P90 TOWARDS A PROTOCOL FOR THE MANAGEMENT OF VERY SEVERE CHRONIC LUNG DISEASE

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Background While corticosteroids appear effective in reducing respiratory support requirements of babies with very severe chronic lung disease of prematurity (CLD), controversy remains regarding the most appropriate route, timing, preparation and dosage. Using Delphi methodology, consensus was reached involving 4-weekly pulses of methylprednisolone for 3 days at 500 mg/m^2 in ventilator-dependent, or close to ventilation, babies in diffuse lung disease of childhood (Cunningham S., *et al*. Am J Respir Crit Care Med 189;2014:A4664). Use of hydroxychloroquine and azithromycin also reached consensus.
Aims and objectives To describe the features of those babies who received methylprednisolone, hydroxychloroquine and azithromycin ("consensus treatment") for severe CLD compared to those who did not in order to inform the drafting of a protocol.
Methods A prospective database detailing care of babies with severe CLD referred to the CLD service at Nottingham Children's Hospital Jan 2009–Dec 2014 was used.
Results 147 children were referred to the service; 4 babies received consensus treatment. Those receiving consensus treatment were ventilated for longer 39(sd 4.6) versus 8(sd 16.8) days ($p < 0.001$). Children receiving consensus treatment were significantly older at discharge 245(65) versus 95(45.5) days and were discharged with higher oxygen requirements (1.0(0.4) vs. 0.3(0.2) litres).
Conclusions Babies with very severe CLD were successfully treated with consensus treatment. A change in practice toward discharge at higher oxygen delivery rates in such babies was safe. Further experience will refine the objective criteria for considering consensus treatment and would inform the design of a future randomised controlled trial.

P91 POST-INFECTIVE OBLITERATIVE BRONCHIOLITIS ACQUIRED BEYOND THE FIRST 3 YEARS OF LIFE

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Introduction Obliterative bronchiolitis (OB) is a rare form of chronic obstructive lung disease that follows a severe insult to the lower respiratory tract, resulting in fibrosis of the small airways. In the non-transplant paediatric population, adenovirus infection is the most common cause. The initial infective insult occurs in the early years and the diagnosis requires a history of acute severe bronchiolitis/viral pneumonia in previously healthy children in the first 3 years of life. Though there has been a case report of post-infectious OB in an adult female,[1] to our knowledge, there are no published cases in children acquired after 3 years of age.
Aim We describe two previously healthy older boys with normal immunological investigations who developed post-infectious OB.
Cases The first patient had severe adenovirus pneumonia aged 7, requiring ventilation, oxygen and bronchodilator therapy. In view of atopic background (nut allergy and paternal asthma) inhaled corticosteroids were initiated at discharge. A year later he presented with productive cough, debilitating shortness of breath on exertion, moderately reduced PEFR but no wheeze. He did not respond to Amoxicillin or step-up asthma treatments. CXR and exercise test were normal and pulmonary function tests (PFT) did not show evidence of reversibility. A mixed growth of typical respiratory pathogens were isolated in sputum and treated with prolonged oral antibiotic course. High resolution chest CT (HRCT) showed air trapping in the right upper lobe consistent with OB.

The second patient developed severe mixed mycoplasma and adenovirus pneumonia aged 3.5, followed by persistent left lower lobe collapse and wet cough requiring intravenous antibiotics and physiotherapy. His left lower lobe re-expanded, but his HRCT revealed air trapping consistent with OB. He continued to have intermittent chest infections with various typical respiratory pathogens isolated in sputum requiring oral and intravenous antibiotics. His PFTs are stable with moderately reduced FEV1/FVC.

Both patients are maintained on regular chest physiotherapy and intermittent antibiotics.
Conclusion Post-infectious OB can develop in healthy children older than 3 years.

REFERENCE

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P92 REAL-TIME ONLINE ANALYSIS OF VOLATILE ORGANIC COMPOUNDS IN THE EXHALED BREATH OF PRESCHOOL CHILDREN

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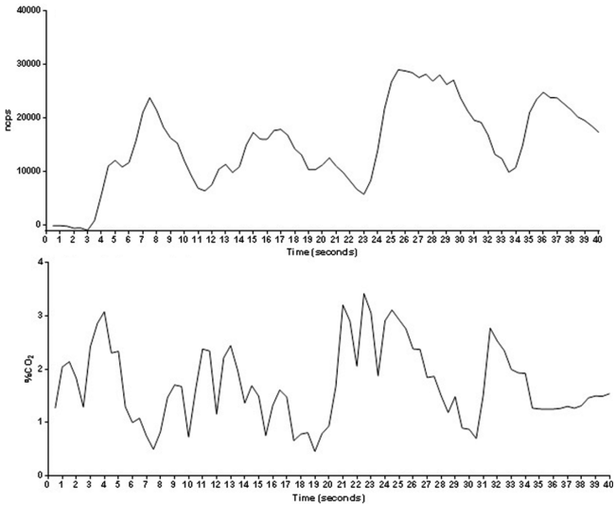
Introduction Investigating airway inflammation and pathology in preschool children is challenging from both a technical and ethical standpoint and as such we urgently need to identify and validate novel, non-invasive techniques. Analysis of exhaled volatile organic compounds (eVOC) has been successfully employed using conventional, offline mass spectrometry in preschoolers (van de Kant 2013). However, real-time, instant analysis of eVOC in this age group would be an important advance in the field of 'breathomics'. We sought to assess whether real-time online analysis of eVOC was feasible in preschool children attending our hospital.
Methods Breath samples were taken from preschool children (aged between 1 and 6 years) attending the emergency department or an acute medical ward at our hospital. Children breathed room air tidally via a facemask and eVOC were analysed instantly by Proton-Transfer-Reaction time-of-flight mass spectrometry (PTR-Tof-MS) coupled to Loccioni breath collection apparatus. Capnography data was simultaneously recorded. The mass spectra were analysed using a Matlab programme coded for adult patients and the spectra for mass channel (m/z) 59 (acetone) were inspected. Total counts for all mass channels were summated.
Results Eight children (median age 42 months, range 14–59 months) participated, of which five (median age 40 months) were able to produce analysable results. The total median count from the summation of all mass channels was 157,465 ncsp (number of counts per second) ranging from 4,831 to 200,319 ncps. The Figure 1 below demonstrates a spectrum for m/z 59 and capnography trace from one of the participants. The patterns of both traces are comparable.



Abstract P92 Figure 1 Spectrum for m/z 59 (1a) and capnography trace (1b). ncps = number of counts per second

Discussion The comparability of the traces for the spectrum of m/z 59 and capnography suggests that real-time PTR-ToF-MS is detecting eVOC which relate to end-tidal breathing. The traces are likely offset due to the lag between end-tidal exhalation and the sample reaching the apparatus. This feasibility study has demonstrated that real-time analysis of eVOC is possible in preschool children in an acute setting. Further work is needed to determine the most accurate way of analysing the spectra to be able to apply this novel, non-invasive method of investigating airway inflammation and pathology in preschool children.

REFERENCE

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P93 THE PRACTICALITIES OF USING ALLERGEN-IMPERMEABLE BED COVERS IN CHILDREN WITH MITE ALLERGIC ASTHMA

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Objective As part of a randomised double-blind placebo-controlled study in children with mite-allergic asthma, mite-impermeable bedding encasings were evaluated in terms of reduction in allergen exposure and patient/parent acceptability.

Methods Physician diagnosed asthmatic children (3–17 years) were recruited following an exacerbation of asthma. Mite-sensitised children were randomised to either mite-impermeable encasings for the mattress, pillow and duvet (Astex Pristine; ACP solutions, Gloucestershire, UK) or placebo encasings (100% polycotton; Musbury fabrics, Rossendale, UK), in a double-blind manner. Vacuumed dust samples were collected from the child's mattress prior to fitting the encasings and at 12 months, stored at -20°C, then analysed for mite allergen content (Der p1) by enzyme-linked immunosorbent assay (Indoor Biotechnologies, Cardiff, UK). Questions aimed at assessing the practicalities of using the encasements were asked of parents by an interviewer blind to their allocation, 8–12 months later.

Results 284 children (mean age 7.7 years; 65.8% male) were randomised (146 active; 136 placebo). There was an 84% decrease in Der p 1 levels in child's mattress in those using the mite-impermeable encasings, which was not seen in the Placebo group ($p < 0.001$). Data on 'use of bedding encasements' were obtained from 232 participants. Significantly more families in the active group reported that the duvet slipped within its cover, compared to the placebo group (32.2% vs 5.3% respectively, $p < 0.001$) and that it was "noisy" (14.4% active vs 0.9% in placebo, $p < 0.001$). Some reported the extra covers made them too warm (3.4% active vs 1.8% placebo, $p = 0.64$). Overall 31 (26.3%) using the mite-impermeable encasings rated them as "uncomfortable" compared with 2(1.8%) in the placebo group ($p < 0.001$). Furthermore, 30(25.4%) children in the mite-impermeable group said they would prefer to have the encasings removed, compared to 3(2.6%) in the placebo group ($p < 0.001$). There was no difference in the numbers of families who stated that they would continue to use the encasings if it were of benefit to the child, (87.3% mite-impermeable vs 89.35% placebo $p = 0.68$)

Conclusions Mite-impermeable encasings can significantly reduce mite allergen levels in the bed. Despite some practical issues, most families are willing to use this intervention if it is of benefit to their child's asthma.

P94 EFFECT OF HYDROXYUREA ON NOCTURNAL AND AWAKE OXYGEN SATURATION IN CHILDREN WITH SICKLE CELL DISEASE

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Introduction Sickle cell disease (SCD) causes lifelong morbidity and reduced life expectancy. Resting hypoxaemia and intermittent nocturnal oxygen desaturation are often seen in children with SCD, which may contribute to morbidity associated with vaso-occlusive episodes. Treatment with hydroxyurea reduces the frequency and severity of vaso-occlusive episodes[1] but the impact of hydroxyurea on oxygen saturation and sleep apnoea is unknown.

Objective To look for any difference in baseline oxygen saturation asleep and awake and the frequency of intermittent nocturnal desaturation after starting hydroxyurea in children with SCD.

Methods A retrospective review of children who were commenced on hydroxyurea between March 2006 and July 2014 attending two UK sickle-respiratory clinics. Data was collected from overnight sleep studies and averaged pulse oximeter spot check recordings in clinic notes when awake from a) 6 months before starting hydroxyurea and b) up to 2 years after. Lung function and haemoglobin changes were also noted over the same time periods.

Results Forty six children (25 male) with a median age of 10 years (range 5–19 years) were started on hydroxyurea. Haemoglobin and HbF rose significantly on hydroxyurea as expected (Table 1). After starting hydroxyurea the average overnight oxygen saturation increased from median of 93.5% to 95.2% ($p = 0.01$) and the median daytime spot oxygen saturation rose from 93.5% to 96.3% ($p = 0.001$). There was no significant change in the median intermittent nocturnal 3% oxygen desaturation index (ODI), nocturnal PCO_2 or spirometry.