided a stool sample. Faecal 16S rRNA sequencing (V4 region) and faecal calprotectin analysis were performed. Statistical analyses were conducted using RStudio (v3.4.4).

Results. 15 OSA and 15 HCs children were recruited (11 male (73.33%) in each cohort; mean (SD) age for OSA and HC were 6.11 years (3.86) and 5.69 years (3.84), respectively). Median (IQR) OAHI in the OSA children were 14.50/h (10.4-30.2). There was no significant difference between faecal calprotectin levels between children with and without OSA (estimated mean difference 153.71 [SE 157.1]; *P = 0.34*). Markers of gut dysbiosis including stool alpha diversities (Shannon and Chao1) (*P = 0.63 and 0.88)* and beta diversities (weighted Bray Curtis) (*P = 0.22)* did not differ between OSA and HCs. ANCOM analysis of the relative abundances of bacterial taxa revealed no significant differences between OSA and HC samples.

Conclusion. There was no significant difference in markers of gut inflammation and dysbiosis between children with and without OSA in this pilot study. A larger cohort is needed to confirm this finding.

Grant Support: Nil

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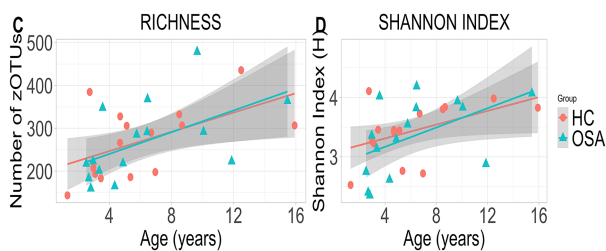
VALIDATION OF THE MORGAN ET AL. METRIC TOOL TO PREDICT DECLINE IN FEV1 (%PRED.) IN PATIENTS WITH CYSTIC FIBROSIS

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Introduction/Aim. Recently, Morgan et al. proposed that calculating the median deviation from a patient's best FEV_1 over a 2-year period can greatly improve the prediction and identification of Cystic Fibrosis (CF) patients at risk of FEV_1 %$_{pred}$ decline [1]. The aim of this study is to assess the validity of the Morgan et al. metric tool in predicting future FEV_1 %$_{pred}$ changes in a retrospective sample of our CF cohort.

Method. Baseline spirometry data (collected between 2015-2016) was analysed using the Morgan et al. metric tool to predict patients future decline in FEV_1 %$_{pred}$ during a 2-year follow-up period (2017-2018). A Wilcoxon signed rank test was used to compare the predicted FEV_1 %$_{pred}$ change to the patient's actual change seen during the follow-up period.

Results. 50 patients with CF were randomly selected for assessment using the Morgan et al. metric tool. The metric tool predicted that 8 patients would experience a rise in FEV_1 %$_{pred}$ and 42 would experience a decline. However, after the follow-up period, 20 patients experienced a rise in FEV_1 %$_{pred}$ and 30 experienced a decline. The magnitude of the FEV_1 variability in the baseline period compared to follow-up did not differ significantly (*P = 0.94*). For our cohort, the Morgan et al. metric tool predicted a median change in FEV_1 %$_{pred}$ of -2.19% (range: -12%, 2%). The actual median change observed in the follow-up period was -2.46% (range -23.1%, 9.5%). We found no significant difference between the Morgan et al. metric tool prediction and the actual change observed (*P = 0.24*) in our cohort.

Conclusion. The Morgan et al. metric tool appears to correlate well with actual changes in FEV %$_{pred}$ within a portion of our CF cohort. Further analysis is needed with a larger cohort to better assess the validity of this metric tool.

Key Words: spirometry, FEV1 variability, Cystic Fibrosis, Morgan metric tool

Grant Support: None

Reference:

1. Morgan WJ, Van Devanter DR, Pasta DJ, Foreman AJ, Wagener JS, Konstan MW. J Pediatr 2016;169:116–21.

USING BRONCHIECTASIS ACTION MANAGEMENT PLANS (BAMP) FOR CHILDREN WITH BRONCHIECTASIS – CAN IT IMPROVE CLINICAL CARE?

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Introduction/Aim. Bronchiectasis is a major contributor to chronic lung morbidity and mortality but remains a neglected disease in respiratory health. Currently, few high-level evidence-based management strategies are available for children with bronchiectasis. Thus, strategies to improve clinical outcomes associated with exacerbations are important and needed. In asthma and chronic obstructive pulmonary disease, use of personalized written management plans have been shown to improve clinical outcomes. We thus undertook a review of the current literature, to determine available evidence, to establish whether a personalised written bronchiectasis action management plan (BAMP) improves clinical outcomes in children with bronchiectasis.

Methods. We conducted a review of the literature and planned to include all observational studies and randomised controlled trials (RCT) using parallel group design that compared the use of a BAMP versus a control group for children with bronchiectasis. Children were eligible if they were aged <19-years and had a high-resolution computed tomography diagnosis of bronchiectasis. Children were excluded if their bronchiectasis was related to cystic fibrosis or interstitial lung disease.

Results. 43 potentially relevant articles were identified from our searches. 16 duplicates were removed, 27 articles were screened and 23 articles were excluded on title or abstract. Four full text articles were reviewed and subsequently excluded. No study (RCT or observational) met the inclusion criteria for this review.

Conclusion. In the absence of published studies, we are unable to determine whether routine use of a written BAMP improves clinical outcomes for children. There is a need for high-quality RCTs to determine the effectiveness of a BAMP that includes a comparative group of usual care to assess improvement in clinical outcomes for children with bronchiectasis.

MOBILE PHONE VIDEO RECORDINGS TO ASSIST IN THE DIAGNOSIS OF OBSTRUCTIVE SLEEP APNOEA IN CHILDREN

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Introduction/Aim. Despite parents often bringing in mobile phone video recordings (MPVR) to consultations there is currently no evidence available to evaluate the role of a short MPVR to diagnose paediatric obstructive sleep apnoea (OSA). Our aim was to determine if a standardised scoring system for MPVR of sleeping children predicts the results obtained from overnight polysomnography (PSG), the current gold standard.

Methods. Inclusion criteria consisted of typically developing children aged between 1 and 16 years who were undergoing PSG for suspected OSA. Instructions were provided to eligible families who gave consent. Videos were taken around the time of the PSG and were to capture breathing patterns that parents were concerned about. Videos were scored by an experienced sleep physician blinded to the clinical history. 5 components were scored: inspiratory obstructive noises (1-4), presence of obstructive events (0-1), increased work of breathing (WOB) (0-1), mouth breathing (0-1) and neck extension (0-1). The total score was plotted against obstructive apnoea hypopnoea index (OAHI) using a receiver operating characteristic curve and the area under the curve (aROC) calculated.

Results. 48 videos were received, with 36 suitable for scoring (12 too dark or WOB unable to be assessed). Distribution of video test score by PSG results graph is attached. Only inspiratory obstructed noises (r_s = 0.52, P < 0.001) and increased WOB (r_s = 0.39, P = 0.01) significantly correlated with the OAHI. Using OAHI >5/h to define moderate-severe OSA, a clinically acceptable aROC was achieved for the total score (0.72 95%CI 0.56-0.89). For a total score ≥ 3, the sensitivity was 100%, specificity 40%, positive predictive value 57% and negative predictive value 100%.

Conclusion. A repeatable MPVR scoring system for OSA has been derived and validated in this prospective study. A total score ≥ 3 has a 100% probability that the patient does not have moderate-severe OSA.

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IN LOW BIRTH INFANTS, THE AIRWAY SMOOTH MUSCLE LAYER COMPRISES AN INCREASED NUMBER OF SMALLER CELLS AND PROPORTIONALLY GREATER EXTRACELLULAR MATRIX

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Introduction/Aim. Individuals born with low birth weight (LBW) have poorer respiratory outcomes later in life. Structural abnormalities of the airway smooth muscle (ASM) layer in low birth weight individuals may increase susceptibility to respiratory impairment. The aim of this study was to compare the structure of the ASM layer at term of infants born with low birth weight and average birth weight (ABW).

Methods. Airways from post-mortem cases were available from infants born at term that were classified as ABW (>2.5 kg, n = 8) or LBW (<2.5 kg, n = 6). The ASM layer thickness was calculated from area divided by the perimeter of basement membrane (P_{bm}) determined by planimetry. Number of ASM cells per airway length (N_L) and ASM cell volume (V_C) were estimated using stereological techniques. Proportions of the ASM (V_{VASM}) and extracellular matrix (V_{VECM}) within the ASM layer were measured by point counting.

Results. P_{bm} between the groups were similar ($P = 0.778$), suggesting no difference in airway size. While there was no difference in the thickness of the ASM layer ($P = 0.987$), V_C was reduced ($P = 0.037$) and N_L increased ($P = 0.011$) in the LBW compared with ABW group. Proportions of extracellular matrix also differed; V_{VECM} within the LBW group was increased compared with ABW ($P = 0.022$).

Conclusion. In LBW infants the ASM layer is abnormal, characterised by an increased number of smaller ASM cells and proportionally greater extracellular matrix. We propose that such structural abnormalities contribute to functional impairment observed in later life.

Declaration of Interest Statement. None.

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REFINING DIAGNOSTIC CRITERIA FOR PAEDIATRIC BRONCHIECTASIS USING LOW-DOSE COMPUTED TOMOGRAPHY (CT) SCANNING PROTOCOLS

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Introduction/Aim. Current diagnostic criteria for bronchiectasis have been extrapolated from adult studies and are likely inappropriate for children. Our aim is to derive paediatric-specific criteria for the diagnosis of bronchiectasis using low-dose CT scanning protocols.

Methods. Two paediatric radiologists (JB and AL) and a paediatric respiratory physician (DW), blinded to each other's observations, performed measurements on 252 axial slices from 43 paediatric patients (age range 0-19 years) undergoing awake low-dose CT chest imaging for non-respiratory indication. Inner and outer bronchial wall short-axis, long-axis measurements (ISA = inner short-axis, ILA = inner long-axis, OSA = outer short-axis, OLA = outer long-axis) and accompanying vessel (ASA = arterial short-axis, ALA = arterial long-axis) were obtained using a standardised protocol. Inter-observer reliability with intraclass correlation coefficient (ICC) was assessed. BAR1a (ISA/ASA), BAR1b (ILA/ALA), BAR2a (OSA/ASA), BAR2b (OLA/ALA) measurements, with mean BAR (mean ± 2SD) regression analyses comparing BAR and age were performed to determine age-specific threshold values for BAR.

Results. 43 patients were included in the study. Average age ± SD was 12.2 ± 3.6 years. ICC was high for ISA, ILA, OSA, OLA, ASA and ALA (0.955, 0.948, 0.920, 0.944, 0.963, 0.973 respectively). Mean BAR-±2SD measurements for BAR1a, BAR1b, BAR2a and BAR2b was 0.63 ± 0.22, 0.64 ± 0.21, 1.01 ± 0.35, 1.00 ± 0.36 respectively. BAR1a showed the strongest correlation with age on linear regression, R = 0.324, $R^2 = 0.105$, $P = 0.034$, hence, the upper limit of normal for BAR (defined by mean ± 2SD) across all paediatric ages was 0.85.

Conclusion. CT-derived BARs are lower in children compared to adults and are positively correlated with age. Age-specific BAR cut-offs should be employed for the accurate diagnosis of paediatric bronchiectasis. BAR calculation using ISA/ASA is recommended.

PERINATAL PREDICTORS OF LUNG FUNCTION IN EARLY CHILDHOOD

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Introduction/Aim. The antenatal environment is a period of rapid lung growth and insults during this period could have long-term consequences on respiratory health. North West Tasmania, a regional and rural area, represents a resource-limited setting with lower SES, high smoking prevalence during pregnancy, and higher Indigenous population proportions compared to national averages. The aim of the study was to determine the associations of such perinatal risk factors with lung function in early childhood (age 6-8 years).

Methods. A cross sectional study of children in school grades 1 and 2, part of an asthma prevalence study, who were able to perform acceptable spirometry. Baseline spirometric measures were linked to their perinatal information via a clinical data linkage process. Descriptive statistics were employed and associations were determined by multilinear regression analyses.

Results. Baseline characteristics for the 273 children included: equal gender distribution, Indigenous 9.6%, and the majority (81.7%) attended public schools. Maternal characteristics: mean age 29.25.8 years, antenatal smoking 27.2%, primiparous 39.6% and breastfeeding in 81.5%. The average birthweight was 3496 559 g), with low birthweight in 4.8%. Only increasing birth weight (positive) and antenatal smoking exposure (negative) showed statistically significant association with routine spirometric measures (FEV_1, FVC and MMEF). Birth order, maternal age, SES, remoteness and presentation to emergency department with respiratory illness in the first 2 years of life showed no statistically significant association with lung function at early school-age.

Conclusion. We have demonstrated modifiable risk factors in the antenatal period impacting on lung function in early childhood. This has implications for health service delivery in a region already experiencing resource limitations.

Abbreviations. FEV_1: forced expiratory volume in 1 second, FVC: forced vital capacity and MMEF: mid-expiratory flowrate, SES: socio-economic status

IMPEDANCE CARDIOGRAPHY ESTIMATE OF THE Q̇-V̇O2 RELATIONSHIP IN PULMONARY HYPERTENSION

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Introduction/Aim. The assessment of cardiac function, specifically cardiac output(Q̇), is one of the most robust indicators of right ventricular function and prognosis in pulmonary arterial hypertension (PH). Impedance cardiography (IC), is non-invasive, easily accessible and can be used at rest and exercise. Preliminary studies, have suggested IC estimates of Q̇ during exercise may be inaccurate(1). One indirect method of validation is to examine the relationship between Q̇ and oxygen uptake(V̇O_2) during exercise, which is well established. The aim of this study was to investigate the Q̇-V̇O_2 relationship in a group of PH participants through IC.

Method. In this preliminary study, 5 medically stable individuals with PH(WHO Functional class II-III) were recruited. All participants completed an incremental exercise test (CPET), to establish peak exercise capacity and on a separate day a submaximal CPET at 30 and 60% of their respective peak workload. During exercise Q̇ was measured using IC (PhysioFlow,) and V̇O_2 measured using open circuit spirometry (Metamax) simultaneously. The Q̇-V̇O_2 was estimated per participant using resting and exercise data.

Results. The mean peak workload for the group was 91 ± 20 W. During the submaximal exercise test, there was a significant increase in Q̇(Rest: 5.2 ± 1.1; 30%: 7.4 ± 2.0; 60%: 10.2 ± 3.8 L.min^{-1}), V̇O_2(Rest: 0.33 ± 0.06; 30%: 0.68 ± 0.04; 60%:1.03 ± 0.14 L.min^{-1}), heart rate(Rest: 74 ± 17; 30%: 94 ± 16, 60%: 113 ± 17 beats.min^{-1}) and stroke volume(Rest: 76.9 ± 38.4, 30%: 83.4 ± 39.3, 60% 95.8 ± 51.2 mL^{-1}). The mean slope of the Q̇-V̇O_2 relationship was 5.9 ± 4.1 (range 1.8-10.8) which compares favourably with the mean slope from previous studies of 5.5 ± 0.5(2).

Conclusion. The results of this preliminary study suggest that when Q̇ is measured using IC, the Q̇-V̇O_2 relationship was similar to that reported by others. However, there was marked variance in the response and further studies are warranted in the PH population.

Key Words. Impedance Cardiography, Cardiac Output, Oxygen uptake, Exercise, Pulmonary Hypertension

Nomination for New Investigator Award: No

Declaration of interest statement: The author declares that there is no conflict of interest.

References:

1. Panagiotou M, et al. Validation of impedance cardiography in pulmonary arterial hypertension. *Clin Physiol Funct Imaging*. 2018; 254-260.

2. Faulkner SH, et al. Reducing muscle temperature drop after warm-up improves sprint cycling performance. *Med Sci Sports Exerc*. 1977; 148-154

BENRALIZUMAB IMPROVES RESPIRATORY RESISTANCE IN PATIENTS WITH SEVERE EOSINOPHILIC ASTHMA

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Introduction/Aim. Benralizumab, an anti-interleukin 5 receptor α monoclonal antibody, is used for the treatment of severe eosinophilic asthma in Australia. Small airway function is abnormal in severe asthma contributing to symptom burden. The effect of benralizumab on lung mechanics measured by the forced oscillation technique (FOT) has not been described. We sought to describe changes in FOT measures, in patients naïve to monoclonals commencing benralizumab.

Method. Patients with severe eosinophilic asthma on high-dose inhaled corticosteroids/long-acting β2-agonist treatment had the following assessments at baseline (week0) and 4 weeks after commencing benralizumab: 5-item Asthma Control Questionnaire (ACQ-5), Asthma Control Test (ACT), spirometry, and FOT to derive respiratory system resistance and reactance at 5 Hz (R5 and X5, respectively). All other asthma treatment was unchanged. Paired t-test, Pearson and Spearman correlations were performed.

Results. 10 patients (6 males) have been studied, with mean $\pm$ SD age 51 ± 19 yrs, BMI 27 ± 5.3 kg/m^2, eosinophil count 1.0 ± 0.4x10^9/L, FEV$_1$-post bronchodilator (post-BD) 60 ± 22%predicted, FEV$_1$/FVC 57 ± 15%. Eosinophil count was undetectable and ACQ-5 and ACT improved significantly from 2.7 ± 0.75 to 1.4 ± 0.78, $P = 0.001$ and 13 ± 5 to 19 ± 4, $P = 0.002$ at week 4. No significant improvements were seen in FEV$_1$, R5 or X5. The change in ACT correlated with a change in both R5 and FEV$_1$ post-BD (r = -0.778, $P = 0.008$; r = 0.717, $P = 0.009$). The change in ACQ-5 correlated with change in FEV$_1$ post-BD (-0.793, $P = 0.002$) but did not reach significance for change in R5 (0.610, $P = 0.061$). Only baseline R5 correlated with change in ACQ-5 (-0.650, $P = 0.03$). No associations were seen with X5.

Conclusion. In this preliminary analysis, asthma symptom control improved as early as 4 weeks after commencing benralizumab. The change in airway function is variable between patients, but correlates with the change in symptoms. Furthermore, baseline resistance was related to subsequent improvements in symptoms, suggesting a potential role in predicting treatment response.

Key Words. FOT, benralizumab, eosinophilic Asthma

ASSESSMENT OF FALSE POSITIVE GAS DIFFUSION ANALYSIS BY GLOBAL LUNG FUNCTION INITIATIVE (GLI) PREDICTED VALUES

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Introduction/Aim. The Global Lung Initiative (GLI) recommend that, gas diffusion (DLCO) measurements should not be corrected for haemoglobin (Hb) levels. However, not taking this into account in DLCO interpretation may result in significant false positive rates.

Methods. A retrospective cohort study of lung function database results of patients at the Princess Alexandra Hospital who had undergone CO diffusion measurements was conducted. The gas diffusion results by GLI predicted values were compared with Hb corrected Beckmann predicted values. This was done across a range of Hb values as well as within high-risk patient groups, namely Haematology, Medical Oncology and Hepatology. A false positive was defined as a result falling below the 95th confidence interval but within the reference range after applying the correction for measured haemoglobin.

Results. 3792 patient results were compared, with an overall false positive rate of just 3.8%. Of these, below a Hb threshold of 80, 100 and 120 there were false positive rates of 13.8%, 13.2% and 9.1% respectively. There were significant differences between corrected and uncorrected DLCO where Hb was below 120 ($P < 0.001$). 319 Haematology, 118 Medical Oncology and 190 Hepatology patients were identified, with false positive rates of 11.91%, 6.78% and 4.74% respectively. There was a significant difference between corrected and uncorrected DLCO in Haematology patients ($P < 0.001$).

Conclusion. Our results indicated a significant difference between corrected and uncorrected DLCO based on Hb bands, suggesting a need to correct DLCO below a Hb threshold of 120. A significant difference was also noted in Haematology patients, highlighting a possible need to consider correction of DLCO in this particular group given their lower mean Hb levels compared to the cohort as a whole.

A NOVEL NON-INVASIVE INDEX OF OXYGENATION AND PREDICTION OF OUTCOMES FOR PATIENTS ON HIGH-FLOW NASAL CANNULA

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Introduction/Aim. Acute respiratory failure (ARF) is a major cause of morbidity and mortality. Predicting patient trajectory has important ramifications. Current tools are limited either by invasiveness or unreliable data points. We explored the utility of a novel non-invasive index of oxygenation (flow x FiO2/SpO2) at predicting outcomes in patients with ARF managed with high flow nasal prongs (HFNP).

Methods. This is a retrospective cohort of patients treated with HFNP from July 2018 to June 2019. Patients were included if they were treated by a respiratory physician, aged 18-85, and had a diagnosis of ARF. Exclusion criteria included post-operative use of HFNP, or the indication for HFNP was not clear. The index was compared to the ROX index for external validation.

Results. Preliminary analysis of 39 patients is reported. The average age was 57 years and 54% of patients were female. The most common indication for HFNP was COPD (38%), followed by community acquired pneumonia (20%). HFNP use was successful in avoiding intensive care, mechanical ventilation and non-invasive ventilation (NIV) in 76.9% of cases., with escalation to NIV the most common outcome in those who failed HFNP. 2 patients died. At 24 hours, the median index score in the success group was 10.7, and 21.5 in the failure group ($P = 0.004$) with no statistical difference at other time points. Divergence in the ROX index for success vs failure occurred at 2 hours (9.7 vs 15.6, $P = 0.004$) and continued to 24 hours.

Conclusion. After preliminary analysis, our novel index was able to predict success of HFNP in ARF at 24 hours. The ROX index performed well in this cohort at a different raw value, potentially explained by a different study population. Further patient numbers are required to determine the precise transition point of this new index and further predictors of success.

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Conflict of Interest: No conflict of interest to declare by any of the authors.

RESPIRATORY OSCILLOMETRY IN THE LONGITUDINAL ASSESSMENT OF ASTHMA IN THE CLINIC

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Introduction. Asthma management requires regular assessment of symptoms and monitoring of airway function. The forced oscillation technique (FOT) measures respiratory system impedance and can be an alternative physiologic measure to spirometry. The longitudinal concordance between FOT, spirometry and symptoms has not been described. We examined these relationships in patients with asthma who had attended multiple clinic visits.

Methods. Patients with asthma attending a tertiary Airways clinic completed FOT (Tremoflo C-100, Thorasys, Montreal), spirometry (Masterlab, Jaeger, Hoechberg), and the asthma control test (ACT) at each visit. FOT parameters examined included resistance (R5) and reactance (X5) at 5 Hz. A significant change between visits was defined as: $\geq 17.4\%$ or $\geq 0.96 cmH_2O.s.L^{-1}$ for R5 and $\geq 36.7\%$ or $\geq 0.50 cmH_2O.s.L^{-1}$ for X5[1]; $\geq 8\%$ or 150 mL for FEV_1 or FVC[2]; and ≥ 3 for ACT. Correlation and agreement between measures was assessed using Spearman's coefficient (r_s) and Cohen's Kappa (κ).

Results. 120 patients with at least two visits were identified. Preliminary data for 42 patients (19 male) with 4 ± 2 clinic visits are presented (mean$\pm$SD: age 56 ± 19 yrs, BMI 27.1 ± 5.2 kg/m^{2}, %predictedFEV_1 $66\pm2\%$, %predictedFVC $90\pm18\%$, ACT score 17 ± 5). X5 was strongly correlated with spirometry (FEV_1 $r_s = 0.51$, FVC $r_s = 0.48$, $P < 0.01$). Of the FOT parameters, X5 had the best agreement with FEV_1 in identifying either any change ($\kappa > 0.51$, sensitivity >75%, specificity >72%;) or a significant change (FEV_1 $\kappa > 0.33$, sensitivity >52%, specificity >80%). Similar agreement was seen between X5 and FVC. The change in ACT had poor agreement with change in either FOT or spirometry.

Conclusion. In the longitudinal assessment of asthma, respiratory reactance is highly specific and moderately sensitive in detecting changes as determined by spirometry. Both spirometry and FOT correlate poorly with the change in symptoms between visits highlighting the importance of objective lung function testing in asthma.

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[1] E. Oostveen *et al*., Respiratory impedance in healthy subjects: baseline values and bronchodilator response. *Eur Respir J,* 2013, 6: 1513-1523

[2] R. Pellegrino *et al*., Interpretative strategies for lung function tests. *Eur Respir J*, 2005, 26: 948-968

DYNAMIC HYPERINFLATION AND INCREASED OXYGEN CONSUMPTION DURING ACUTE EXACERBATIONS OF COPD

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Introduction. Increased dyspnoea is a cardinal feature of acute exacerbations of COPD (AECOPD). There may be several contributors including increased metabolic demand (VO_2) related to infection and/or altered work of breathing due to impaired airway function or dynamic hyperinflation. We aimed to examine the relationship in resting VO_2, lung mechanics and symptoms from admission to recovery from an AECOPD.

Methods. Patients with AECOPD were recruited within 48 hours of admission. Patients completed daily: dyspnoea scores and visual analogue scale (VAS); metabolic testing (VO_2); and post bronchodilator lung function tests, in order, forced oscillation technique (FOT) to derive resistance and reactance at 5 Hz, spirometry and inspiratory capacity (IC). Assessment was repeated 6 and 12 weeks after discharge. Data was analysed by paired t-tests and Spearman correlations.

Results. 5 patients (4 males) were recruited (mean $\pm$ SEM: age 78 ± 3y; FEV_1 39 ± 2%pred; FVC 71 ± 5%pred). FEV_1 and FOT parameters were unchanged throughout the study period. VO_2 peaked within 48 hours of admission then fell in recovery (3.82 ± 0.33 vs 3.07 ± 0.26 ml/min/kg, $P < 0.01$). Similar trends observed for respiratory frequency (Rf) (21 ± 2 vs 16 ± 2 breaths/min, $P = 0.01$) and minute ventilation (12.9 ± 1.2 vs 9.5 ± 0.6 L/min, $P < 0.01$). IC%pred increased from recruitment to recovery (57 ± 3% vs 72 ± 8%, $P = 0.02$). VO_2 across visits correlated with IC%pred ($r = -0.71$, $P < 0.01$) and Rf ($r = 0.53$, $P < 0.02$). VAS dyspnoea ($r = -0.56$, $P = 0.01$) and Rf ($r = -0.82$, $P < 0.01$) correlated with IC%pred.

Conclusion. This pilot study in patients with severe COPD shows that the metabolic demand was highest in the acute phase of an exacerbation. These findings confirm earlier studies that dynamic hyperinflation and resultant increased work of breathing at higher lung volumes, rather than airways resistance, are the predominant mechanisms contributing to increased dyspnoea during AECOPD.

IMPACT OF DIAGNOSTIC CRITERIA ON PREVALENCE OF NOCTURNAL HYPOVENTILATION IN PATIENTS UNDERGOING DIAGNOSTIC POLYSOMNOGRAPHY

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Introduction/Aim. Nocturnal hypoventilation is an increasingly recognised condition in the Australian context. We aimed to describe the prevalence of hypoventilation in our laboratory according to different diagnostic criteria.

Methods. All patients undergoing diagnostic in-laboratory polysomnography at Royal Melbourne Hospital with transcutaneous CO_2 ($TcCO_2$) monitoring between October 2017 and April 2019 were screened. Patients were excluded if paired arterial blood gases were unavailable (n = 41), $TcCO_2$ was not calibrated (n = 34) or supplemental oxygen was used (n = 0).

Increase in $PaCO_2$ of ≥ 10 mmHg across study, American Academy of Sleep Medicine-defined $TcCO_2$-based hypoventilation or > 30% of night with SpO_2 < 90% were considered consistent with hypoventilation. Where baseline SpO_2 was reduced, >30% of night with greater than 10% reduction from baseline was defined as positive.

Results. 176 patients were screened, with 96 patients meeting inclusion criteria. Patient characteristics (mean $\pm$ SD unless stated): Male (44%), age 57 ± 16.7 years, BMI 41 ± 14 kg/m^2, Wake oxygen saturation 93 ± 3%, median AHI 22 ± 31/hr and median FEV_1 66 ± 24%. 25 (26%) patients had intrinsic lung disease.

4/19 $TcCO2$ positive patients were excluded due to drift. 17/97 (17.5%) were positive by any criteria (figure). 3/4 positive oximetry patients may have been confounded by sleep apnoea.
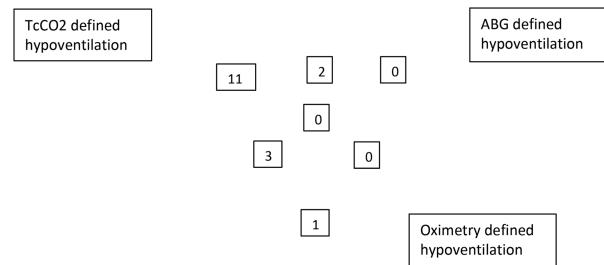
Conclusion. In patients undergoing evaluation for nocturnal hypoventilation, only 46% had complete data, highlighting difficulties in performing adequate testing. The prevalence of hypoventilation varied widely depending on diagnostic method utilised.

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DAYTIME PREDICTORS OF NOCTURNAL HYPERCAPNIC HYPOVENTILATION IN CHILDREN WITH NEUROMUSCULAR DISORDERS: A THRESHOLD FOR FVC Z-SCORE

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**Introduction/Aim.** Forced vital capacity (FVC) is identified as a potential daytime predictor of nocturnal hypercapnic hypoventilation (NHH) in children with neuromuscular disease (NMD). The 2012 Global Lung Function Initiative recommend interpreting FVC based on z-scores rather than % predicted values. We aimed to identify an FVC z-score cut off that predicts NHH and examine other daytime predictors of NHH in paediatric neuromuscular patients.

Methods. A retrospective medical record review of all paediatric neuromuscular patients who had a diagnostic sleep study over a 5 year period was performed. NHH was defined as per American Academy of Sleep Medicine critera: $TcCO_2 > 50$ mmHg for >25% of total sleep time. Spirometry, sleep study and clinical data was recorded. Statistical analysis was performed using logistic regression and receiver operator curves.

Results. Fifty-two children were included, mean age 10.2 years (5.14). NHH was diagnosed in 19 patients (37%). For the entire cohort, there was no statistically significant association between NHH and age (OR 1.02, $P = 0.75$), BMI z-score (OR 0.82, $P = 0.14$) and ambulatory status (OR 0.63, $P = 0.31$). For the subset of 30 patients who had spirometry testing (mean age 12.1 years (3.5)), there was a statistically significant association between NHH and FVC z-score (OR 0.55, $P = 0.01$), FVC % predicted (OR 0.95, $P = 0.02$) and presence of scoliosis requiring treatment (OR 4.3, $P = 0.02$) on univariate analyses. There was highly significant correlation between FVC z-score and % predicted (r = 0.99, $P = 0.00$). On multivariate logistic regression, FVC z-score remained a statistically significant predictor of NHH (OR = 0.55, $P = 0.03$). NHH was predicted by FVC z-score < -3.24 (sensitivity 79%, specificity 73%), or FVC < 60% predicted (sensitivity 79%, specificity 73%).

Conclusion. Children with NMD and low FVC z-scores warrant investigation for possible NHH. However, NHH can also be present in young children who are not able to perform lung function tests, and routine diagnostic sleep studies in these children are important.
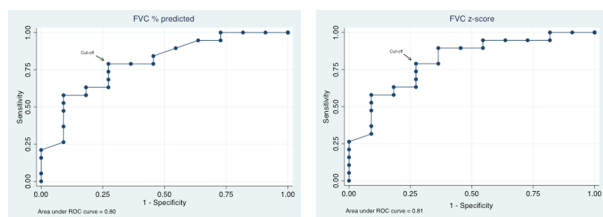
ASSESSMENT OF FVC VARIABILITY DUE TO UPPER AIRWAY HYPERRESPONSIVENESS IN BRONCHIAL PROVOCATION TESTING

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Introduction. Clinical observations suggest that upper airway hyperresponsiveness (UAHR) eg. vocal cord dysfunction may lower FVC and cause a false positive test for asthma.

Aim. To perform a retrospective audit and analysis of consecutive bronchial provocation tests performed at Newcastle Pulmonary Function Laboratory to investigate whether UAHR and inspiratory flow limitation could cause a significant fall in FVC.

Methods. Data from consecutive hypertonic saline bronchial provocation tests over a 6 month period were collected from Newcastle Pulmonary Function Laboratory's database. De-identified data including demographics, changes in FEV1, FVC and mid inspiratory flow at each dose were analysed. These data were categorised as to whether they met predetermined cut-offs for bronchial hyperresponsiveness(BHR) (FEV1 ≥ 15% fall in response to hypertonic saline), or suggestive of upper airway hyperresponsiveness(UAHR) (forced inspiratory flow at mid inspiration (FIF50) drop of ≥20% in response to hypertonic saline), grouped as either BHR+/UAHR+, BHR+/UAHR-, BHR-/UAHR+, or BHR-/UAHR-. We reviewed whether a fall in FVC was related to change in FEV1, and/or mid inspiratory flow rate changes.

Results. 118 tests had been performed, 14(11.9%) were BHR+/UAHR+, 10(8.5%) BHR+/UAHR-, 53(44.9%) BHR-/UAHR+ and BHR-/UAHR- in 41(34.7%)

Means analysis of fall in FVC was performed to compare UAHR-/BHR- results to the other 3 groups (α = 0.001). In the UAHR-/BHR- group, there was a mean FVC drop of 9.17% and in the UAHR+/BHR- group, a statistically similar drop of 10.15%. In both groups with BHR+, there was a statistically different fall of 20.9%(UAHR-/BHR+), 18.3% (UAHR+/BHR+).

Conclusion. Upper airway responsiveness was relatively common in this unselected group of patients referred for bronchial provocation testing. The hypothesis that inspiratory limitation from upper airway closure led to a reduction in FVC and a false BHR test was refuted. Further work is needed to better understand how to interpret UAHR+/BHR+ results.

BETWEEN-TEST REPEATABILITY IN FREE VS CONTROLLED BREATHING PROTOCOL IN HEALTHY ADULTS USING MULTIPLE BREATH NITROGEN WASHOUT (MBNW) TO MEASURE VENTILATION HETEROGENEITY

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Introduction/Aim. Multiple Breath Nitrogen Washout (MBNW) provides indices of ventilation heterogeneity, which may help detect early onset of small airway dysfunction. Two protocols are commonly used: free tidal breathing vs 1-L controlled breathing. We previously compared agreement between the two protocols. In this study, we aimed to establish between-session repeatability for both protocols.

Method. Healthy individuals with a smoking history <5pk-yrs performed either free breathing or 1 L-breathing protocol on the Eco Medics Exhalyzer® D system, in randomised order, according to ATS/ERS criteria. Indices were extracted from the pooled results of 3 trials/session: FRC, LCI (lung clearance index), Scond and Sacin (ventilation heterogeneity in the conductive and acinar airways, respectively). Free breathing protocol Scond and Sacin were corrected for tidal volume. Subjects returned for a second testing session within 2-10 weeks. For both protocols, between-session agreement was assessed using Bland-Altman plots; mean difference and limits of agreement (95%CI of the differences).

Results. Data from 10(8 male) individuals (age range 23-38 yrs, mean $\pm$ SD BMI 25.2 ± 4.64 kg/m^2, %predFEV$_1$ 109.4 ± 16.5, FEV1/FVC 84.77 ± 5.48%) are presented. The mean $\pm$ SD time between sessions was 7.7 ± 2.4 weeks. Mean indices derived from the 1 L-controlled breathing protocol at the first visit were FRC 3.41 ± 1.04 L, LCI 7.05 ± 0.57, Scond 0.016 ± 0.005 L^{-1}, Sacin 0.066 ± 0.024 L^{-1}. The mean differences ($\pm$limits of agreement) between the two visits are shown in the table below:

	Free Breathing	1-L Controlled Breathing
FRC, L	-0.12 ± 0.50	-0.11 ± 0.68
LCI	0.29 ± 1.02	0.24 ± 0.90
Scond, L^{-1}	0.007 ± 0.021	0.001 ± 0.014
Sacin, L^{-1}	0.014 ± 0.078	-0.003 ± 0.030

Conclusion. Between-session repeatability of MBNW indices was generally greater in the free breathing protocol. The limits of agreement for 1 L-breathing are comparable to previously published next-day repeatability for a validated in-house device (Scond ±0.003 L^{-1} and Sacin ±0.029 L^{-1}, (Jetmalani et al 2016)). These values facilitate the interpretation of any observed differences due to protocol, disease, or treatment.

Key Words. Multiple Breath Nitrogen Washout (MBNW), repeatability

Grant Support: No

VENOUS BLOOD GASES: A SUITABLE SUBSTITUTE FOR ARTERIAL BLOOD GASES DURING OVERNIGHT SLEEP STUDIES?

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Introduction/Aim. Arterial blood gas (ABG) analysis is the cornerstone investigation in the diagnosis and management of hypercapnic respiratory failure. ABG samples can be painful and difficult to collect and are associated with known complications. Venous blood gases (VBGs) are more readily obtained and may be a useful alternative in stable patients with chronic illness, but data are limited. We examined the agreement between ABG and VBG measures of carbon dioxide tension (PCO$_2$), pH, oxygen tension (PO$_2$) and oxygen saturation (SO$_2$) in sleep and ventilation studies.

Methods. Adults having sleep studies requiring ABGs for investigation and/or treatment of known or potential hypercapnic respiratory failure had a paired VBG taken before or after each ABG in randomised order. Correlation and agreement by modified Bland-Altman plot were examined.

Results. We analysed 115 VBG-ABG pairs from 61 patients. Arterial and venous measures were correlated (with $P < 0.05$) for PCO$_2$ (r = 0.84) and pH (r = 0.72), but not PO$_2$ or SO$_2$. Adjusted mean veno-arterial differences (95% limits of agreement) were + 5.0 mmHg (-4.4 to +14.4) for PCO$_2$, -0.02 (-0.09 to +0.04) for pH; -34.3 mmHg (-78.5 to +10.0) for PO$_2$; and -23.9% (-61.3 to +13.5) for SO$_2$. PCO$_2$ estimated from VBGs obtained from the back of the hand demonstrated reduced mean PCO$_2$ veno-arterial difference ($P < 0.01$).

Conclusion. VBGs are inadequate surrogates for ABG measures of PCO$_2$, PO$_2$ and SO$_2$ where precision is important, such as in titrating chronic ventilation, while pH measures demonstrate arguably better agreement. VBGs may be useful in estimating ABG values where the limits of agreement are understood by the practitioner.

Grant Support:

TP 202

DOES THE ADDITION OF AN EXTERNAL HUMIDIFIER TO A NON-INVASIVE VENTILATION CIRCUIT EFFECT PRESSURE? A LABORATORY STUDY

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Introduction/Aim. Patients frequently perceive pressure reduction with the addition of an external humidifier when using life support non-invasive ventilation (NIV). We aimed to determine pressures measured at the machine and mask ends of the breathing circuit, without and with a humidifier.

Methods. A bench-top experimental study was performed using a Philips Trilogy 100© ventilator with inspiratory positive airway pressure (IPAP) ranging 10-22 cmH_2O (1 cmH_2O increments) and expiratory positive airways pressure (EPAP) 5 cmH_2O, and a Validyne pressure transducer (DP45) calibrated using a water manometer. Pressures were measured at machine (position 1) and mask (position 2) ends of the breathing circuit (Fisher Paykel RT202), with and without a humidifier (Fisher Paykel MR 850). Data were collected at 100 Hz using a data acquisition device (National Instruments USB-6211) and analysed with custom software.

Results. With the transducer sampling at the machine end (position 1), pressure remained stable at all settings. In position 1, IPAP 10 cmH_2O measured as 9.6 ± 0.1 (mean $\pm$ SD), and IPAP 22 cmH_2O measured as 21.3 ± 0.1 with and without external humidifier, and EPAP 5 cmH_2O consistently measured as 4.9 ± 0.1. With the pressure transducer at the mask end of circuit (position 2), IPAP 10 cmH_2O measured as 8.5 ± 0.1 without humidification and 8.3 ± 0.1 cmH_2O with humidification; and IPAP 22 cmH_2O measured as 18.8 ± 0.1 without and 18.3 ± 0.1 cmH_2O with humidification. Addition of an external humidifier resulted in relative reduction in measured inspiratory pressure ranging 0.2 to 0.5 cmH_2O when IPAP ranged 10-22 cmH_2O. At position 2, EPAP 5cmH_2O consistently measured 4.3 ± 0.1 and 4.2 ± 0.1 without and with humidification.

Conclusion. Small reductions in IPAP and EPAP at the mask end of the NIV circuit were measured with the addition of an external humidifier. Further studies are required to examine clinical implications of these pressure reductions.

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ASSESSMENT OF VENTILATION HETEROGENEITY AND RESPIRATORY MECHANICS IN STABLE AND REFRACTORY ASTHMA

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Introduction/Aim. There is poor understanding of why patients with refractory asthma are difficult to treat compared with patients who have stable well controlled asthma. Improved characterisation of asthma subgroups is necessary to aid clinical management. Airway remodelling in asthma leads to fixed airflow obstruction, which may be a protective mechanism to reduce airway hyper-responsiveness. This study aimed to assess physiological differences between subjects with stable and refractory asthma by using advanced physiological tests of ventilation heterogeneity and airway mechanics.

Method. Three groups were recruited. Healthy non-smoking controls (n = 19). Stable subjects with asthma (n = 23) who had fixed airflow obstruction due to asthma in the absence of current smoking (post-BD FEV1 < 70% predicted and FER < 0.7) and had not had an exacerbation within 12 months. Refractory group (n = 17) had poorly controlled asthma with a recent exacerbation. To assess lung function; measurements of obstruction (spirometry), ventilation heterogeneity (multi-breath nitrogen washout), respiratory system mechanics (forced oscillation technique) and asthma symptoms and control (asthma control questionnaire, ACQ,) were completed for the three study groups.

Results. No significant difference was found in spirometry, multi-breath nitrogen washout and forced oscillation technique parameters between the stable and refractory asthma groups. ACQ was the only parameter of difference between subjects with stable and refractory asthma (1.6 ± 0.8 vs 3.5 ± 1.15, $P < 0.001$). 14(82%) of the refractory group also had fixed airflow obstruction. To identify physiological indices that predict asthma control and symptoms (ACQ) stepwise multiple regression analysis was performed for all subjects. The only significant predictors of ACQ were Scond ($P = 0.006$), from multi-breath nitrogen washout, Rrs6-19 ($P = 0.041$) and Insp Xrs at 6 Hz ($P = 0.003$), from the forced oscillation technique.

Conclusion. There were no measureable physiological differences between subjects with stable and refractory asthma. Most subjects with refractory asthma also had fixed airflow obstruction. Therefore this study suggests that fixed airflow obstruction is not a protective mechanism against asthma exacerbations.

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REVIEW OF PRE-SURGICAL LUNG FUNCTION ASSESSMENT OF SCOLIOSIS PATIENTS AT ROYAL PERTH HOSPITAL

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Introduction/Aim. The optimum pre-operative Pulmonary Function Tests (PFTs) for patients with idiopathic scoliosis is unknown. Current Royal Perth Hospital (RPH) Surgical Operational Guidelines recommend pre-operative PFTs with no specification about what lung function measurements are required. Vital capacity (VC) measurements are recommended for post-operative assessment. Scoliosis patients currently undergo laboratory-based comprehensive PFTs including spirometry, DLCO, lung volumes and respiratory pressures. In addition the guidelines mandate repeat erect spirometry at the preadmission assessment appointment (PAAS).

The aim of this pilot review was to:

1. Review the RPH guidelines regarding pre and post-operative PFTs
- Establish the clinical usefulness of comprehensive PFTs as opposed to spirometry
- Assess accuracy and concordance of spirometry performed in the lab and PAAS clinic

Methods. Retrospective review of thirty patients who underwent corrective surgery for scoliosis at RPH between November 2015 and May 2017.

Results.

n = 30	Mean $\pm$ SD	# < LLN (%)
Age (yrs)	17.8 $\pm$ 3.67	-
BMI (kg/cm^2)	22.3 $\pm$ 3.9	-
FEV$_1$ (L)	3.15 $\pm$ 0.78	11 (37)
FVC (L)	3.70 $\pm$ 0.95	8 (27)
FVC$_{PAAS}$ (L) [n = 28]	3.52 $\pm$ 0.98	12 (43)
Kco (ml/min/mmHg/L)	5.37 $\pm$ 0.83	4 (13)
VA (L)	4.53 $\pm$ 1.08	10 (33)
D$_L$CO (ml/min/mmHg)	24.2 $\pm$ 5.94	10 (33)
TLC (L)	4.88 $\pm$ 1.04	5 (17)
LOS (days)	8.9 $\pm$ 3.5	-

None had post-operative respiratory complications. There was no significant difference in the length of stay between patients with normal vs abnormal lung function measures. A significant discordance between lab vs PAAS clinic VC measurements noted in 35% of patients (10.21 $\pm$ 5.68%, $P = 0.0005$).

Conclusions. Current pre and post-operative PFTs occur in accordance with RPH guidelines. The guidelines are ambiguous, there is duplication of spirometry within a short time and two different forms of lung function measures are compared pre and post operatively. There is a discrepancy between lab vs PAAS clinic spirometric measurements. The current guidelines need to be reviewed and the discrepancy between lab vs PAAS clinic spirometry warrant further investigations.

Key Words: Scoliosis, pre-operative, pulmonary function test

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LONG-TERM VARIABILITY IN OSCILLATORY IMPEDANCE IN STABLE OBSTRUCTIVE AIRWAYS DISEASES

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Introduction/Aim. The forced oscillation technique (FOT) may be used for monitoring in obstructive airways diseases, such as obliterative bronchiolitis in bone marrow transplant (BMT) recipients, asthma and COPD. FOT provides parameters of respiratory system resistance (Rrs) and reactance (Xrs) during tidal breathing. Knowing the between visit variability in stable disease, would aid clinical interpretation of Rrs and Xrs. We hypothesised that the within- and between-visit variability is increased in obstructive airways disease but differs between diseases.

Methods. 16 BMT recipients without airflow obstruction, 20 COPD and 25 asthmatic subjects underwent FOT measurements during their regular clinic visits. All subjects were clinically stable during the visits. 12 healthy controls also underwent repeated FOT measurements. Within-session variability was calculated as the standard deviation (SD) and coefficient of variation (CoV) of 3 repeated measurements of each session and between-visit variability was expressed as the SD of the mean measurements over 3 separate visits, several months apart.**Results.** Mean FEV1/FVC ratios for BMT, asthma and COPD groups were 0.78 ± 0.07, 0.64 ± 0.12 and 0.44 ± 0.16, respectively. The within- and between-visit SD of Rrs and Xrs were increased in BMT recipients ($P = 0.03$ for both) and were greatest in patients with COPD and asthma. Differences in CoV were similar to that for SD. In the entire group, within-session variability of Rrs and Xrs was related to the between-visit variability ($r_s = 0.58$, $P < 0.0001$, $r_s = 0.77$, $P < 0.0001$, respectively) and worse FEV1/FVC correlated with increased within- and between-visit SD of Xrs ($r_s = -0.38$, $P = 0.002$, $r_s = -0.46$, $P = 0.0002$, respectively).

	Healthy	BMT	Asthma	COPD
Within-session SD Rrs	0.12 (0.08-0.2)	0.19 (0.10-0.4)	0.26 (0.18-0.37)	0.24 (0.17-0.40)
Within-session SD Xrs	0.05 (0.03-0.07)	0.11 (0.04-0.15)	0.24 (0.13-0.6)	0.34 (0.17-0.68)
Between-visit SD Rrs	0.14 (0.10-0.23)	0.26 (0.17-0.39)	0.51 (0.28-0.86)	0.62 (0.44-0.86)
Between-visit SD Xrs	0.09 (0.05-0.13)	0.16 (0.10-0.26)	0.49 (0.24-0.87)	0.74 (0.39-1.1)

* Expressed as median (interquartile range) (cm H$_2$O/L/s)

Conclusion.

In clinically stable subjects, within- and between-session variability is increased in BMT recipients with normal spirometry, but is less than in asthma and COPD, where variability was similar despite worse airflow obstruction in COPD subjects. This suggests that variability of Rrs and Xrs may be used as a marker of disease progression or activity in the clinic.

MEASURING PEAK COUGH FLOW: AN EVALUATION OF DEVICES AND INTERFACES

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Introduction/Aims. Peak cough flow (PCF) is used as a measure of cough effectiveness in people with neuromuscular disease (NMD). Unlike other respiratory function tests, there are no standardised methods for measuring PCF. This study compared PCF between different devices and interfaces.

Methods. Experiment 1: Forty healthy participants performed three "weak" and three "maximal" coughs, into three devices: i) EasyOne Spirometer (PCF_{EO}), ii) Peak Flow Meter (PCF_{PFM}), iii) pneumotachometer (PCF_{PN}). Devices were connected in series and order randomised. Experiment 2: Forty healthy and NMD-affected participants performed three coughs into i) PCF_{EO} using a mouthpiece (PCF_{MP}), ii) oro-nasal facemask (PCF_{ONM}), with interface order randomised. Statistical analyses comprised paired *t*-tests and Bland-Altman plots.

Results. Experiment 1: Total coughs sampled = 540, over PCF_{PN} range = 18.5 - 535.2 L/min. PCF_{PN} was significantly higher than PCF_{EO} (mean bias (95% limits of agreement) = -6.8 L/min (-50.0 to 36.5), $P < 0.001$). There was no difference between PCF_{PN} and PCF_{PFM} (-1.56 L/min (-26.15 to 23.02, $P = 0.114$)).

Experiment 2: In participants with NMD there was no difference between PCF_{MP} and PCF_{ONM} (mean (95% CI) = -1.0 (-13.4,12.3), $P = 0.93$). In healthy participants, PCF_{MP} was greater than PCF_{ONM} (15.1 (3.0,27.2), $P = 0.01$).

Discussion. Whilst inter-device variability was small, especially between PCF_{PN} and $PCF_{PFM,}$ the device used did affect absolute values. Interface may also influence measurement, however in a NMD population this was minimal. When repeating PCF assessments over time, device and interface used should be standardised. Clinicians should also be mindful when comparing absolute values from different test procedures.

RESPIRATORY FUNCTION AND INFECTIONS IN PEOPLE WITH MOTOR NEURONE DISEASE

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Introduction & Aims. The primary cause of death in MND is respiratory failure and/or respiratory tract infection (RTI). However the rate of RTI is not clear (9-75% reported). Furthermore, knowledge of respiratory physiology comes from slowly-progressive neuromuscular disease (NMD), not rapidly-progressive disease. This study aimed to compare respiratory function and history of RTI in MND to other NMDs.

Methods. Vital capacity (VC), peak cough flow (PCF), static lung volumes, respiratory system compliance (C_{rs}), maximal inspiratory and expiratory pressures (MIP, MEP) were measured in 80 participants: 27 MND and 53 other NMDs. Respiratory function (Student's t-tests) and RTI history in the previous year were compared by disease type (MND or Other).

Results. No significant difference in MIP or MEP was found between groups (MND vs Other, mean ± SD: MIP $39 ± 19\%$ vs $47 ± 28\%$ predicted, MEP $40 ± 19\%$ vs $44 ± 23\%$ predicted). In people with MND, VC was higher ($53 ± 15\%$ vs $35 ± 17\%$ predicted, $P < 0.01$), the chest less stiff (C_{rs} $0.041 ± 0.027$ vs $0.023 ± 0.020$ L/cmH$_2$O) and fewer people reported RTIs (22% vs 53%, $P = 0.010$). History of RTI was associated with lower VC and PCF.

Discussion. People with MND had better lung capacity and were less stiff compared to those with Other NMDs. Respiratory muscle strength was similar. A lower VC and PCF were noted in people with a RTI, however the sensitivity and specificity of these measures was not high. These findings support the hypothesis that lung capacity is influenced by weakness initially, but that reduced lung or chest wall compliance may have a compounding effect.

DEPRESSION AND ANXIETY SYMPTOMS PRE AND POST CPAP IN OSA

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Introduction/Aim. The interaction of obstructive sleep apnoea (OSA) and mood symptoms is complex and multi-directional. This study aimed to assess change in Hospital Anxiety and Depression Scores (HADS) pre and post implementation of continuous positive airway pressure (CPAP) in OSA.

Methods. A retrospective cohort analysis was performed of consecutive patients attending sleep clinic, diagnosed with OSA and prescribed CPAP therapy in addition to lifestyle advice. Change in depression (HADS-D) and anxiety (HADS-A) subscales were compared between participants with high-adherence (mean nightly CPAP usage>4 hours) and low-adherence (<4 hours). Inclusion criteria included patients ≥18 years-old, English speaking, CPAP naïve with completed HADS at time of diagnostic sleep study, prescribed CPAP therapy for ≥30 days with no change in psychotropic medications.

Results. 172 patients were recruited, of whom 108 met inclusion criteria, with age (mean ± SD) 56 ± 12.8 years, BMI 37.7 ± 11.5 kg/m^2, with apnea-hypopnea-index 46.8 ± 25.5 or overnight-desaturation-index 54 ± 35.5. The median duration of CPAP therapy was 1.3 years, with nightly CPAP usage of 5.8 ± 3.0 hours, with mean pressure 10.6 ± 2.9cmH2O.

Depressive Symptoms: HADS-D significantly decreased across all patients by -1.21 ± 3.98 (n = 108, 95% CI -0.45 to -1.98, P = 0.002). Those with high-adherence (n = 84) had a tendency towards greater reduction in HADS-D -1.5 ± 4.1 compared with low-adherence (n = 24) -0.2 ± 3.5 (P = 0.16). Rates of clinically significant depression, represented by HADS-D > 8, decreased from 30% (25/84) to 18% (15/84) in those with high-adherence (P = 0.16).

Anxiety Symptoms: HADS-A also decreased across all patients -1.13 (95% CI -0.43 to -1.82, P = 0.002). There was no significant difference between adherence groups, nor rates of clinically significant anxiety (HADS-A > 11).

Conclusion. In the sleep medicine outpatient setting, CPAP appears to reduce depressive symptoms. Improvement in HADS across all patient groups may reflect the specialised care and lifestyle advice provided on attending sleep clinic. Further research is required into the effect of CPAP on patients with major depressive disorder.

Grant Support: Nil

Conflicts of Interest: Nil

SPIROMETRY TO IDENTIFY MODERATE TO SEVERE OBSTRUCTIVE SLEEP APNOEA IN COPD PATIENTS

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Introduction/Aim. The prevalence of COPD in people aged 40 and above in Australia is 7.5%. The estimated prevalence of moderate to severe obstructive sleep apnoea (OSA) is 10 to 30% in COPD patients, of whom many remain undiagnosed. The indications for polysomnography in COPD patients are not well defined. It is important therefore to identify clinical parameters that can predict the diagnosis and severity of OSA. We sought to evaluate the use of spirometry to identify moderate to severe OSA in COPD patients.

Methods. A retrospective chart review of all diagnostic sleep studies (SS) conducted in COPD patients at the Canberra Hospital from November 2017 to October 2018 and the Prince of Wales' Hospital from November 2017 to March 2018 was performed. Spearman's Rho test was used to evaluate the correlation of apnoea-hypopnea index (AHI) with FEV1, FEV1 percent predicted (FEV1%), FVC, FVC percent predicted (FVC%) and FEV1/FVC ratio. ROC (receiver operating characteristic) analysis was performed with FEV1% and FVC% as test variables to identify moderate to severe OSA. ROC analysis was also performed on age and BMI to allow comparison.

Results. A total of 27 patients were identified who had COPD, SS and spirometry. A significant negative correlation was observed between FEV1% and AHI (Spearman R -0.393, P = 0.043) as well as FVC% and AHI (Spearman R -0.634, P < 0.001). No significant correlation was observed between AHI and FEV1, FVC and FEV1/FVC ratio. The areas under the ROC curve for FEV1% and FVC% were 0.770 (P = 0.038) and 0.871 (P = 0.004) respectively. The areas under the ROC curve for age and BMI were 0.704 (P = 0.115) and 0.707 (P = 0.109) respectively but were not significant.

Conclusion. Further research should be conducted to understand the association of FEV1% and FVC% with AHI, and to evaluate the use of FEV1% and FVC% to identify moderate to severe OSA in COPD patients.

Grant Support: Nil.

THE EXCITATORY AND INHIBITORY RESPONSES TO ELECTRICAL FIELD STIMULATION IN KANGAROO AIRWAY SMOOTH MUSCLE

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Introduction/Aim. While the contraction of the airway smooth muscle (ASM) is predominantly governed by cholinergic nerves, relaxation occurs through non-adrenergic non-cholinergic pathways. Species variability offers an opportunity to reveal different mechanisms for ASM activation/deactivation that may be relevant to aberrant ASM contraction in disease and/or treatment interventions. Kangaroos use a unique hopping-mediated breathing mechanism that exposes the ASM to a different physiological (mechanical) environment compared with most other species. This study aimed to characterise excitatory and inhibitory neural control in ASM from kangaroos.

Methods. Kangaroo lungs were acquired after licensed culls and airway rings (6.0 ± 0.2 mm diameter) were isolated and stored in carbogenated Krebs solution for experimentation. Airway rings were mounted in organ bath chambers and active tension was recorded in response to electrical field stimulation (EFS) of nerve endings (30 Hz, 5 ms, 60 V). Responses were examined with and without exposure to propranolol (n = 7), L-NAME (n = 7) or indomethacin (n = 7) and normalised to the contraction induced by histamine (10^{-5} M) data are mean $\pm$ SEM.

Results. Contraction to EFS (0.13 ± 0.02 mN/mm) was blocked by atropine (0.006 ± 0.001 mN/mm; $P = 0.0001$) indicating that excitation was driven solely by cholinergic nerves. Initial EFS-induced contractions were unaffected by propranolol ($P = 0.97$) or indomethacin ($P = 0.66$) but were increased in the presence of L-Name ($88 \pm 18\%$) when compared with Control ($32 \pm 11\%$; $P = 0.02$), suggesting endogenous nitric oxide release. To assess the effects of inhibitory nerves, relaxation to EFS was measured in the presence of atropine and after pre-contraction to histamine. Relaxation to EFS was pronounced ($63 \pm 5\%$ reversal of histamine-induced contraction) and partially inhibited by propranolol ($33 \pm 2\%$; $P = 0.0005$) suggesting β-adrenergic activation.

Conclusion. These data therefore demonstrate that neurally induced ASM contraction is driven by cholinergic nerves, while inhibitory response involves both β-adrenergic and nitrergic pathways.

A FEASIBILITY STUDY OF AN AMBULATORY NON-INVASIVE VENTILATION (NIV) SET UP MODEL USING INTELLIGENT VOLUME ASSURED PRESSURE SUPPORT (IVAPS) MODE IN MND

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Introduction. In Australia, NIV initiation typically requires an in-hospital admission and/or a diagnostic polysomnogram (PSG) followed by a PSG-directed titration. However, delay in starting NIV while awaiting PSG titration results in poorer 12-month survival (Sheers,2014). Autotitrating modes of NIV such as intelligent volume assured pressure support (iVAPS, ResMed) are routinely available on home ventilators, but there is limited data regarding its use and outcomes in MND.

Aim. To evaluate the feasibility of and adherence to iVAPS in MND patients

Methods. An open label prospective study was conducted in symptomatic MND patients who presented with overnight pulse oximetry, SpO2 < 90% for >5% of total sleep time. The initial acclimatisation phase to the mask and pressurised air (20-30 minutes) occurred during an outpatient consultation (90 minutes). A cloud-based patient management system (ResMed AirView) enabled adherence monitoring and ventilator settings adjustments in the home. Respiratory consultations occurred at one, three and six months following the initiation of therapy. Ventilator data were downloaded for analysis of adherence and therapy settings.

Results. Nine MND patients enrolled: [median(IQR)], age 58(54-69) years, BMI 28.7(24.2-30.4) kg/m^2 and ALSFRS scores 37(33-41). At one-month, median(IQR) average iVAPS usage was 5.8(4.65-8.45) hours/night. Adherence at six-months increased for all patients: median average usage 7.9(6.40-9.70) hours/night. Therapy settings at six-months: [median(IQR)] expiratory positive airway pressure 8(6-9) cmH$_2$0, 95[th]percentile inspiratory positive airway pressure 14(13-16) cmH$_2$0, targeted tidal volume (V_T) 6.4(6.2-6.7) ml/kg IBW with delivered V_T of 450 (419-462) ml.

Conclusion. NIV initiation using ambulatory iVAPS set up model was feasible and achieved good adherence to therapy.

BRONCHIECTASIS ACROSS THE TOP END: UNDERSTANDING THE DEMOGRAPHIC AND CLINICAL FEATURES OF ADULT PATIENTS

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Introduction/Aim. Approximately 30% of the population in the Northern Territory (NT) of Australia identify as Aboriginal or Torres Strait Islander. Chronic respiratory conditions are known to be more prevalent in this population. Moreover, 80% of the NT's Aboriginal and Torres Strait Islander community live in remote locations. Bronchiectasis is increasingly recognised to contribute to morbidity and mortality in this population. However, there is a paucity of literature describing the clinical characteristics of Aboriginal patients with bronchiectasis living in various health districts of the Top End. This study aims to analyse the differences in demographic and clinical features amongst this patient population.

Methods. For healthcare delivery, the Top End Health Service (TEHS) is divided into four main health districts (Urban Darwin, Rural Darwin, Katherine and East Arnhem). This is a retrospective study of adult patients diagnosed with bronchiectasis over a 5 year period. Patients meeting selection criteria were analysed across the different TEHS districts for demographic features, respiratory and other co-morbidities, frequency of clinical exacerbations and the results of lung function, radiological and sputum culture tests.

Results. A total of 425 patients with a diagnosis of bronchiectasis were identified. The number of patients in the various districts was 165, 107, 96 and 57 respectively, with comparable mean age and mean body mass index. Chronic obstructive pulmonary disease (COPD) co-existed in a significant proportion of patients. Lung function was shown to be significantly impaired across the districts, with the mean FEV1 % predicted 41, 37, 48 and 42 respectively.

Conclusion. The proportion of patients with bronchiectasis varies in various health districts of the Top End, with significant rates of co-existing COPD and poor lung function. Further research is needed to explore and address underlying factors contributing to high rates of bronchiectasis and associated morbidity in this vulnerable population.

Grant Support. Nil

COMMUNITY-ACQUIRED PNEUMONIA AT ROYAL NORTH SHORE HOSPITAL – AN AUDIT OF MICROBIOLOGICAL INVESTIGATIONS AND FINDINGS

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Introduction/Aim. Microbiological investigations should guide antibiotic therapy in community-acquired pneumonia for effective treatment, to avoid unnecessary adverse effects from inappropriate treatment and to limit antimicrobial resistance. Further, local aetiological data should inform recommendations of empiric antibiotic therapy. However, such data from Australia is limited. We completed an audit of microbiological investigations performed on patients admitted to Royal North Shore Hospital under the Respiratory Department with community-acquired pneumonia to determine the frequency with which these investigations were performed, the proportion in which a definite or probable microbiological diagnosis was made and what the commonly identified organisms were.

Methods. We assessed all patients admitted with pneumonia under the Respiratory Department at Royal North Shore Hospital from the 10th of June to the 10th of September, 2018. We recorded the investigations for bacterial and viral pathogens (blood and sputum cultures, viral PCR, urinary antigen and serological tests) that were performed for each case and their results.

Results. 111 cases were identified. Viral PCR was the mostly commonly performed investigation (82%), followed by blood cultures (78%), urinary antigen testing for *S. pneumoniae* (62%) and *L. pneumophila* (62%), sputum culture (58%) and *M. pneumoniae* serology (32%). While acute serological tests for *Chlamydia* and *Legionella* species were performed in a few cases, we were unable to determine whether paired convalescent serology was performed in the outpatient setting. Pathogenic organisms were identified in 49 patients (44%), with the most common organisms being viral (26%), followed by *S. pneumoniae* (12%), *H. influenzae* (6%) and *M. pneumoniae* (4%).

Conclusion. While viral PCR was commonly performed with a high positive rate, the frequency of other microbiological investigations performed was variable. The most common pathogenic organisms were similar to those identified in previous studies. As such, current empiric antibiotic guidelines remain appropriate.

LONG-TERM IMPACT OF ANTIMICROBIAL STEWARDSHIP ON ANTIBIOTIC PRESCRIBING FOR COMMUNITY-ACQUIRED PNEUMONIA

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Introduction/Aim. Antimicrobial stewardship (AMS) encompasses measures that reduce inappropriate antimicrobial prescribing and improve management of microbial infections. Community-acquired pneumonia (CAP) is a common infection and AMS has been shown to improve patient mortality when antibiotic guidelines are followed for both empirical and targeted therapies in the management of CAP. The aim of this study is to assess the long-term impact of AMS on antibiotic prescriptions for CAP.

Method. This is a retrospective study comparing consecutive patients admitted with CAP between May-July 2014 (pre-AMS) and the corresponding 3 months in 2015 (post-AMS) and 2018 (long-term post-AMS) in a single institution. Pneumonia severity was calculated using the SMART-COP score. Compliance of antibiotics treatment was determined by adherence to current Australian antibiotic guidelines. The impact of AMS implementation was evaluated by comparing antibiotic compliance rate, inpatient mortality, readmission rate, and the length of stay.

Results. 346 CAP presentations were included (pre-AMS n = 107, post-AMS n = 104, long-term post-AMS n = 136). While the overall antibiotic compliance rate was significantly higher immediately post-AMS implementation (60.6% vs 37.4%, P = 0.001), the long-term post-AMS compliance rate returned to pre-AMS levels (43% vs 37.4%, P = 0.407). Similar patterns of prescribing compliance rates were seen for antibiotic choices covering typical (pre-AMS 45.8%, post-AMS 67.3%, long-term post-AMS 53%) and atypical organisms (55.1%, 76.9%, 67%). Inpatient mortality rates (11.5%, 11.2%, and 6%) and average length of stay (7.8, 5.9, 7.7 days) were comparable between the 3 periods.

Conclusion. The introduction of AMS demonstrated an improvement in antibiotic prescriptions in the short term, but there appears to be a drift to pre-AMS prescribing patterns over the longer term. Developing strategies to maintain effective AMS is important to reduce inappropriate antibiotic prescriptions.

Key Words. antibiotics, community-acquired pneumonia, antimicrobial stewardship

Co-authors: The co-authors for this study have approved the submission of this abstract.

BRONCHIECTASIS SEVERITY AND QUALITY OF LIFE IN NEW ZEALAND VARY ACCORDING TO SOCIOECONOMIC FACTORS AND ETHNICITY

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Introduction/Aim. The NZ Bronchiectasis Registry (NZBR) is a multi-centre, prospective, observational study enrolling consecutive patients with bronchiectasis unrelated to cystic fibrosis, in collaboration with the Australian Bronchiectasis Registry. We aimed to assess bronchiectasis severity and quality of life in patients in the NZBR.

Methods. Bronchiectasis severity was evaluated using the Bronchiectasis Severity Index (BSI) - severe bronchiectasis was defined as BSI score ≥ 9. Socioeconomic status was determined by the NZ Deprivation Index 2013 (NZDep2013). Quality of life was assessed using the Bronchiectasis Health Questionnaire (BHQ), with lower scores indicating worse health status.

Results. One hundred and fifty-five patients were enrolled across 4 sites from June 2018 to September 2019. Data were available for 141 patients. Median age was 67 years (IQR 54-74), 80 were female (56.7%), mean BMI 27.8 ± 7.3 kg/m^2 (SD), and FEV1% 68.5 ± 21.9 (SD). 53.2% were NZ European or other white ethnicity, 15.6% NZ Māori, 20.6% Pacific peoples, and 10.7% Asian or other ethnicity.

Forty percent of patients had severe bronchiectasis and mean BSI score was 8.18 ± 4.77 (SD). The "frequent exacerbator phenotype" was identified in 50.4% of patients (≥3 exacerbations in the preceding year). The proportion of patients with severe bronchiectasis was highest in Pacific peoples (14/28, 50%). NZ Māori had the most impaired quality of life (mean BHQ score 51.09 ± 9.52 [SD]), followed by Pacific peoples (60.03 ± 11.59 [SD]).

Forty-nine patients (34.8%) lived in the most deprived areas by quintile (65.3% were NZ Māori or Pacific peoples) and had the lowest mean BHQ score (56.75 ± 8.87 [SD]). 51.1% of these patients had severe bronchiectasis compared to 28.6% in the least deprived quintile.

Conclusion. This analysis of the NZ Bronchiectasis Registry indicates that these patients have high rates of severe bronchiectasis and frequent exacerbations. NZ Māori and Pacific patients endure the greatest socioeconomic deprivation and most impaired quality of life.

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LONG-TERM OUTCOMES OF ADULTS WITH ACUTE RESPIRATORY FAILURE TREATED WITH EXTRACORPOREAL MEMBRANE OXYGENATION

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Introduction/Aim. Venovenous-extracorporeal membrane oxygenation (vv-ECMO) has been increasingly used for severe but potentially reversible acute respiratory failure since 2009, however there is limited literature regarding long-term morbidity. At Royal Prince Alfred Hospital (RPAH) most patients requiring vv-ECMO have been followed-up by a single physician. The objectives were to examine the patients' respiratory, musculoskeletal and psychological functioning over time, and compare inpatient morbidity and mortality rates to international data.

Methods. Retrospective audit of inpatient and outpatient medical records from 2005–2019.

Results. 133 patients were treated with vv-ECMO from 2005-2019. The patients were young (mean age:42.5+/-14.8-years) and obese (mean BMI:30.4+/-10.4 kg/m^2). 59% were male and 58% had no-comorbidities. Median duration of ECMO was 8-days (IQR:5-13-days). Complication rates were comparable to the literature. Survival depended on the aetiology of respiratory failure (χ^2(6,N = 133) = 23.37,P = 0.0007). 68% survived until discharge; similar to the latest international registry data (59%)[1].

88/91 survivors live in Australia. 51/88 (58%) received regular follow-up with a median of 3 reviews (IQR:2-4) over 11.5-months (IQR:6.0–24.6 months). The follow-up cohort was similar to the survival cohort. Physical symptoms and signs resolve in most patients within the first year following discharge (Table 1).

Table 1. Time to resolution of respiratory and musculoskeletal symptoms and signs

Symptom/sign	% resolved at last review	Median time to resolution - months (IQR)
Dyspnoea	98%	2.5 (1.6 - 4.8)
Dyspnoea limiting exercise	84%	3.5 (2.0 - 7.1)
FVC* < 80% predicted	67%	6.0 (3.7 – 9.6)
DLCO$_{cor}$ˆ < 80% predicted	60%	9.3 (4.6 – 17.6)
Lower limb weakness	86%	3.3 (1.8 – 6.4)
Lower limb neurological signs	84%	3.7 (2.2 – 6.7)
Mobility issues	86%	2.7 (1.8 – 5.6)
Below pre-morbid level of conditioning	68%	3.8 (2.4 – 8.5)

*FVC = forced vital capacity, ˆDLCO$_{cor}$ = diffusing capacity for carbon monoxide corrected for haemoglobin

60% returned to employment at a median of 5.4-months, with 49% in full-time employment by a median of 5.6-months. 11% had not returned to work at their last review (median=17.6-months). 30% had symptoms of anxiety, depression or post-traumatic-stress-disorder. Psychological symptoms improved over time, however were still present in all patients at their last review.

Conclusion. The survival and inpatient complication rates at RPAH are similar to the international literature. Breathlessness and weakness resolve early within 6 months, with lung function abnormalities taking longer. Most patients who return to work do so by 6 months. Although psychological symptoms improve over time, they persist beyond the resolution of physical symptoms.

Reference:

[1] Extracorporeal Life Support Organisation 2019, *International Summary,* Extracorporeal Life Support Organisation, viewed 1 October 2019, <https://www.elso.org/Registry/Statistics/InternationalSummary.aspx>

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UTILITY OF BRONCHOALVEOLAR LAVAGE (BAL) GALACTOMANNAN ASSAY IN THE DIAGNOSIS OF INVASIVE PULMONARY ASPERGILLUS INFECTION IN IMMUNOCOMPETENT PATIENTS

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Introduction/Aim: The role of Bronchoalveolar lavage (BAL) Galactomannan level in diagnosis of invasive pulmonary aspergillosis (IPA) is well established in immunosuppressed patients. However, its use in non-immunocompromised patients is not well recognized.

In this study, we evaluated the utility of BAL galactomannan level in diagnosis of IPA in apparently immunocompetent patients.

Methods: We conducted a single centre retrospective cohort study at Greenslopes Private Hospital (Brisbane, Queensland). Between January 2012 to December 2018, all adult patients with primary respiratory pathology (>= 18 years old) that underwent bronchoscopy and BAL Galactomannan level (cutoff: 0.5 ODI) were reviewed. Microbiological, clinical and radiological data were extracted from patient records. Patients were then classified into proven, putative and no invasive aspergillosis guided by European Organization for Research and Treatment of Cancer/ Mycosis Study Group (EORTC/MSG) criteria [1]. Sensitivity and specificity values were then calculated for BAL galactomannan.

Results: 308 BAL samples, collected from 242 patients, were tested for galactomannan. Two patients were diagnosed with definite and twelve with putative IPA. Twenty-eight patients had positive galactomannan but were not diagnosed with IPA. Sensitivity and specificity of BAL galactomannan for proven/putative IPA was 93.3% and 84.2%, respectively with a likelihood ratio of 49.1. BAL galactomannan test had a positive predictive value of 33.3% and negative predictive value of 99.6% in our dataset.

Conclusion: In conclusion, although BAL galactomannan has a high sensitivity and specificity for invasive aspergillosis, its results in apparently immunocompetent patients should be interpreted in conjunction with clinical symptoms, radiological changes and other microbiological tests.

Grant Support: Not applicable.

Reference:

1. Stijn I. Blot, A clinical algorithm to diagnose invasive pulmonary aspergillosis in critically ill patients, Ats Journals 2012:186, 1.

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DOSES AND OUTCOMES OF INTRAPLEURAL FIBRINOLYSIS FOR PLEURAL SPACE INFECTIONS

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Introduction/Aim. The use of a combination therapy of intrapleural tissue plasminogen activator (tPA) and deoxyribonuclease (DNase) given up to twice a day for three days has been shown to improve outcomes in patients with complicated pleural infections. However, the dosing regimen of tPA/DNase in previous trials was empirically chosen based on prior small-scale data. The aim of our study was to determine the number of doses received by patients treated with intrapleural tPA/DNase and their outcomes.

Methods. A retrospective review was conducted on all patients treated for pleural space infections with intrapleural tPA/DNase in Gold Coast University Hospital between 1st April 2017 to 31st March 2019. A total of 33 cases were recorded and analysed for this study.

Results. The results of our audit showed that 17 (51.5%) out of the 33 patients treated with intrapleural fibrinolysis received 6 doses of tPA/DNase, which is the current standard dosing regimen. Out of the 17 patients, 16 patients (94.1%) showed clinical improvement in radiological and/or biochemical markers of their infection, while 1 patient (5.9%) was referred for surgical intervention due to failure of therapy. Of the 16 patients that received less than 6 doses of tPA/DNase, 14 patients (87.5%) showed improvement in their condition. 1 patient (6.3%) deteriorated and died due to sepsis, while another patient was referred for surgery. The mean hospital stay was 12.5 days in the group that received 6 doses, and 11.2 days in the group that received less than 6 doses.

Conclusion. Our results demonstrated that a majority of patients (87.5%) showed improvement with less than 6 doses of tPA/DNase. Hence, there is a need to conduct further trials to determine the optimal number of doses of tPA/DNase required to provide best patient outcomes while reducing cost burden to hospitals.

Grant Support: Nil

SINGLE TERTIARY HOSPITAL EXPERIENCE OF INTRAPLEURAL FIBRINOLYTICS IN MANAGEMENT OF PLEURAL INFECTION AND MALIGNANT PLEURAL EFFUSIONS

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Introduction/Aim. Combination intrapleural fibrinolytics are a safe and effective management option for patients with pleural infection and malignant pleural effusions. Therapy improves fluid drainage, reduces need for surgery and duration of admission by reducing viscosity and dissolving septations and loculations. Pain is a common complication and serious complications are rare. We describe our experience with this novel therapy, pleural fluid characteristics, management and complications of these patients admitted to a newly established tertiary care hospital.

Methods. Retrospective review of all patients dispensed and administered both alteplase (tPA) and deoxyribonuclease (DNAse) from January 2015 to May 2019. Patients who were only dispensed tPA or administered one of tPA or DNAse were excluded. Data were collected through electronic medical record, medication chart, investigation and dispensing records.

Results. Of 74 cases, 85.1% were admitted under Respiratory. 86.5% had pleural infections, 5.4% had malignant effusions and 8.1% had infected malignant effusions. The mean number of tPA/DNAse doses was 4.8 (SD $\pm$ 1.9) and 4.7 (SD $\pm$ 2) respectively, given via a mean 14.3 (SD $\pm$ 7.1) French chest drain. 24.3% were referred for surgical opinion, with only 8.1% undergoing decortication. 3 patients needed two courses, but did not require decortication. 32.4% had positive microbiological culture, with 28.4% with monomicrobial and 4.1% with polymicrobial infection. The most common complication was pain needing opioids (87.8%). Serious complications were rare (9.5% extravasation, 4.1% bleeding).

Conclusion. Single course combination intrapleural fibrinolytics is safe and effective for management of both infected and non-infected pleural effusions, avoiding decortication in a majority of patients. There may be an increasing role in management of non-infected malignant pleural effusions.

RETROSPECTIVE OBSERVATIONAL STUDY OF PSEUDOMONAS AERUGINOSA IN PATIENTS WITH BRONCHIECTASIS

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Introduction/Aim: *Pseudomonas aeruginosa* is a key pathogen in patients with bronchiectasis that is independently associated with poorer clinical outcomes. Currently there is a paucity of Australasian data on the characteristics and outcomes of patients with bronchiectasis who have *P. aeruginosa* cultured from lower airway secretions. The study aim was to describe the characteristics and clinical course of patients with non-cystic fibrosis bronchiectasis at Counties Manukau District Health Board (CMDHB) in Auckland, New Zealand with positive *P. aeruginosa* cultures from the lungs.

Methods: All patients at CMDHB with *P. aeruginosa* cultured from at least one airway sample between January 01 2008 and December 31 2018 were identified using inpatient and outpatient microbiology databases. Electronic clinical records identified those patients with radiologically-confirmed bronchiectasis. Patient demographics and clinical characteristics were analysed including mortality data.

Results: Three hundred and forty seven patients with bronchiectasis were identified with *P. aeruginosa* culture over the follow-up interval. The average age at time of first *P. aeruginosa* isolation was 69 years (SD 13.61) and 59.1% were female. The ethnic distribution was 37.5% NZ European, 18.2% NZ Māori and 27.7% Pacific. One hundred and eighty patients died in the follow-up period (51.9%) with 42.2% secondary to respiratory illness and 9.4% from cardiac causes. One hundred and eighty patients (51.9%) had bronchiectasis affecting ≥3 lobes and the mean FEV1 percent predicted was 55.5% (SD 23.12). 18.4% of patients had LTOT prescribed over the study period and 30.3% had macrolide therapy prescribed for at least 3 or more months. Recurrent isolation of *P. aeruginosa* was found in 51.3% of patients.

Conclusion: This retrospective observational study describes the patient characteristics of *Pseudomonas aeruginosa* infection in a large, multi-cultural region of Auckland where bronchiectasis burden is high. The mortality rate was high in these patients.

Key words. *Pseudomonas aeruginosa*, bronchiectasis, infection

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COMMUNITY ONSET ACINETOBACTER BAUMANNII PNEUMONIA: A CLINICAL DECISION TOOL

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Introduction/Aim. Community onset *Acinetobacter baumannii* pneumonia (COAP) is a rare but serious infection of tropical Australia, occurring during the wet season. The syndrome is hallmarked by a rapid progression to fulminant disease, with mortality rates exceeding 60%.[1,2] Strict adherence to antibiotic protocols may reduce mortality to 11%.[3] Early diagnosis and prompt treatment are thus crucial in mitigating mortality. Our aim was to develop a COAP score to aid diagnosis, and guide the early use of targeted antibiotics.

Methods. We conducted a retrospective cohort study on bacteraemic cases of COAP over a fifteen-year period from 2000-2014 in the Far North Queensland health district. Cases were selected on microbiologic, clinical, and radiographic parameters. Common risk factors, markers of disease severity, and biochemical data were used to create a score to guide clinical suspicion on diagnosis and rationalise antibiotic use.

Results. Records for 16 cases of Acinetobacter bacteraemic pneumonia were available and met inclusion criteria. A scoring system was developed with the criteria of; hazardous alcohol intake or current smoker (1 point), two or more risk factors (1 point), moderate SMARTCOP score (1 point), severe SMARTCOP score (2 points), and one point for cytopaenia (thrombocytopaenia or lymphopaenia). A maximum score of five is obtainable. A score of 4 or more provided sensitivity for predicting COAP at 81% and a more liberal score of 3 increased sensitivity to 100%.

Conclusion. High mortality rates for COAP may be mitigated by strict adherence to appropriate and timely antibiotics. We report on common risk factors and disease parameters that were seen in our retrospective cohort and devised a scoring system to aid earlier diagnosis of COAP. This demonstrated favourable sensitivity in detecting disease, ranging from 81-100%. This in tandem with clinical acumen, antibiotic guidelines and sepsis management may help to mitigate the high mortality rates seen with this disease.

References:

1. Anstey NM, Currie BJ, Withnall KM. Community-Acquired Acinetobacter Pneumonia in the Norther Territory of Australia. *Clin Infect Dis. 1992;*14(1):83-91.DOI:10.1093/clinids/14.1.83.

2. Dexter C, Murray GL, Paulsen IT, Peleg AY. Community-acquired Acinetobacter baumannii: clinical characteristics, epidemiology and pathogenesis. *Expert Review of Anti-infective Therapy*. 2015;13(5):567-573. DOI:10.1586/14787210.2015.1025055.

3. Davis JS, McMillan M, Swaminathan A, Kelly JA, Piera KE, Baird RW, Currie BJ, Anstey NM. A 16-year prospective study of community-onset bacteraemic Acinetobacter Pneumonia. *Chest*. 2014;146 (4):1038-1045.DOI:10.1378/chest.13-3065.

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OSELTAMIVIR FOR INFLUENZA TREATMENT IN CHILDREN WITH CHRONIC LUNG DISEASES

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Introduction/Aim. Oseltamivir is recommended in treatment of influenza illness in high-risk populations, including those with chronic lung diseases (CLDs). We conducted a systematic review and medical record review to determine the uptake and effectiveness of oseltamivir in this group.

Methods. For the systematic review, we searched all randomised controlled trials and observational studies published between 1999-2017 comparing oseltamivir against no-oseltamivir or placebo. As data were limited, we included all patients with cardio-pulmonary conditions. For the medical record review, data were extracted to include all children with CLDs presenting with influenza-like-illness (ILI) to the Sydney Children's Hospital during the influenza seasons of 2010-2018. Main outcomes measured included uptake and effectiveness of oseltamivir in reducing disease severity. Outcomes measured for effectiveness were influenza-related complications (respiratory infections and asthma exacerbations), hospitalisation rates and time to freedom from illness.

Results. Our systematic review retrieved a total of 330 articles. Final analysis was conducted on nine articles. Use of oseltamivir ranged from 31-100%. In patients who received oseltamivir compared to control, rates of respiratory tract infections reduced by 0.9-33.7%, hospitalisation reduced by 0.7-11.1% and median time to illness alleviation decreased by 10.4-120 hrs. The record review identified 244 children with CLDs, and only seven received oseltamivir. Oseltamivir was administered to 2.9% children with ILI and 17.9% with confirmed influenza. Of the 228 children for whom data for duration between symptom onset and presentation were available, 109/228 (47.8%) presented within 2 days and 45/109 (41.3%) were tested for influenza. Of the 45 tested, 6/45 (13.3%) tested influenza-positive and only one received oseltamivir. Due to small numbers we could not evaluate effectiveness in reducing disease severity.

Conclusion. Oseltamivir is beneficial in reducing disease severity, however, its use in high-risk population is suboptimal, even when tested influenza-positive and presenting within 48 hours of symptom onset.

SUCCESS OF INTRAPLEURAL THERAPY IN TREATMENT OF ACTINOMYCES MEYERI EMPYEMA: A FIRST CASE REPORT

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Introduction/Aim. *Actinomyces meyeri* is a rare cause of thoracic empyema. Incidence in the reported literature is around 1:300,000. Only 10 to 15 cases had been reported in the English literature. We describe the first case of *Actinomyces meyeri* associated empyema which was successfully treated with chest tube drainage and intrapleural therapy, resulting in avoidance of surgical intervention.

Methods. An 83-year old female presented to our service with non-resolving pneumonia for three months with multiple courses of oral antibiotics as an outpatient. She had no previous medical history and did not consume alcohol. Computer Tomography of the Chest showed a large loculated right sided empyema. She underwent 14Fr chest tube drainage with six doses of intrapleural tPAse and DNase.

Results. Frank pus was aspirated during drain insertion. Biochemistry of the fluid showed Lactate Dehydrogenase of 3025 U/L, glucose <0.1 mmol/L, protein 15 g/L and pH of 7.5. Culture showed *Actinomyces meyeri* after 6 days of incubation. She had normal immunoglobulins with negative gamma interferon and HIV serology. Her Orthopantomogram did not show dental abscesses. Her repeat Computer Tomography of the chest after 6 days showed marked improvement (figure 1). She subsequently recovered after receiving intravenous ceftriaxone for 6 weeks and oral amoxicillin for 6 months.

Conclusion. Pulmonary involvement *with Actinomyces meyeri* is rare. Associated risk factor includes immunosuppression, chronic alcoholism, aspiration and poor oral hygiene. There is no standard of treatment and current literature reports treatment success with video-assisted thoracoscopic surgery or chest tube drainage follow by prolonged antibiotics with penicillin due to its susceptibility. We here describe a first case in the literature of remarkable success of chest tube drainage with intrapleural therapy for *Actinomyces meyeri* associated empyema.
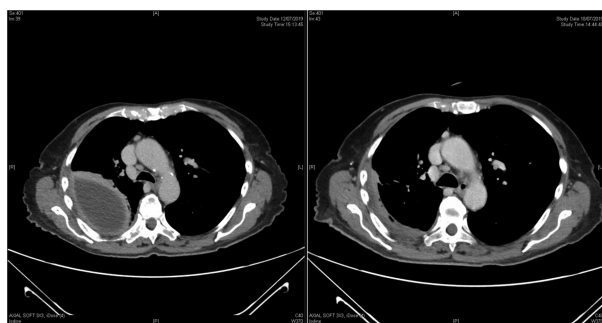
Grant Support:

Figure 1. Right sided *Actinomyces meyeri* empyema treated with a 14F chest drain and intrapleural therapy with marked response to treatment. Left: Before treatment; Right: 6 days after treatment

DIETARY FIBRE IMPROVES ANTIBODY RESPONSES AFTER INFLUENZA VACCINE IN COPD PATIENTS AND HEALTHY OLDER PEOPLE

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Introduction/Aim. Although influenza vaccination is considered standard of care in COPD, recent evidence suggests suboptimal vaccine efficacy in some people. Dietary fibre and microbial metabolites such as short chain fatty acids (SCFA), may affect systemic immune function. This pilot study sought to determine if a soluble fibre supplement improves vaccine immunogenicity.

Methods. In this double-blind, placebo controlled trial, COPD (n=8) and age-matched healthy (n=8) participants were randomly allocated supplements of soluble fibre (inulin) or placebo (maltodextrin), to take 6 g twice daily for two weeks prior to, and four weeks after, seasonal 2019 influenza vaccination. Serum antibody levels and plasma SCFA were measured. Habitual dietary patterns over the preceding 12 months were evaluated with the Dietary Questionnaire for Epidemiological Studies, and standard food diaries were used to assess dietary intake during the study. Supplement tolerance was monitored at each visit through the Structured Assessment of Gastrointestinal Symptoms questionnaire.

Results. Although not significant, fewer COPD patients met dietary fibre recommendations compared to healthy controls, (50% versus 80%, *P=0.28*). Dietary macro- and micronutrients were assessed, with a minor reduction of in fibre intake reported during the study; from 26.5 (14.8) to 23.3 (7.5) g/day (median, IQ range). A small number of participants reported minor gastrointestinal symptoms.

Compared to placebo, inulin supplementation significantly augmented post vaccine antibody titres for the seasonal vaccine strains A_Singapore (H1N1) and A_Brisbane (H3N2), but had no effect on B_Phuket (Yamagata). Inulin did not significantly alter SCFA levels. Antibody titres were similar in COPD and healthy participants.

Conclusion. This pilot study indicates that increasing dietary fibre may improve vaccine induced antibody responses. A larger trial is required to confirm these findings, examine the mechanisms involved, and determine the extent to which these effects vary according to usual fibre intake.

PULMONARY INVOLVEMENT IN A CASE OF EXTRAPULMONARY TUBERCULOSIS

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Introduction/Aim. Tuberculosis (TB) remains one of the leading causes of death due to infection worldwide and affects millions of people each year (WHO 2018). Despite decline in TB incidence, the TB global epidemic remains a major public health issue particularly in the context of increased travel and immigration. We present a case of a 23 year old female from Burma who is immunocompetent with extensive TB meningitis complicated by TB-immune reconstition inflammatory syndrome, ocular tuberculous granuloma and concurrent pulmonary TB. Her chest x-ray (CXR) was normal, however CT imaging demonstrated extensive changes including cavitation and tree-in-bud infiltrate. We consider the sensitivity of CXR in identifying patients with extrapulmonary TB and simultaneous pulmonary TB.

NURSE LED CLINIC TO EMPOWER PATIENT'S WITH IDIOPATHIC PULMONARY FIBROSIS

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Introduction/Aim. Idiopathic Pulmonary Fibrosis is disease with significant symptoms resulting in decreased quality of life. Treatment options and guidelines for care are limited in this patient group. Patients with IPF receive sub-optimal care through the illness both in terms of treatment and end of life care [1]. The aim of this project was the creation of a nurse-led clinic to support, guide and optimise therapy for patients with IPF.

Methods. The IPF nurse clinic was run alongside a specialist respiratory physician clinic. Patients were seen for an initial 45-minute assessment with a completed pre-clinic questionnaire. Assessment was needs based looking at symptom management, medication side effects, end of life planning, care giver needs and wellbeing. Follow up was made depending level of need. The IPF nurse was the point of contact for patients, to act as a conduit between the patient and physician. A post clinic questionnaire will be carried out at 6 months post assessment.

Results. A total of 9 patients have been seen for initial assessment and 2 for follow-up visits. Needs amongst this small group varied from one patient very close to end of life to one patient just being diagnosed and coming to terms with diagnosis and a quick functional decline. Patient feedback so far has been positive.

Conclusion. Upon completion we hope to have evidence showing an increased empowerment for patients living with IPF. A qualitative study of 100 patients entitled 'The patients have spoken; now it's time for us to listen' summarises the importance of a worthy, untapped resource in nurse led initiatives [2]. The issues raised in that study included patient dissatisfaction about information on IPF received, burden of travel, management of co-morbid conditions impacting on IPF burden and side effects of treatment are all areas that can be managed by nurse leaders.

References

1. Rajala et al, *BMC Palliative Care*, 2016, 15, 1-6.
2. Lindell, *Respirology*, 2019, 24,197-198.

QI AUDIT TO REVIEW THE UPTAKE OF ADVANCE CARE PLANNING

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Introduction/Aim. The New South Wales (NSW) Ministry of Health policy (Advance care planning (ACP)for quality care at end of life- Action plan 2013-2018) states that it is a

priority to incorporate ACP into routine care, to educate health professionals in conducting and responding to ACP and to improve collaboration between hospital based clinical services and community and primary care health professionals.

Given the chronicity and progressive nature of chronic obstructive pulmonary disease (COPD), timely discussion of ACP and end-of-life issues are recommended (McDonald, Khor 2013).

The aim of the audit is to review documented conversations about ACP. Did those conversations lead to completion of an ACP?

Methods. The review included adults living in the community with chronic lung disease and enrolled on the Respiratory Chronic Care Program in the Concord Repatriation General Hospital (CRGH) area. In each case, the patient would be one in whom the development of an Advance Care Planning is strongly recommended.

We reviewed the electronic medical records (EMR) of these patients to see if they had a documented conversation about ACP's and went on to complete an ACP.

Results. In our current respiratory program of 56 patients, 29 have received supported care to complete an ACP. Of those 29 patients, only 11 patients have completed an ACP.

Conclusion. It could be concluded that this proportion is too low and that modified or new means of presenting information could be helpful.

Frequent hospital admissions resulting in successful interventions with recovery could be a barrier to completion of an ACP.

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Conflict of interest: There is no conflict of interest

DOCUMENTATION OF INSERTION AND CARE OF INTERCOSTAL CATHETERS IN INPATIENTS UNDER THE CARE OF RESPIRATORY MEDICINE AT WESTMEAD HOSPITAL: AN AUDIT

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Introduction/Aim. Small bore intercostal catheters (ICC) guidelines suggest precise documentation following insertion, including drain type, depth inserted and suture technique. Patients with drains in situ should have hourly drain observations, connection checks and regular review of drain depth and insertion site to identify tube migration. Our aim was to assess the documentation of healthcare professionals regarding ICC care and management.

Methods. Retrospective chart review of patients admitted under Respiratory and Sleep Medicine with small bore ICCs between September 2016 and October 2018. Some admissions included more than one drain and others were excluded as they involved pleural taps or large bore ICCs.

Results. The audit population consisted of 155 drains involving 128 patients (age 62.7 ± 18y, 68%male). There was an ICC 'fall out' rate of 9%. Following insertion, Medical staff documented 'drain type' in only 60% of records reviewed and drain insertion depth in only 35% of records. Only 2% of records noted suture technique. In the 24 hours following drain insertion, 84% of records reviewed had hourly drain observations documented for 16-24 hours, 0% had hourly connection site checks, and 2.5% had regular insertion site inspections by nursing staff. Checking of drain depth was also not regularly documented by Nursing staff.

Conclusion. Documentation of ICC insertion and care is done poorly by both Medical and Nursing staff and may hinder the early identification of ICC migration and potential adverse outcomes for patients. In order to improve ICC documentation, an additional ICC 'check list' and daily weekday ICC 'rounds' have been implemented. A prospective study is planned to evaluate these changes.

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QUALITY OF LIFE TRENDS IN PULMONARY ARTERY HYPERTENSION PATIENTS ON THERAPY CORRELATED WITH HAEMODYNAMICS AND FUNCTION

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Aim. To evaluate the Quality of Life (QOL) in pulmonary artery hypertension (PAH) patients over 18 months; and compare with the patient's haemodynamics and function.

Methods. Patients prospectively completed the Emphasis 10 a QOL questionnaire at sequential stand care appointments. Routine haemodynamics were assessed by echocardiogram +/- right heart catheterization (RHC). Function was assessed by 6 minute walk distance (6MWD) and world health organisation functional class (WHO FC) assessment.

Results. This is an ongoing project; 64 participants with full data at baseline and 6 months; 45 with 18 months of data. Mean age was 63 yrs ($\pm$12), 46 women (72%), predominantly with Connective Tissue Disease (CTD) associated PAH (31, 48%), idiopathic (17, 26%) or Chronic Thrombo Embolic Pulmonary Hypertension (CTEPH) (14%). At baseline the cohort had functional class II (30, 47%), III (27, 42%) and two patients had functional class IV (3%). The mean Emphasis-10 at time points 1, 2, 3 was 21 ($\pm$12), 21 ($\pm$13) and 21($\pm$13). The Emphasis-10 correlated with 6MWD at all-time points (R= -0.45, P=0.00; R=-0.35, P 0.008; R= -0.35, P= 0.04) and WHO FC at all time points ($P < 0.01$). 19 patients had repeat RHC showing significant improvement in mean Pulmonary Artery Pressure (41 to 36 mmHg, P= 0.01) and Pulmonary Vascular Resistance (8.9 to 6.1 woods units, P <0.01); however no improvement in mean Right Atrial Pressure. Emphasis 10 stratified the cohort by WHO FC at each time point (P= 0.00); patients with worsening functional class had higher scores. There was no significant difference in QOL in PAH subsets.

Conclusion. There were significant correlations between the Emphasis-10 and known prognostic physiologic measures (6MWD, WHO FC, mRAP). This suggests that the Emphasis-10 identifies the cardinal PH symptoms of breathlessness and fatigue. As haemodynamics improve with medications, nurses are well placed to improve breathless and fatigue with non-pharmacological strategies.

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HOME CARE BY OUTREACH NURSING FOR CHRONIC OBSTRUCTIVE PULMONARY DISEASE: A COCHRANE META-ANALYSIS

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Introduction. Chronic obstructive pulmonary disease (COPD) is associated with substantial morbidity as the disease progresses with increased burden and costs to healthcare systems. Outreach respiratory nursing is a specialist role in the community supporting COPD patients to manage disease exacerbations and ongoing management in an effort to reduce pressures to healthcare systems.

Aim: To evaluate the effectiveness of home care by outreach nursing programmes for COPD patients

Methods. The Cochrane Airways Group Specialised Register of Trials, electronic databases and bibliographies was searched. Included studies were randomised controlled trials of stable COPD patients receiving care from a Respiratory or outreach nurse or respiratory therapist with a focus on COPD management optimisation and having COPD diagnosed as per spirometric testing guidelines e.g. Global Obstructive Lung Disease (GOLD). Eligible control groups were patients who received routine COPD care as defined by current standard practice or minimal intervention (i.e. brochure), without respiratory or outreach nurse or respiratory therapist input. Excluded studies included interventions defined as telehealth or hospital at home.

Results. Seven studies were identified for inclusion. Hospitalisation data pooled from 3 studies demonstrated heterogeneity. Pooled disease specific quality of life from 6 studies demonstrated improvement in the total score of the St George Respiratory Questionnaire in the intervention group P=0.003. Of the 3 domains of the SGRQ only the impact domain demonstrated a statistical significant change P= 0.002. Pooled all-cause mortality data demonstrated no statistically significant reduction. Insufficient data to analyse number of emergency department presentations and hospital readmissions.

Conclusion. Although outreach nursing programs demonstrate improvement in quality of life, and no increase in mortality, effect on hospitalisations is heterogeneous. Further reviews may need to include subgroup analysis of interventions e.g. exercise training, and an additional outcome of reported exacerbations for overall efficacy assessment of nursing outreach programs.

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PROVIDING A HOME NIV SERVICE: WEIGHING UP THE NUMBERS

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Introduction. There is an increasing demand for the provision of long-term home Non-Invasive Ventilation (NIV) for patients with Chronic Hyper-capnic Respiratory Failure (CHRF). Effective treatment requires a specialised clinical service experienced in establishing and titrating bi-level NIV. In 2014 a large tertiary referral teaching hospital took active steps to develop a home respiratory failure service. This study is a review of the patient numbers relating to this.

Methods. A cohort analysis was performed on all patients established on home NIV over a 5 year period by an adult respiratory failure service covering a large metropolitan, rural and regional health district (130,000 km^2) with a population of 950,000 people. Patients requiring NIV for central sleep apnoea, and Continuous Positive Airway Pressure (CPAP) for CHRF were also included.**Results.** The number of patients established on home NIV/CPAP increased from 15 in 2014 to 432 in 2019, of which, Obesity Hypoventilation Syndrome (OHS) was the leading indication by a significant margin (n=224, 41%). The other disease groups were: Motor Neuron Disease (MND, n=71, 13%); Central Sleep Apnoea (CSA, n=66, 12%); Obstructive Sleep Apnoea with Chronic Obstructive Pulmonary Disease (OSA+COPD, n=50, 9%); COPD (COPD, n=50, 9%); Slowly Progressive Neuromuscular Disorder (SPNMD, n=36, 7%); Chest Wall Disorder (CWD, n=21, 4%); idiopathic diaphragmatic dysfunction (Diaphragm, n=18, 3%); Cystic Fibrosis (CF, n=4, 1%); and Spinal Cord Injury (SCI, n=1, 0.2%).

New Home NIV Patients per Disease Group per Annum
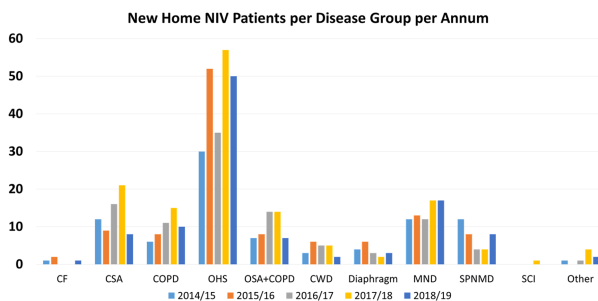
Conclusion. The number of patients requiring home NIV/CPAP due to OHS far outweighs any other disease group. These findings support prior research which predicts a significant and rising demand for specialised sleep and respiratory failure services to be able to provide treatment for OHS.

IMPACT OF SPECIALIST RESPIRATORY OUTREACH SERVICE TO THE REMOTE AND REGIONAL ABORIGINAL COMMUNITIES OF THE NORTHERN TERRITORY OF AUSTRALIA

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Introduction/Aim. In the Northern Territory approximately 25 - 30% of the population are Aboriginal Australians. The population profile is spread over a vast geographical area and 81% of the Aboriginal Australians in the NT live in remote or very remote areas. The respiratory and sleep service based at the Royal Darwin Hospital, Darwin, provides a specialist outreach service for the remote and regional Aboriginal communities of the Top End Health Service region (TEHS).

Methods. This service visits an average of about 20 remote communities each year at a frequency of one to three times per year. The average population in each community varies from 200 to 2000. The outreach team incudes respiratory and sleep specialist, Respiratory Nurse Consultant, Respiratory and Sleep technologist.

Results. During this study over a 5 year period, 767 patients were reviewed by the outreach respiratory service team. The service provided includes, Specialist consultant review, education on smoking cessation, sputum clearance technique, Lung function testing, ambulatory sleep studies and Oxygen assessment.

Conclusion. The respiratory and sleep specialist outreach service is useful in providing quality care in the diagnosis and management for Aboriginal patients with in the regional and remote communities of the NT of Australia. Furthermore, by consulting and investigating patients in their own communities, the financial burden associated in the cost of transferring patients to Darwin is considerably reduced. The model of care will be presented at the conference.