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ABSTRACT WITHDRAWN

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THE ROLE OF CARDIOPULMONARY EXERCISE TESTING IN CHILDREN WITH CYSTIC FIBROSIS

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10.1136/archdischild-2015-308599.332

Introduction Cardiopulmonary exercise testing (CPET) is the gold standard test of aerobic fitness in Cystic Fibrosis (CF). CPET is measured by peak oxygen uptake (VO₂ peak) during maximal exercise. It can be used to identify the cause of exercise intolerance, prescribe exercise programmes, evaluate therapeutic interventions¹ and predict prognosis.² The American Thoracic Society defines a normal VO₂ peak as >84% predicted.³ In our centre, CPET was included in the CF annual reviews from 2013. Currently no guidelines exist as to the frequency of CPET in CF patients.

Aims To determine whether CPET was a useful and feasible routine test in children with CF and to assess whether VO₂ peak correlated with Forced Expiratory Volume in 1 s (FEV₁), disease severity, gender, genotype or previous intravenous antibiotics.

Method A pilot observational study was performed. Body mass index (BMI) was used as a marker of disease severity. Genotype was divided into 3 groups; DF508 homozygous, heterozygous and all other genotypes. Data was retrieved from case notes and our CF database.

Results 38 patients (17 male, 21 female) underwent CPET. Age range 7–14 (mean 9.8) years. 36/38 had technically satisfactory CPET. Mean VO₂ peak was 107% predicted, standard deviation 18%. Only 8% had an abnormal VO₂ peak. Mean FEV₁ was 91% predicted, standard deviation 15%. There was no relationship between VO₂ peak and FEV₁ [$p = 0.297$] or BMI [$p = 0.382$] (Pearson correlation). Additionally, no correlation was demonstrated between VO₂ peak and genotype [$p = 0.236$] (one-way ANOVA), gender [$p = 0.902$] or patients who had received at least one course of intravenous antibiotics in the past year [$p = 0.253$] (two-sample T test).

Conclusions CPET is a feasible test with 95% of our patients achieving technically satisfactory assessments and reassuringly, VO₂ peak was largely normal. We could not demonstrate a relationship with FEV₁ or disease severity although our study is limited by the small sample size. It is recognised that the CF annual review is already a long day for patients and we plan to reserve CPET for those showing exercise intolerance rather than performing it annually.

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DEMOGRAPHICS AND SELECTED CLINICAL FEATURES OF PAEDIATRIC HUMAN METAPNEUMOVIRUS INFECTION

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10.1136/archdischild-2015-308599.333

Aims This study aimed to characterise seasonal variation, co-infection rates, susceptible groups (by gender, age and co-morbidities) and selected clinical features of childhood human metapneumovirus (HMPV) infection.

Methods The study was a retrospective analysis of 656 HMPV-positive respiratory samples collected from paediatric patients aged 0–15 years processed from January 2010 to December 2013 using real time PCR assays. In addition, 200 HMPV-positive samples from January 2012 to January 2013 were cross-referenced with electronic discharge summaries and descriptive statistical analyses of selected clinical features were performed.

Results 377 of 656 (57%) HMPV-positive samples were from male patients. HMPV was most frequently detected in children aged 6–9 months and the median age of patients studied was 15 months. Seasonal patterns of HMPV infection varied from year to year. The peak in HMPV-positive isolates occurred between February and May. 117 of 656 (17.5%) samples were positive for other respiratory viruses in addition to HMPV. The most common co-infections were due to rhinovirus (58/656, 8.84%) and adenovirus (36/656, 5.49%).

81 (40%) of the 200 fully-characterised patients were hospitalised, 7 (3.5%) of whom required intensive care (ICU) or high dependency (HDU) admission. Rashes were reported in 14 (7%) and febrile seizures in 9 (4.5%) of 200 patients. These clinical features were more common in children with co-infections [6/40 (15%) and 4/40 (10%) respectively].

Conclusions Male gender is suggested as a predisposing factor for HMPV infection, along with younger age. Seasonal variation of HMPV infection in Scottish children appears different to the reported winter peaks of other studies, with peak incidence occurring between February and May in our dataset. Co-infection is common, and most frequently associated with rhinovirus or adenovirus. Rashes and febrile seizures are relatively common in HMPV-positive patients, especially those co-infected with other respiratory pathogens. Human metapneumovirus is a significant cause of morbidity in children. Further, larger-scale epidemiological research appears warranted, along with work to develop new therapies aimed at targeting HMPV.

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DESCRIPTIVE ANALYSIS OF ADHERENCE WITH NON-INVASIVE VENTILATION IN CHILDREN

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10.1136/archdischild-2015-308599.334

Aims Home non-invasive ventilation (NIV) is an established treatment for children with sleep-disordered breathing. There is

little evidence available regarding NIV compliance and the factors that affect this. Accurate compliance data from individual ventilators is readily available and gives a new opportunity to explore this further. The aim of this research was to describe and analyse adherence with NIV among established patients and determine if this was significantly affected by age, gender, diagnosis, time since commencement, apnoea-hypopnoea index (AHI), mean daily usage, leak or pressure.

Methods Ventilator download-data from sleep study databases and electronic patient-notes were retrospectively reviewed. Patients aged 0–18, established on NIV with between 30–182 days of available data were included. Adherence, defined as percentage of nights with ≥ 4 h use, was compared by diagnosis, gender and age and correlated with the above factors.

Results 102 children were included, 67% were male and median age was 13 years (range 0.25–18). The mean adherence for all patients was 64.2%. There was a strong positive correlation between mean daily usage and compliance ($r = 0.74$). Children with Down's syndrome had a mean adherence of 37.9%, considerably lower than in other diagnoses including obstructive sleep apnoea (62.3%), craniofacial conditions (61.7%), neuromuscular disease (64.7%) and conditions with central hypopnoeas (80.5%). Gender and presence of leak did not affect adherence and no correlation between adherence and ventilator pressure ($r = 0.30$), age ($r = 0.05$) or AHI ($r = 0.08$) was demonstrated.

Conclusion It is clear from the few correlations found that patients are heterogeneous and the challenges multifactorial. A better understanding of adherence levels in individual patients can now enable us to have open discussions with families to address challenges they face with the use of NIV. Children with Down's syndrome are normally carefully selected prior to establishment of NIV because of known difficulties with treatment. Despite this, they are still the group with poorest adherence, highlighting the need for novel approaches to improve this. Ongoing use of NIV does suggest that although adherence is far from perfect, patients must gain some clinical benefit and the levels of adherence truly required to reduce long term complications is still not known.

G380(P) HYPONATREMIA – CEREBRAL SALT WASTING

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10.1136/archdischild-2015-308599.335

Setting PICU

Consultant and PICU registrar

Problem 4 year old child transferred to PICU after space occupying lesion cranial surgery. On day 2 post operatively was noted to have very high urine output with falling serum sodium. His urine output was very variable and ranged from 3 ml/kg/hour to 17 ml/kg/hour. He had very high urinary sodium content.

Clinical context

- Falling sodium
- High urine output
- Low plasma osmolality

Assessment of problem and analysis of its causes

- Hyponatremia in Patients with Neurologic Disorders
- Inappropriate secretion of antidiuretic hormone (SIADH)
- Cerebral salt wasting (CSW) syndrome

The distinction between these two conditions is important because their treatments are different. It is not possible to distinguish CSW from SIADH based on serum and urine laboratory findings alone, because their associated abnormalities are identical. For this reason, accurate determination of the patient's volume status is the key to differentiating these syndromes.

Fundamental difference between the two processes is extracellular fluid volume status. Patients with CSW have hypovolemia compared with patients with SIADH, who have euvolemic or mild extra cellular fluid expansion.

The mainstay of therapy for CSW is replacement of the sodium and water that is lost as a result of pathologic natriuresis and diuresis. This is in direct contrast to the treatment of SIADH, the crux of which is free water restriction.

CVP-directed treatment of hyponatremia and volume status in such patients is effective.

Intervention New guidelines for cerebral salt wasting introduced in PICU guidelines.

Lessons learnt Consider CSW in children with low sodium and high urine output, measure volume status, in PICU setting with CVP measurement

G381(P) IMMUNOPROTECTIVE EFFECTS OF INHALED NITRIC OXIDE IN NEWBORNS WITH RESPIRATORY DISEASES ON MECHANICALLY VENTILATION

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10.1136/archdischild-2015-308599.336

Introduction This study presents the results of the influence of inhaled nitric oxide (iNO) on the immune system of infants with respiratory diseases on mechanically ventilation (MV).

Purpose Decrease neonatal mortality.

Materials and methods In a controlled, randomised, blinded clinical trial 37 newborns with respiratory diseases on MV were included. In group I 20 patients received iNO (10 ppm, 24 h; "Pulmonox mini", "Messer II NO Therapeutics", Austria). Newborns in group II ($n = 17$) did not receive iNO. On admission and at 3–5 days, subpopulations of lymphocytes were studied by the one-parameter immunophenotyping using reagents company Immunotech Beckman Coulter (USA): CD3, CD4, CD8, CD14, CD19, CD34, CD56, CD69, CD71, CD95 monoclonal antibody, the relative content of lymphocytes in apoptosis using AnnexinV + labelled FITC and propidium iodide (PL+), labelled with PE (Saltag, USA). The statistical power of the study was 80% ($\alpha \leq 0.05$).

Results In group I an increase of mature monocytes (CD14⁺) to $23.1 \pm 0.8\%$ ($p < 0.05$) was observed on 3–5 days. The relative content of CD69 was reduced to $3.8 \pm 0.21\%$, and in lymphocytes in apoptosis to $7.12 \pm 0.46\%$ (AnnexinV-FITC⁺PI), and to $0.79 \pm 0.07\%$ (AnnexinV-FITC⁺PI⁺, $p < 0.001$). Duration of MV was 4.1 ± 1.4 days in group I and 18 ± 3.4 in group II. All newborns in group I survived and had no septic complications. None of the patients showed clinical or laboratory evidence of adverse effects of iNO. In group II 7 newborns died, 5 developed neonatal sepsis.

Conclusion Inhaled NO in mechanically ventilated newborns increased the relative content of mature macrophages and decreased the number of lymphocytes in apoptosis. Most importantly, the incidence of sepsis and fatal outcome was reduced in iNO-treated newborns.