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ABSTRACTS

ASTHMA & ALLERGIES

Title: Defining acute asthma severity – how do worldwide asthma guidelines compare?

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Background: Asthma guidelines have been in place throughout the UK since the 1990's and provide clinicians with guidance, underpinned by evidence, to ensure patients receive the best care.

Aims: To identify asthma guidelines worldwide and compare definitions of acute asthma severity including near fatal asthma. The results of this comparison will inform the questions for an eDelphi with an aim to reach a consensus definition of near fatal asthma.

Methods: The websites www.theipcrg.org and www.globalasthmanetwork.org act as a repository for international guidelines and were used to identify existing guidelines. As these had not been updated since 2013 and there were a number of guidelines missing a further search was carried out using Google by country. Definitions of acute asthma severity were compared using clinical features, objective measurements and activities of daily living.

Results: A total of 28 guidelines were identified: 20 were combined adult and paediatric guidelines and 8 were only for children**.** 15 included definitions across the spectrum of acute asthma severity. More information was included in each guideline as the severity of the attack intensified. In life threatening asthma, 20 included objective measurements including oxygen saturations and heart rate, 23 had clinical features and 11 included activities of daily living including the ability to talk and walk. Near fatal asthma was mentioned in 5 of the guidelines however there was an absence of definition.

Conclusions: Guidelines addressing acute asthma severity lack consistency of definition, in particular for objective versus subjective criteria. For guidelines to also be helpful for people with asthma the inclusion of activities of daily living such as the ability to eat, drink and sleep will be important. Greater consistency across guidelines for the definition of severity of asthma attacks will be required to improve surveillance of attacks and the effects of interventions.

Using remote Direct Observation Therapy to improve asthma inhaler technique

Authors:

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Introduction

Poor inhalation technique at home, even after repeated inhalation instructions in children with asthma is well recognised and Kamp et al reported only 30% asthmatics had adequate inhaler technique at home1. This is a major factor in poorly controlled asthma, which increases risk of disease exacerbation, hospital admissions, and increased cost of care2. Remote Direct Observation Therapy (rDOT) is an innovative technology to monitor and improve inhaler technique at home3.

Aim(s)/Objectives

We aimed to optimise inhaler technique at home and thereby improve asthma control in paediatric asthma patients.

Methods

rDOT installed on patients' smartphones enabled monitoring and assessment of asthma inhaler technique4 by asking patients to film themselves daily while using their inhaler. After 2-days baseline assessment, we emailed patients online educational videos5 to revise inhaler technique. After one week, we gave personalised daily feedback to patients via email or text on how their technique could be improved for 3 weeks.

Results

We recruited 28 patients of which 6 patients (male : female, 1:1; mean age 7.5 years) completed the project. These patients had suboptimal baseline inhaler technique at home (72.83%), which increased to 83.33% with educational videos and 96.67% with daily feedback. Median Child Asthma Control Test (c-ACT) increased from 16.5 at baseline to 21 after 4 weeks. Median adherence to video submission was 59.05%.

Discussion/Conclusion

rDOT with daily feedback shows potential in improving inhaler technique and asthma control, limited by the poor adherence to video submission. Other limitations were the small sample size and high dropout rate.

Acknowledgements

We gratefully acknowledge the valuable input of Professor Mike Shields (Queen's University Belfast, Belfast, United Kingdom).

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Development of an Electronic Paediatric Emergency Department Asthma Assessment Tool (PEDAAT) to identify High Risk Children in Accordance with the National Review of Asthma Deaths (NRAD) 2014 Standards

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Background

The National Review of Asthma Deaths (NRAD) 2014 outlined secondary care objectives for children with asthma. In 2016, an electronic Paediatric Emergency Department (PED) Asthma Assessment Tool (PEDAAT) was developed, using NRAD standards, to identify high risk children for whom secondary care follow up (FU) is recommended.

Aims

1. to determine use and effectiveness of PEDAAT

2. to develop PEDAAT to ensure delivery of high quality asthma care as a service improvement measure

Method

A retrospective audit was conducted. Children <16 years of age attending the PED 01/12/2016-30/09/2017 with a discharge diagnosis code of Asthma or Wheeze, for whom the PEDAAT was completed, were identified and matched by age, sex and discharge diagnosis to a randomly selected cohort for whom the PEDAAT was not completed. A focus group gained information regarding PEDAAT user difficulties. A revised tool was developed.

Results

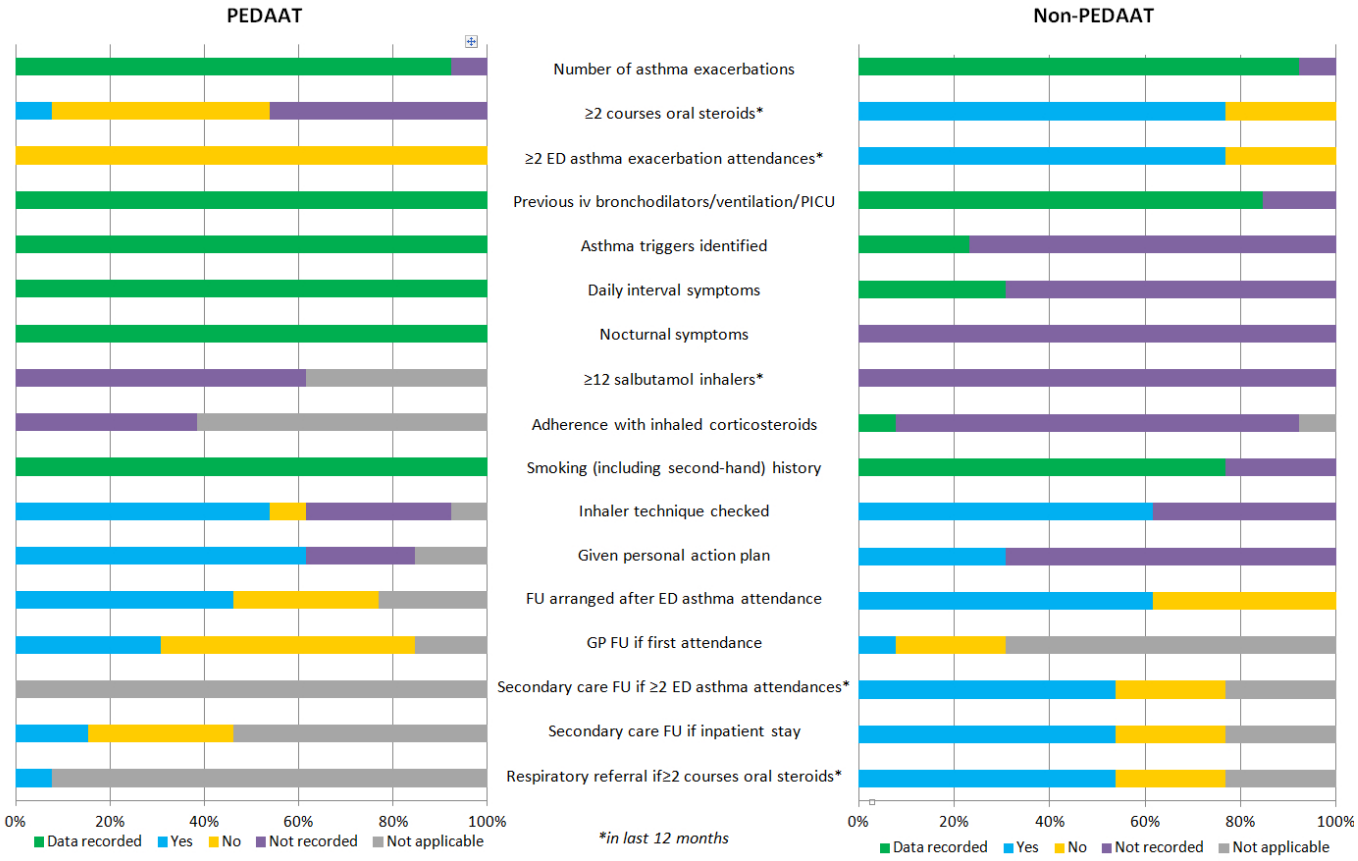
The PEDAAT was completed for only 13 of 548 (2.4%) PED attendances with Wheeze/Asthma. Figure 1 illustrates comparative documentation of asthma control and FU linked to NRAD standards. 82.9% of applicable standards were recorded in the PEDAAT Group vs 51.9% when standard PED clinical documentation was used alone. PEDAAT application resulted in receipt of a Personal Action Plan in 72.7% vs 30.8%.

A focus group identified specific PEDAAT difficulties: lack of knowledge of tool existence, IT accessibility, practicality, and absence of guidance regarding FU. Recommendations were implemented. A revised, concise, user-friendly, click-box PEDAAT-2 was developed, automatically identifying and referring eligible children to a newly established Paediatric Respiratory Nurse-Led PED Asthma clinic. A multimodal education package is facilitating tool reintroduction (2018).

Conclusion

An electronic PEDAAT-2 has been developed which is able to identify high risk children with poor asthma control and ensure appropriate FU, in accordance with NRAD standards. User feedback and education is critical to tool development and utilisation.

Figure 1. *A Comparison of Performance between PEDAAT and Non-PEDAAT Groups in Accordance with NRAD Secondary Care Standards (group size n=13)*



Background information for submission:

Abstract category: Asthma

Abstract word count: 300

The abstract has not previously been presented or published.

I am registered as paid delegate.

Disclosure of Smoking in Adolescents- a feasibility study

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Introduction

Initiation of smoking during adolescence has a critical impact on life-long health and smoking behaviours. Barriers to self-disclosure of smoking status in adolescents need to be identified and overcome to offer treatment and reduce smoking initiation. This study aimed to ascertain if adolescents are more likely to disclose accurate information about smoking status if questioned alone, with knowledge that they would have biological validation of their smoking status.

Methods

Patients (13-16 years) (table 1) with a diagnosis of asthma attending a secondary care, paediatric asthma clinic were recruited and randomised to 2 study groups in an exploratory, prospective, randomised pilot study. Both groups undertook a short questionnaire: group 1 with a parent present and group 2 alone. Both groups performed biological validation of their answers using exhaled carbon monoxide testing (eCO).

Results

19 consenting adolescents were recruited and randomised to the study over a 6-month period. 13/19(68%) reported never smoking, 1/19(5%) reported regular smoking, 6/19(32%) reported occasional smoking. 9/19(50%) had a parent who smoked, 5/19(26%) had relatives who smoked and 7/19(37%) had friends who smoked. Adolescents and parents were willing to engage with a questionnaire and to perform eCO measurements. Mean eCO measurements were 3.6(SD, range) 1.9, 1-8ppm.

Conclusion

There were no specific barriers to recruitment or to randomisation to the pilot study. The use of a questionnaire and eCO monitoring were acceptable interventions for both adolescents and parents, in both groups. The data confirms the feasibility and need for further studies

Table 1 Patients' Characteristics

Group 1 represents adolescents with parents present at their consultation about smoking and Group 2 represents adolescents without parents present at their consultation about smoking. Age and school years are expressed as mean +/- SD and range. Numbers of smokers are expressed as a percentage of the study groups.

Variables	Group 1	Group 2
No. of participants	9	10
M/F	5/4	6/4
Age	15.1+/-1.6(13-17)	15.0+/-1.3(13-17)
School year	10.1+/-1.7(8-12)	10.1+/-1.1(9-12)
% of smokers	44	20

Air pollution: Effects of biomass burning generated particulate matter on bronchial epithelial cells

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Background: Severe haze periods are common in Southeast Asia; however there is a paucity of data on the personal exposure to particulate matter (PM) during haze, and properties and biologic effects of haze PM.

Aim: was to monitor Black Carbon (BC) exposure among school children in Singapore and characterise the size resolved PM for morphology, elemental composition, trace metal content, inflammatory response and cytotoxicity.

Methods: 46 children had 24h ambulatory BC exposure monitoring using a portable Aethalometer (microAeth® model AE51). Size fractionated PM collected using a cascade impactor during haze and non-haze period were characterised for size, morphology and elemental composition using an environmental scanning electron microscope (ESEM) and energy dispersive X-ray spectroscopy (EDX). The trace metal content in PM was determined using Inductively Coupled Plasma-Mass Spectrometer (ICP-MS). The ability of PM fractions to generate abiotic Reactive Oxygen Species (ROS) was measured using 2',7'-dichlorodihydrofluorescein diacetate. Effect of PM on bronchial epithelial cell (BEAS-2B) viability was measured using resazurin reagent. The cytokine/chemokine response was measured using Human Cytokine Panel 1 (Merck Millipore, United States).

Results: The mean (± SE) BC exposure on a typical school day was 3343 (± 174.4) ng/m^3/min and the exposure level was higher during haze. Haze PM showed higher mass concentration and larger size variability compared to non-haze PM (Figure 1). The smaller haze PM ($PM_{0.25-0.5}$) showed crystal-like morphology, rich in sulphur, potassium and trace metals. A dose dependent abiotic ROS response, activation of NF-κB and decrease in cell viability was observed with both haze and non-haze PM, while release of IL-6, IL-8 and TNFα by BEAS-2B cells was significantly higher with haze PM.

Conclusions: Our data provide evidence for higher BC exposure during haze and higher health hazard potential of haze PM.

Word count: 299 (excluding author list and affiliations)

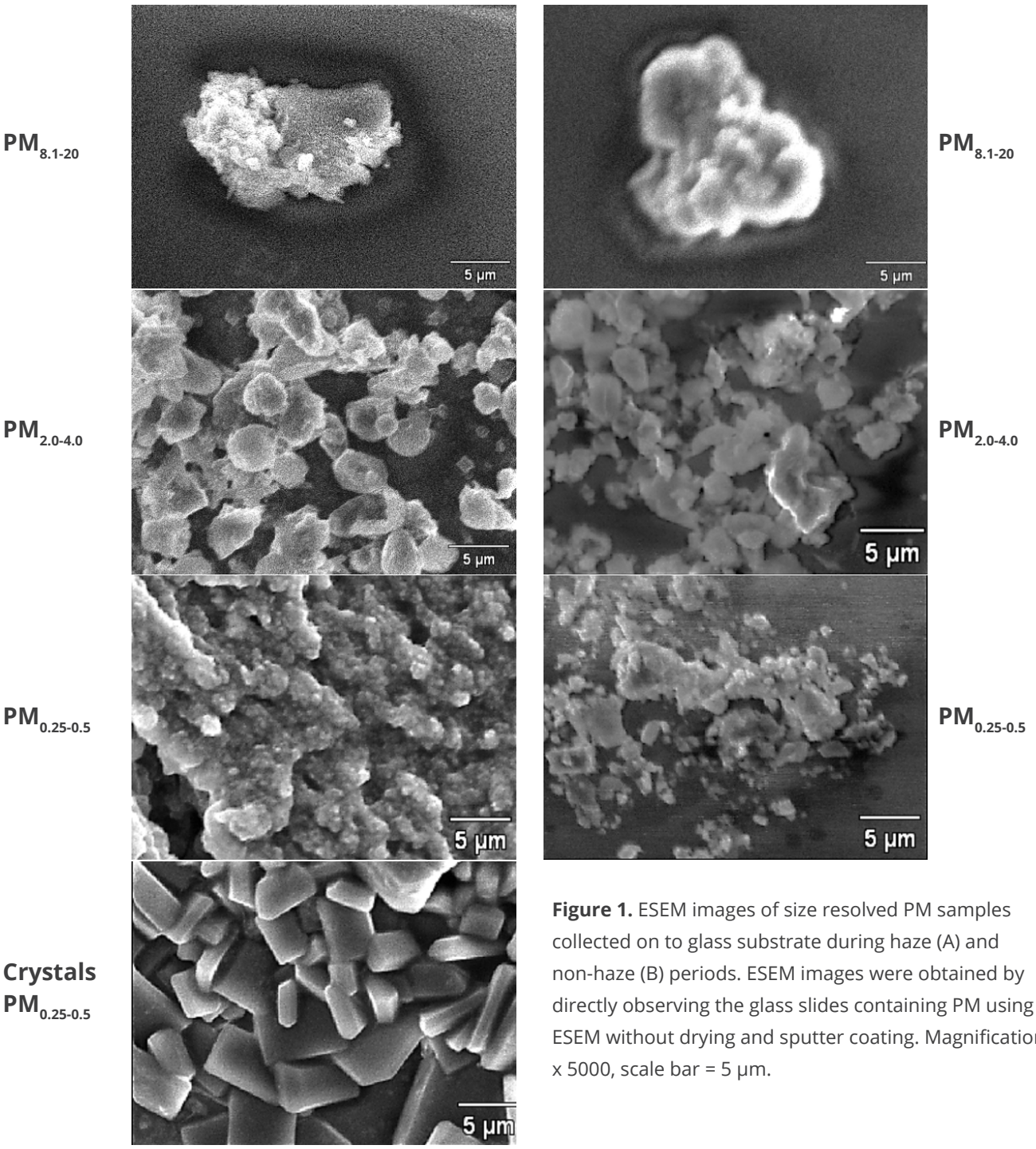


Figure 1. ESEM images of size resolved PM samples collected on to glass substrate during haze (A) and non-haze (B) periods. ESEM images were obtained by directly observing the glass slides containing PM using ESEM without drying and sputter coating. Magnification x 5000, scale bar = 5 µm.

Title: Are we fully aware of our child's asthma medications?

Oh, I thought the inhaler was still full!

Authors: Dr Haji Sheeraz Khan (consultant Paediatrician)
Dr Mary Barraclough (consultant Paediatrician)

BACKGROUND: Asthma is one of the most common long-term conditions in children in the UK. Poor discharge planning, lack of education and improper use of asthma medications are the main reasons for numerous re-admissions. Asthma poses a significant financial burden on the NHS. The importance of health education is well recognised in the management, however, the best way to deliver an effective message is still to be determined.

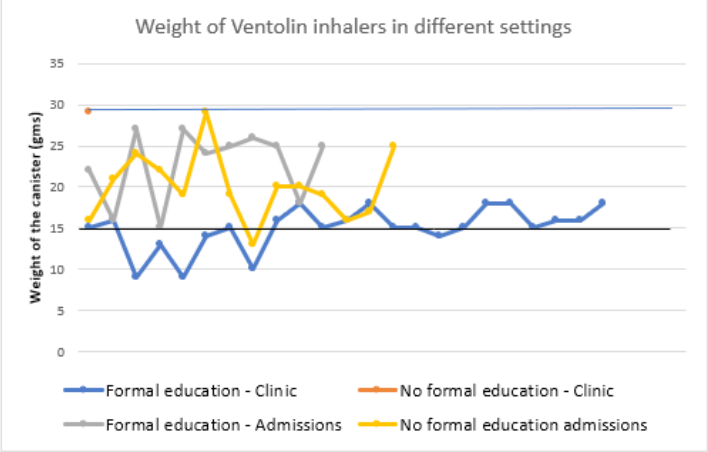
AIMS: This study aimed to assess the knowledge of a parent about their child's inhaled therapy, to investigate if there is any correlation between asthma knowledge and symptom control and to see what methods patients use to check the fullness of their inhalers.

METHODS: For this study, a pre-defined questionnaire was used to survey the participants who were a cross section of children, who had been prescribed a reliever inhaler. These children attended the respiratory clinic or were admitted to the ward. We weighed the reliever inhalers under their use.

RESULTS: 112 responses were collected. 70% of study population had had some kind of asthma education, 48% of children did not keep their inhaler with them (p 0.65). 5.4% were never shown how to use the inhaler. 8% didn't take their inhaler to school (p 0.003). However, no significant difference in their previous hospital or GP visits in both arms.

Patients used a wide variety of methods to assess their inhaler's fullness: shaking was most commonly used method (78.6%). One third of the inhalers brought with the patient weighed the same as a corresponding empty inhaler would weigh.

CONCLUSION: This study identifies a lack of understanding/ineffective education on the importance of inhaler use. There is no validated method to assess inhaler's emptiness if there is no dose counter and therefore inhalers can be erroneously used more than recommended without an effective dose being delivered.



Emotional distress in children with problematic severe asthma is associated with parental anxiety and depression

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Introduction

Asthma symptoms negatively impact on physical, social and emotional aspects of life and high levels of anxiety and depression have been reported in adults with asthma.

Hypothesis

High levels of emotional distress in children with problematic severe asthma (PSA) are associated with worse asthma control, increased number of attacks and there is an association with parental anxiety and depression.

Methods

Retrospective analysis of 86 children assessed as part of our difficult asthma protocol (2010-2017). Emotional distress was assessed using the Paediatric Index of Emotional Distress (PI-ED) and anxiety and depression in parents using the Hospital Anxiety and Depression Score (HADS). A PI-ED score ≥10 (boys) or ≥11 (girls) indicates significant emotional distress. Asthma Control Test (ACT), Paediatric Asthma Quality of Life Questionnaire (PAQLQ), courses of oral corticosteroids (OCS) in past 12 months, hospital admissions, spirometry and exhaled nitric oxide (FENO) were measured.

Results

The median PIED score was 13 (IQR 8.5-18). 63 (73%) children had significant emotional distress. The parents of children with high levels of emotional distress had significantly higher HADS scores. There were no differences in any other measures of asthma control (Table 1) between the groups.

Conclusions

High levels of emotional distress are common in children with PSA and are associated with parental anxiety and depression. Attention to psychological morbidity in children and their families is a vital component of asthma care.

Table 1

	PI-ED score ≥10 (boys) or ≥11 (girls)	PI-ED score <10 (boys) or <11 (girls)	p
Number	63	23	
Male:Female	37:26	10:13	
Age, years, median (IQR)	12.2 (9.7-14.75)	13.1 (10.03-14.73)	
Parental HADS anxiety, median (IQR)	6 (4-10)	4 (1-7)	0.0017
Parental HADS depression, median (IQR)	4 (1.75 – 7)	2 (0-4.75)	0.0097
ACT score	13 (9-17)	17.5 (10.5-22)	0.0588
Uncontrolled asthma (ACT ≤15) n/total	39/63	14/23	0.0863
$FEV_{1,}$ % predicted, median (IQR)	89.5 (87-101.5)	91 (84.5-101.5)	0.926
FENO, ppb, median (IQR)	44 (21-77)	41 (10-71)	0.724
ICS dose, mcg/day beclomethasone or equivalent, median (IQR)	800 (500-850)	800 (575-1200)	0.404
PAQLQ, median (IQR)	4.47 (3.31-5.75)	5.06 (3.57-5.82)	0.523
OCS courses in the last year, median (IQR)	5 (4-10)	5 (2-10.5)	0.74
Number of hospitalisations	1 (0-3)	1.5 (0-4.75)	0.32

A one year experience of free allergy asthma clinic catering mainly to low and middle socioeconomic class from South India

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Aim: To share our experience of a free allergy asthma clinic catering mainly to low and middle socioeconomic class from south India.

Methods: This study is a retrospective analysis of our free allergy asthma clinic data from January2017 till January2018.

Results: A total of 172 cases were registered with Male:Female=1.4:1. 116 patients(67.4%) belonged to low Socioeconomic class,44(25.5%) belonged to middle class and only 12 patients belonged to upper class. As we are catering mainly to Pediatric patients, 46 patients(26.7%) were aged less than 5 years, 76(44.1%) were aged 5 to 12 years, 38(22%) were aged between 12 to 18 years of age and only 12 patients were aged above 18 years. Among Under five, 6 children were episodic viral wheezers and 37 children were multitrigger wheezers. About 125 patients had asthma of which, 10 had intermittent asthma, 67 mild persistent asthma, 42 moderate persistent asthma and 8 severe persistent asthma. 39 patients had allergic rhinitis and 8 children atopic dermatitis.Allergy skin test was done for 126 patients. Most common allergens were house dust mite(28 patients) and cockroach(13 patients).Spirometry was done for 106 patients. It was normal in 61 and showed reversible airway obstruction in 23. Of the 172 cases only about 56 cases turned up for follow up of which only 23 cases had more than 3 follow ups. During the follow up, 32 cases were well controlled, 14 cases partly controlled and 10 cases were poorly controlled.

Conclusions:

1. Most of our patients are suffering from mild and moderate persistent asthma with House dust mite being the most common allergen causing sensitisation.

2. There is a poor long term follow up of our patients eventhough services are provided free of cost. Hence, there is an urgent need to implement suitable intervention strategies for optimum management of asthma.

Acknowledgement: we wish to thank Dr P.K.Vedanthan for having provided the financial, intellectual and moral support to run this charity clinic for asthma patients.

Latex allergy among health care professionals at a tertiary care government hospital in South India

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Aim: Latex gloves are worn universally by all health care professionals in our hospital. Hence, the present study was undertaken to determine the prevalence of latex allergy among health care professionals of our hospital.

Methods: Present study was a cross sectional study conducted from December 2017 to February 2018. All the participants were given validated self-administered questionnaire prepared from American latex allergy association(ALAA). Among those patients considered to have latex allergy by questionnaire, skin prick test(SPT) was done using latex allergen(1% w/v from credisol, Mumbai).

Results: A total of 127 health care professionals were screened by ALAA questionnaire of which 78 were females and 49 were males. Of 127 subjects,76 were doctors, 43 were nurses and 8 were group D employees. The number of years of glove use was less than 5years in 31 subjects(24.4%), 5 to 15 years in 72 subjects(56.69%), 15 to 25 years in 15 subjects(11.8%) and above 25 years in 9 subjects(7.08%). About 20 subjects(15.7%) had personal history of allergy in the form of allergic rhinitis or other allergies. Only 2 persons were allergic to fruits like kiwi and avocado. 19 subjects(15%) had history of either rash, itching, cracking, chapping,scaling or weeping of hands with glove use and which used to subside when they stop wearing gloves for some time. 7 subjects gave history of itchy red eyes, sneezing, itching of nose when they wear gloves or when they are around others wearing latex gloves. Of the 19 subjects who had history suggestive of latex allergy, skin test for latex allergen for 16 subjects was negative. 3 subjects refused for skin test.

Conclusions: In the present study though there was a high prevalence of latex glove induced dermatoses among health care professionals there was no true latex allergy.

Acknowledgement: we thank all the healthcare workers who participated in the study.

Inhaled magnesium sulfate for acute asthma in children: Cochrane review update

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Aims:

In the UK, a child is admitted to hospital every 20 minutes with acute asthma [1]. Intravenous magnesium sulfate ($MgSO_4$) is an effective addition to standard treatment for severe acute asthma [2], but there is uncertainty about the role of inhaled $MgSO_4$ [3]. Several large recent studies have addressed this question.

The aim of this Cochrane review update was to assess whether giving inhaled magnesium for acute asthma is safe, improves lung function, reduces the need for admission and reduces asthma symptom/severity scores. The review includes studies in all ages; paediatric data are presented here.

Methods:

We included parallel-design randomised controlled trials of patients with acute asthma allocated to receive inhaled $MgSO_4$ compared with a control inhaled treatment. We allowed co-interventions. Our primary outcome was change in pulmonary function from baseline. Secondary outcomes were clinical severity scores, hospital admissions and adverse events. Data were collected, extracted and assessed for risk of bias according to established Cochrane methods.

Results:

We included eight randomised controlled trials involving a total 1247 children with acute asthma. Sample sizes ranged from 17 to >500 participants with predominantly moderate to severe acute asthma. The larger trials were conducted more recently.

Table 1: characteristics of included studies

Study	Origin	Primary outcome(s)	Total n randomised	Severity of asthma exacerbation
Alansari 2015 [4]	Doha, Qatar	Time to readiness for discharge	400	Moderate to severe
Ashtekar 2008 [5]	Cardiff, Wales	ASS (Yung)	17	Severe
Khashabi 2008 [6]	Urmia, Iran	Reduced mean duration of O_2 therapy in $MgSO_4$ group,	40	Unclear
Mahajan 2004 [7]	Detroit, USA	% change in FEV1	62	Moderate to severe
Meral 1996 [8]	Izmir, Turkey	% change in PEF, ASS	40	Moderate to severe
Mohammedzadeh 2014 [9]	Babol, Iran	Pulmonary index, PEFR, adjusted PEFR	80	Moderate to severe
Powell 2013 [10]	UK	Yung asthma severity score	508	Severe after conventional treatment
Turker 2017 [11]	Turkey	Modified pulmonary index score	100	Moderate

ASS: asthma severity score, FEV_1: forced expiratory volume in 1 second, PEF: peak expiratory flow, PEFR: peak expiratory flow rate

Two studies reported improved lung function with the addition of inhaled $MgSO_4$ to standard inhaled treatment compared to standard treatment alone, although the difference was not significant. There was no significant difference in admission rates of children between the groups. Serious adverse events were rare but slightly less frequent in the $MgSO_4$ group.

Conclusion:

Treatment with nebulised $MgSO_4$ is likely to be safe and may result in modest additional benefits for children when added to inhaled salbutamol and ipratropium bromide; however, our confidence in the evidence is low and there remains substantial uncertainty.

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The role of pet allergen sensitisation and exposure in asthmatic children

By Shahamah Alshaher and Clare Murray

Category: Asthma, Allergy

Background: Pet allergen (cat/dog) exposure in sensitised asthmatics may contribute to increased symptoms and treatment required.

Objective: Amongst children recruited for a randomised, double blind study of mite avoidance, we investigated whether cat or dog allergen sensitisation and exposure was associated with the amount of treatment children were prescribed.

Methods: Mite-sensitised children were skin prick tested (SPT) to cat and dog. Sensitisation was defined as a wheal diameter 3mm or greater than the negative control. Exposure was defined as the presence of a cat or dog in the household or regular pet contact. BTS treatment level (Step1-3 and 4-5) was determined for each child based on parental report of current medication.

Results: Of 284 recruited children (65% male, median age 7.0 years) 255 were SPT to cat and dog; 36.1% were sensitised to cat, 34.9% to dog and 25.6% to both. Of those sensitised to cat, dog or both 19.8% were at treatment step 4-5 compared with just 5.8% of those sensitised to mite only (p=0.002). Children sensitised and exposed to cat were significantly more likely to be on higher treatment steps compared with those sensitised to mite only (33.3% versus 5.8% at step 4-5; p<0.001). A similar pattern was seen for dog sensitisation and exposure but this failed to reach significance (p=0.17).

Conclusion: Mite sensitised asthmatics who are sensitised to cats, dogs or both appear to be taking more medication for their asthma. Exposure to the allergens they are sensitised to may be contributing further to their disease.

CYSTIC FIBROSIS

Early development of the airway microbiota in infants with CF.

Ahmed, B[1,2], Cox, M.J.[1], Cuthbertson, L[1], James, P[1], Cookson, W.O.C.[1], Davies, J.C.[1,2], Moffatt, M.F.[1], Bush, A[1,2].

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Background:

The airways of patients with CF harbour rich communities of microbes ("microbiota"), the role of which is unclear. Adult studies have demonstrated that decreased community diversity is a feature of end stage disease with little change seen with exacerbations (PNAS 2012;109:5809-5814). Longitudinal studies of the microbiota in infancy may identify early changes that could be targeted therapeutically to prevent disease progression. We hypothesised that changes in the airway microbiota would be seen with age and changing clinical status in infants with CF.

Methods:

Thirty infants with CF diagnosed on newborn screening were recruited at a median age of 84 days. Throat swabs, a reasonable surrogate for the lower airway microbiota (Thorax 2014;69:A123), were collected at routine clinical appointments for up to 2 years (median of 35 days between each visit). Quantitative PCR and sequencing of the 16S rRNA bacterial gene was performed using Illumina MiSeq. Data analyses were performed in QIIME and Phyloseq in R. All participants received anti-staphylococcal prophylaxis.

Results:

Streptococcus and *Haemophilus* were the most common genera (55% and 12.5% of reads respectively) and were inversely related. *Streptococcus* increased in its relative abundance up to 9 months of age then plateaued and *Haemophilus* showed the opposite trend ($P < 0.001$). Beta (between sample) diversity changed significantly with age (Bray Curtis $r^2 = 0.15$, $P = 0.03$). Surprisingly, *Staphylococcus* and *Pseudomonas* were rarely detected. There were no significant changes in the microbiota at the first pulmonary exacerbation or growth of *Pseudomonas aeruginosa* (Pediatric Pulmonology 2016;51:328).

Conclusions:

These results suggest that *Streptococcus* and *Haemophilus* may play an important role in early CF. Whether they are protective against infection with more typical CF micro-organisms, or pathogenic and thus meriting treatment needs to be determined.

The effect of gastronomy insertion on long-term pulmonary function in children with cystic fibrosis: a systematic review

Hera Asad(1), Tavishi Kanwar(1), Shani De Soysa(1), Usmaan Ahmed(2), Haroon Ahmed(1)

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(2) BHR Hospitals, NHS England, UK

Category: Cystic Fibrosis
Abstract (300 words)

Aims:

Cystic Fibrosis (CF) affects both the gastrointestinal and respiratory systems. Patients experience problems in weight maintenance, hence gastrostomies are routinely used to ameliorate nutritional status. We aimed to qualitatively assess the effect of gastrostomies on long-term lung function in CF children through reviewing the literature from the past 30 years.

Methods:

We searched the PubMed and Cochrane libraries with a search strategy: (paediatric or children or young or adolescent or infant or neonat*) and (cystic fibrosis) and (gastrostomy or PEG) and (lung or pulmonary) and (function or death or mortality or FEV or FVC or exacerbation or transplant). We selected papers by scanning their abstracts for relevance

Results:

Seven retrospective cohort studies are included in the review. The commonest indicators of pulmonary function are percent predicted forced expiratory volume in one second (ppFEV1) and percent predicted forced vital capacity (ppFVC). Three of the studies showed a positive effect, three found no significant improvement and one showed a decline in lung function in the form of increased pulmonary exacerbations. Results are shown in Table 1 (Attached).

Conclusion:

Overall the current literature depicts an uncertain long-term impact of gastrostomy on pulmonary function in children with CF. The potential reasons to explain this include: small cohort sizes; lack of an exclusively paediatric demographic and an insufficient follow-up period. In addition, the literature in this area is sparse and consists of retrospective cohort studies only. We recommend careful consideration of the appropriateness of gastrostomy on a case by case basis, given the lack of convincing evidence and the impact on quality of life that this intervention may have. Although RCTs are unlikely, comparison with regions of the world where gastrostomies are not the norm as well as larger prospective cohort studies are needed to provide a robust evidence base to guide future practice.

The management of non-tuberculous mycobacteria in paediatric patients with cystic fibrosis compared with current international consensus guidelines

By Hannah Shimmin, Prita Rughani, Sarah Brown, Caroline Pao, Catherine Lambert, Chinedu Nwokoro

Background

Non-tuberculous mycobacteria (NTM) are environmental organisms causing chronic pulmonary infection, particularly in cystic fibrosis (CF). NTM is characterised by progressive inflammatory lung damage, and eradication is inherently difficult, requiring prolonged multi-drug treatment. A Cochrane review highlighted the need for a unified approach to the management of NTM in CF patients, which led to the formulation of consensus recommendations by the United States and European CF Societies, 2016.

Aims

To assess whether the management of NTM in paediatric CF patients in our tertiary centre is consistent with the consensus guidelines.

Methodology

The medical records of paediatric CF patients at our centre diagnosed with NTM between 2010-2016 were reviewed in accordance with the consensus guidelines. We ascertained:

1. 1) Whether treatment for NTM was commenced on the basis of two positive sputum samples or one positive bronchoalveolar lavage sample, in conjunction with indicative high-resolution computed-tomography (HRCT) findings.

2. 2) The treatment duration and regime.

Results

Our institution cares for 137 CF patients, from which 14 isolated NTM. The most common isolates were Mycobacterium abscessus (43%) and Mycobacterium gordonae (29%).

Seven (50%) patients did not undergo HRCT, while seven (50%) had insufficient positive microbiology samples. Six (43%) received treatment with a varying regime and duration (six months to five years). Under the 2016 guidelines, five (83%) patients would have received a different treatment schedule, four (66%) patients would not have reached treatment threshold without additional radiological and/or microbiological evidence, while one (13%) who went untreated would warrant further investigation with HRCT to determine the need for treatment.

Conclusions

Prior to the January 2016 consensus guidelines, management of NTM in CF patients was highly variable dependent on consultant and departmental preference. Treatment requires standardisation in order to promote best patient outcomes and facilitate data comparability for research purposes. We have formulated a Trust-wide guideline in order to enable best practice.

INFECTIONS, EPIDEMIOLOGY, SUPPURATIVE LUNG DISEASE

What are the most common potentially causative factors in children with Trisomy 21 that are associated with recurrent respiratory symptoms?

Author Dr Yasmine Kamal ST7 Community Paediatrics, Leeds Community Healthcare Trust

Supervisors Dr Gillian Robinson Community Paediatrician, Leeds Dr Chris Edwards Respiratory Paediatrician,Leeds

Background

Respiratory disease is a major cause of morbidity in patients with Trisomy 21. There is a paucity of guidance on how to approach investigation of children with T21 and recurrent “respiratory symptoms.”

Aims

Retrospective cohort study to establish the common predisposing factors, how these children are currently managed and if their management can direct future screening and surveillance.

Methods

Patient letters and investigation results for all children up to the age of 10 years were reviewed. Results were interpreted for acute/chronic lung pathology on chest X-ray, aspiration on video fluoroscopy, “safe/unsafe” swallow on SALT assessment, sleep apnoea on sleep study and immunodeficiency on blood tests. Those receiving prophylactic antibiotics and those classed as obese at age five were noted. Severity of chest symptoms was made by recording number of hospital admissions and total length of hospitalstay.

Results

Ninety two children were included in the study. Twenty one (49%) of those under five years had been admitted to hospital at least once for respiratory tract infection. Seventeen (37%) children remained inpatients for greater than ten days. Seven (47%) children deemed to have a safe swallow by SALT went on to have an abnormal VF. Twenty seven (69%) children had an abnormal sleep study, the majority were obese. Twelve (25%) children aged five or over were classed as obese at five years. No statistically significant relationship between chest X-ray changes, VF results, sleep apnoea, immune status, prophylactic antibiotics and number of hospital admissions. Statistically significant relationship between being classed as obese at five years and increased number of hospital admissions, p=0.03.

Conclusions

Clinicians must remain vigilant to the possibility of swallowing dysfunction, sleep apnoea, and obesity when reviewing patients with T21. This is an area in need of ongoing research and inclusion in national guidelines.

Miliary TB with broncho-pleural fistulae and cystic parenchymal changes on CT.

Authors: Dr. Alex Paes, Dr. Will Daw; *Paediatric Registrars*

Dr. Chris Edwards, Dr. Guy; *Paediatric respiratory consultants*

Mr. Crabbe, Ms. Sidebotham; *Consultant paediatric surgeons*

Dr. O'Riordan; *Paediatric Consultant in Infectious Disease & Immunology*

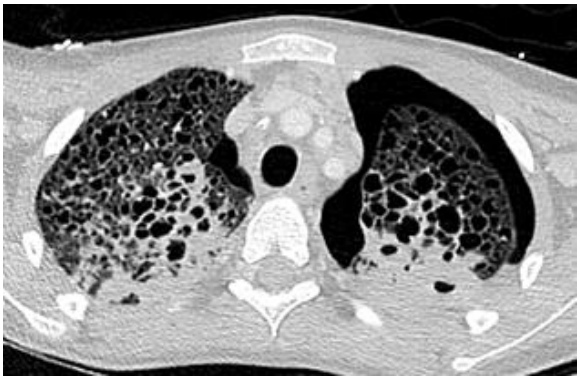
Introduction

The usual presentation of broncho-pleural fistula with pneumothorax in children is following complicated pneumonia and surgical treatment for empyema. Tuberculosis is a very rare cause.

Case Description

A previously healthy 13 year old girl presented with a month's history of fevers, weight loss, and breathing difficulty. She was treated in Leeds Teaching Hospitals NHS Trust. Broncho-alveolar lavage (BAL) and lung biopsy confirmed tuberculosis.

She had poor lung compliance, making her difficult to ventilate on intensive care, and then had significant high flow therapy and oxygen requirement. She developed bilateral pneumothoraces, which persisted despite having bilateral chest drain inserted and on suction.



CT scans showed diffuse cystic parenchymal change, apical bullae, and septated pneumothoraces. Some of the apical bullae had ruptured, contributing to the air leak being caused by broncho-pleural fistulae. Bronchoscopies demonstrated normal airway anatomy.

Some CT changes were suggestive of interstitial lung disease, but on extensive testing (including bloods and lung biopsy) no other cause was found. MRI head showed scattered high intensity foci; whether they are tuberculomata is not known.

Her admission lasted 6 months, and she had multiple procedures, including division of septations, stapling of lung bullae, and several pleurodeses. She was discharged with bilateral chest drains with flutter valves in situ.

Discussion

Despite the above medical and surgical treatments, it still took 7 months for the pneumothoraces to resolve, finally allowing chest drain removal. She continues on 1 year of TB treatment, and has reduced lung function. As a percentage of predicted, forced expiratory volume in 1 second (FEV1) is 59%, forced vital capacity (FVC) 59%, and peak flow 77%. This severity of TB and the duration of air leak is very rare in TB in children, especially in the developed world.

Respiratory syncytial virus: are the goalposts changing? Three case studies of children over the age of 2 years with significant RSV infections.

Authors: Dr G. Wilson, Dr P. Desai

Declarations:

This abstract has not been previously published or presented.

Category for submission:

Infections, epidemiology, Suppurative lung disease

Aims:

Presentation of three case studies to highlight the significance of respiratory syncytial virus (RSV) infection in children over 2 years.

Methods:

We discuss the cases of three children over the age of 2 years presenting to a hospital with respiratory complaints of cough, wheeze and fevers within 1 week. They were each treated with intravenous antibiotics but failed to improve, requiring prolonged inpatient stays with significant respiratory support. One patient was intubated, ventilated and admitted to a Paediatric Intensive Care Unit (PICU) for 5 days. Each child had a nasopharyngeal aspirate performed due to lack of improvement, all three of which came back positive for RSV.

Conclusion:

RSV is most commonly known for causing bronchiolitis in children under 2 years, accounting for 4.4 per 100 admissions of children under 6 months. In children over 2 years it usually causes a mild lower respiratory tract infection and is therefore not commonly tested for in this age group. These cases have highlighted the possibility of RSV as either an important cause of lower respiratory tract infection in itself, or a concomitant infection causing significant morbidity in those with a bacterial lower respiratory tract infection. Either way, the question should be asked whether we should be testing older children for RSV.

Audit of Management of chest drains in empyema

Molla I Ahmed[1], Yean L Ng[1], Manjith Narayanan[1]

1. Department of Paediatrics, University Hospitals of Leicester

Background:

Children presenting with empyema frequently need chest drain insertion for pleural drainage. There are no standard guidelines on managing chest drains in empyema including technique of insertion and post insertion care. Absence of standard guidelines can result in variation of practice, which could adversely affect clinical outcome.

Aims:

We conducted a retrospective audit of our local practice of chest drain insertion with an overall aim to determine the rate of complications including chest drain dislodgement, long-line occlusion and iatrogenic pneumothorax. We aimed to produce recommendations to reduce complication rate by consensus following the findings of the audit.

Methods:

We collected details of patients who had chest drain insertion for empyema in last 5 years using a structured proforma.

Conclusions:

51 patients who had empyema were audited. Paediatric surgeons performed majority of chest drain insertions in empyema. Narrow bore straight tipped chest drains were most commonly used. Urokinase was used in majority of the patients. Long line was inserted in 90% of the patients having a chest drain inserted for empyema. Documentation on the type of chest drain inserted, the technique of securing chest drains and whether chest drains were clamped after drainage of fluid more than 10 ml/kg required improvement. There was no consensus within surgical team regarding the method of securing chest drains. 33 of 51 (64.7%) patients had a documented improvement in chest X-ray following drain removal.

Action points:

We have introduced a proforma to be used on the ward to improve documentation and have convened a working party on amalgamating current local versions of chest drain and empyema guidance. We have launched an Internet survey identifying different practices nationwide on the management of chest drains in paediatric empyema. We shall re-audit chest drain management in 2 years to determine if standards are met.

Paediatric Tuberculosis Screening – Current Practice at a London District General Hospital

L. Elliott[1], T. Rahimi[1], Q. Wu1, R. Wells[1], N. Elhadi[1]

1. Department of Paediatrics, West Middlesex University Hospital, Chelsea and Westminster NHS Trust, London, UK.

Aim

We aimed to evaluate our current tuberculosis (TB) screening service at a busy London hospital against latest NICE guidance, to assess efficiency and current patient load. We also wished to assess the impact that full adoption of the updated guidance will have on our service to aid future service provision planning.

Methods

We identified patients referred to our department for TB screening between April and October 2017. The following data was collected retrospectively from electronic records: time from referral to both investigation and diagnosis; management initiated; and diagnostic value of the investigations carried out – chest x-ray (CXR), Mantoux tuberculin skin test (TST) and Elispot Interferon-γ release assays (IGRA).

Results

77 patients were referred, comprising 13 referrals for suspicious imaging or history and 64 for TB contacts. 15 patients were classified as active or latent TB. Two further patients would be defined as having a positive TST under the new guidance. Median time from referral to screening was 16 days (range 0-79). Median time from referral to treatment, where required, was 43 days (range 5-98).

98.5% of patients referred due to TB contacts had a normal CXR. The 1.5% with an abnormal CXR also had a positive TST. Our current practice is that all patients with pulmonary contacts have both TST and IGRA on referral. All patients with a positive IGRA (9.6%), also had a positive TST.

Conclusions

Our results suggest that CXR adds no diagnostic value and could be removed from our screening process. The IGRA and TST results support the guidance that IGRA's can be reserved for those with negative TST. However, this might be expected to increase workload as the number of clinic visits required increase commensurately. Similarly, 4 additional patients per year might be expected to require treatment due to the updated guidance on TST positivity.

“PODCAST” Patient Information- The future

Authors: Dr Shravanthi Chigullapalli (Specialty Paediatric Trainee 6)

Dr Venkat Thiyagesh (Paediatric Consultant)

Calderdale Royal Hospital, Halifax

Aim

We aim to evaluate podcast (hosting web programmes) as a means of delivering information to patients and their families.

Background

Health literacy is the single best predictor of individual’s health status. Patients want more information about their health care.

The reading age of the general population in UK, has been estimated to be an average of 9years of age (equivalent to year 4 at school), but most of the available information is aimed at population to an average 15years old ability or higher. There is a considerable age gap, between the availability and need. It’s important to customize health information to the level of reading skills of population.

From the parent’s perspective, the current education of their medical problem consists of an overwhelming amount of new information which often is presented on one occasion. They prefer education to be continuous process that is reproducible as needed, the principles of adult learning.

Method

It is a prospective qualitative, pilot project.

- **Step 1**- pilot user survey to understand the patient/ carer preference of using the information provided as ‘PODCAST’ and whether there is basis for expanding the use of this medium.

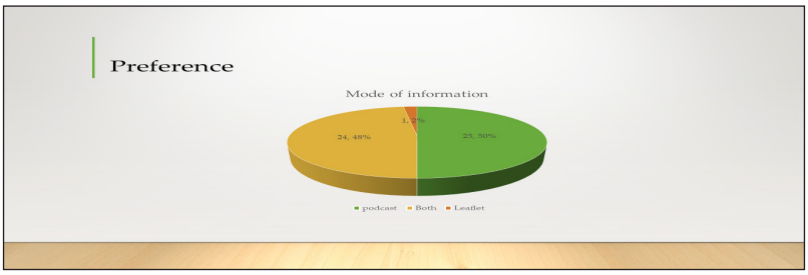
  From survey of convenience sample of 29 carer’s, 28 of them preferred to use them in comparison to patient information leaflet.

- **Step 2** - ‘Podcast on Bronchiolitis’ created.

  Convenience sample of 50 carer’s on the ward, provided them with both modalities. Followed by an Evaluation questionnaire.

Results

50 evaluation questionnaires over 2 months period.



Conclusion

Podcast was widely accepted as a medium of Health information provision, due to its ease of use and accessibility.

NEONATAL PULMONOLOGY, BRONCHOSCOPY, CONGENITAL MALFORMATIONS, RESPIRATORY INTENSIVE CARE & AIRWAYS

Primary Spontaneous Pneumothorax in Children: A Case Report

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Introduction

Pneumothorax in children is uncommon. It is often caused by a tear in the visceral pleura due to the rupture of a subpleural bulla. Primary spontaneous pneumothorax usually occurs in three conditions: thin, tall and thirties. In this case, the patient was thin and tall, but not in their thirties.

Case presentation

A 16-year-old asthenic look boy admitted to emergency room of Persahabatan Hospital, Indonesia with the worsening of dyspneu without wheezing since a day before. He had no history of asthma or current asthma and had been previously healthy without history of certain period of continous cough or dyspneu. He was 40kg and 172cm tall.

He showed 26 times breath/min, no tracheal deviation or jugularvenous pressure increase. Physical examination revealedasymmetric chest wall movement, decrease of vocal fremitus and hypersonor percussion as well as decrease of vesicular sound of his left hemithorax. X-ray imagined the pleural line with collapse of left lung and he was treated by the insertion of chest tube.

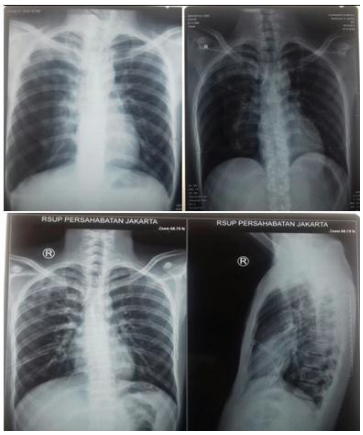

Fig 1.

a) X-ray imaging a hyperlucent avascular with pleural line

b) Post chest tube insertion X-ray imaging

Fig 2. Follow up X-ray showing lung expansion and fibroinfiltrate in the right upper lobe of the lung

In follow up, the X-ray imaging with improvement of lung expansion depicted the fibroinfiltrate pattern that led to a tuberculosis (TB) suspection which might be the underlying cause of the pneumothorax. Sputum collection was done for acid-fast bacili *Mycobacterium tuberculosis (Mtb)* detections as well as culture to confirm assesment as bacteriological TB which will be the subject to underlie this case as a secondary spontaneous pneumothorax(SSP).

However, the diagnosis as PSP was made instead due to the fact that the patient was finally confirmed to have no lung disease such as TB (negative result for *Mtb* examination). His asthenic habitus may be the subject to be the cause of pneumothorax. The outcome showed good result with 100% lung expansion without any complication.

Conclusion

Primary spontaneous pneumothorax can be caused by the factor such as thin, tall and thirties. It is uncommon in children but the asthenic habitus can be the reason of this condition occuring in children.

Inhaled nitric oxide use in persistent pulmonary hypertension of the newborn: a retrospective audit in a neonatal intensive care unit.

Dr. Beatrice Zanetti and Dr. Rahul Roy

Neonatal Intensive Care, Norfolk and Norwich University Hospital NHS trust.

Aims:

Inhaled Nitric Oxide (iNO) therapy is indicated in severe hypoxic respiratory failure with persistent pulmonary hypertension (PPHN) in neonates >34 weeks. Some preterm babies (< 34 weeks) receive iNO despite lack of evidence to support iNO use in this age group. We analysed treatment outcomes with iNO therapy in a tertiary NICU and estimated whether better adherence to local guidelines would lead to potential cost savings.

Materials and Methods:

Retrospective audit of 21 patients who received iNO during a 2 year period. Data was collected through a standardised proforma from local neonatal database. Analysed data included treatment indications, exclusion criteria (<34 weeks, patients with pulmonary hypoplasia and patients with cyanotic cardiac defects), trial with other treatments before iNO, hours of iNO use, response to therapy, weaning and toxicity. Cost data was extrapolated from total hours of iNO therapy received.

Results:

8/21 (38%) patients were treated despite not meeting the inclusion criteria (figure 1). Alternative therapies (rescue surfactant, inotropes and High Frequency Oscillatory Ventilation) were trialled before iNO use in 71%, 95% and 76% of patients respectively. Treatment response rate was 62%. 24% of patients required ECMO and 14% passed away. Of note, 3/8 (37%) of babies who responded to iNO were preterm. Response to iNO within the first hour was reviewed in all patients. However, iNO was not stopped early in 38% of patients who did not respond to treatment. Adherence to the weaning protocol was 86%. Total treatment costs were £48102 over 2 years.

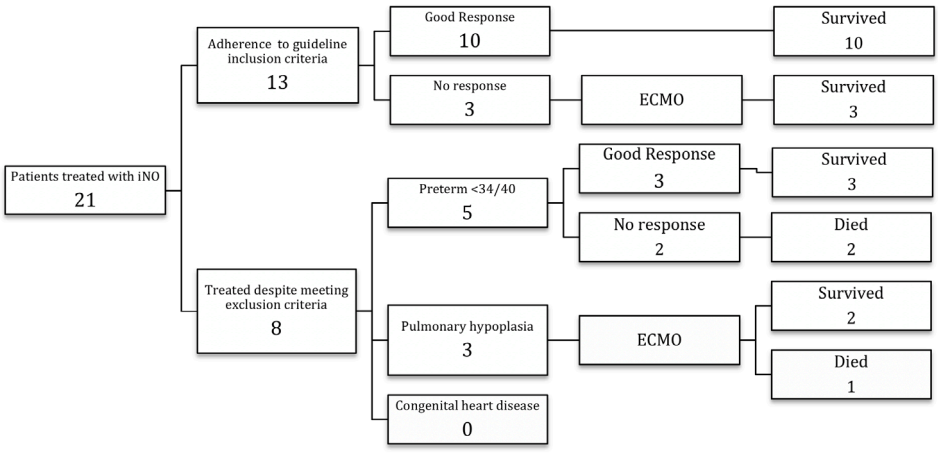

Figure 1 : Outcomes of patients treated with inhaled Nitric Oxide

Conclusion:

INO is occasionally started on patients outside the recommended indications, sometimes with a positive outcome. Potentially, £8000/year could be saved by stricter adherence to guidelines; this would involve carefully selecting patients who are likely to benefit from iNO and stopping iNO early if response is poor.

Case report: A novel therapy for severe pulmonary haemorrhage in newborn

Authors: M Ranjan[1], A Jeyaraman[2] S Hamad[3]

1.ST7 Paediatrics,

2. ST5 Paediatrics

3.Consultant Neonatologist- Hull Royal Infirmary

Introduction

Pulmonary haemorrhage is a well recognised life-threatening condition in newborn. The bleeding ranges from mild blood-stained aspirates to catastrophic bleeding. It is usually treated with supportive measures including ventilator support- which ranges from oxygen supplementation to mechanical ventilation with high positive end-expiratory pressure or high frequency oscillatory ventilation; regular evaluation and correction of coagulation abnormalities.

Traditionally, treatment modalities for haemostasis have included the use of antifibrinolytics such as tranexamic acid(TXA). Limited data are available for neonatal use. However, its being used for cardiac surgeries and spinal surgeries in children.

TXA is used in pulmonary haemorrhage in adults. There are reported studies of bleeding being stopped with the first dose of TXA, and the treatment was well tolerated without adverse events.

Case report

We report a new-born with severe pulmonary haemorrhage who was successfully treated with tranexamic acid.

A 26+6 wk gestational age baby on day two of life while on mechanical ventilation developed profuse bleeding through endotracheal tube and became haemodynamically unstable needing initiation of massive haemorrhage pathway management.

He received multiple red cell, fresh frozen plasma and platelet transfusion in addition to ABC stabilisation, resuscitation, increasing ventilatory support with high frequency ventilation, inotropes, meticulous fluid management, sedation with atracurium and midazolam and close monitoring and correction of coagulopathy etc. His bleeding stopped with first infusion of TXA. The treatment was well tolerated.

Conclusion:

This case illustrates

1. The usefulness of TXA in massive pulmonary haemorrhage
2. The importance of further exploring TXA use in massive pulmonary haemorrhage in newborn as it is readily available in UK
3. Importance of initiation of massive haemorrhagic pathway

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PHYSIOLOGY, SLEEP, NIV

Initiating and Titrating Ventilation in Children – Do different models of delivery affect adherence and health economic outcomes?

Authors

Walker, Anne Marie; O'Toole, Sophie; Lowe, Paula; Kerr Joanna; Gavlak, Johanna; Evans, Hazel J.

Background

Home mechanical ventilation is offered to increasing numbers of children[1]. Due to increased service demand two models for ventilation initation and titration (VIT) have developed in Southampton. This service evaluation explored model outcomes.

Method

Over eight months children underwent VIT either

1. By admission to a sleep laboratory with live adjustment of ventilator settings according to the American Academy of Sleep Medicine Titration Algorithm (Group 1) or
2. By ward admission with daily adjustment of ventilator settings according to unattended sleep study results from the previous night. (Group 2).

All children underwent pre-admission mask orientation. Follow up at 3-6 months was by telephone, home and clinic visits to determine adherence defined by four hours of ventilator tolerance.[2] Statistical analysis was performed using SPSS.

Results

Thirty four admissions (17 boys, 17 girls) were evaluated. Median age (interquartile ranges (IQR)) for Group 1 (n=24) were 12.8 (8.2-15.2years), and for group 2 (n=10) were 5.4 (2.4-16.2 years). Median (IQR) length of stay was significantly less for group 1 (1 night, 1-1) versus group 2 (3 nights 2-3) ($p = 0.000$). Follow up was available on 29 children (19 group 1, 10 group 2). There was no significant difference in adherence with respect to preset criteria ($p = 1.000$).

Conclusion

Single night admission with live adjustment of ventilator settings achieved significantly reduced lengths of stay with no impact on long term adherence to ventilation demonstrating health economic benefits.

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UK

Correlations of Forced Oscillation Technique and Flow-Volume Spirometry Measurements in a Clinical Audit of 3-17 Years Old Children.

Background
Forced oscillations (FOT) method has gained popularity in measuring lung function in children due to minimal need for co-operation compared to flow-volume spirometry (FVS) needing forced expiratory blows. We evaluated how FOT correlates with FVS in terms of baseline lung function and bronchodilator responsiveness (BDR) in a clinical audit.

Methods
3-17-year-olds were studied subsequently with FOT and FVS. In all 83 baseline FOT measurements were available to be compared with baseline FVS measurements and 70 post-BD FOT measurements with post-BD FVS measurements, obtained according to the ATS/ERS-guidelines.

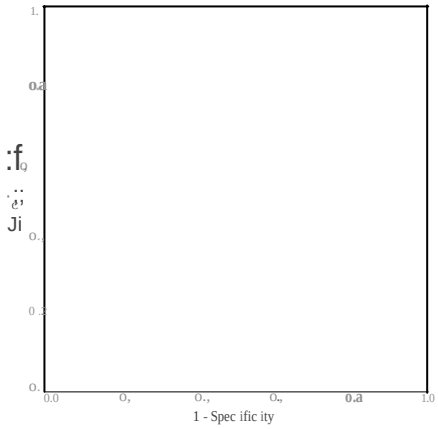
Results
Baseline FOT was accepted in 100%, and baseline FVS measurement approved in 93% of the visits when attempted. Children less than 5 years old (mean 4.8, 95%CI 3.9-5.6) could not produce an acceptable FVS measurement, and FVS between the age of 5-10 years (mean 7.8, 95%CI 5.7-9.9) was associated with technical difficulties.

Mean CoV for baseline Rrs8 was 13.5% (SD 4.6) and for post-BD Rrs8 14.6% (SD 4.7). In baseline comparisons, there was a statistically significant correlation between categorized abnormal Rrs8 and abnormal FEV_1 (ρ=0.32, p=0.007), FEV_1/FVC-ratio (ρ=0.53, p<0.001) and $FEF_{25-75,}$ (ρ=0.44, p<0.001) but not between Rrs8 and FVC. The cut-offs for abnormal Rrs8 and FEV_1/FVC-ratio showed a sensitivity of 0.81, specificity of 0.71 and AUC of 0.85 (Figure 1a).

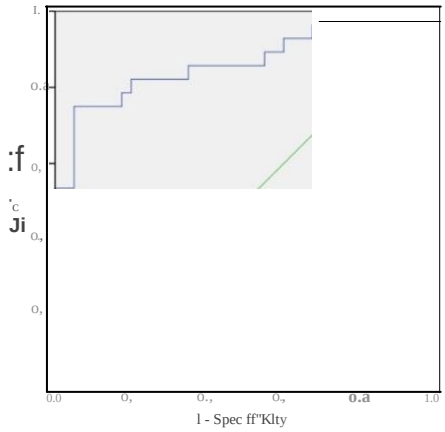
In post-BD comparisons, there was a statistically significant strong correlation between abnormal ΔRrs8 (-38%) and ΔFEV_1 (-12%) in response to bronchodilation (ρ=0.73, p<0.001), which showed a sensitivity of 0.75, specificity of 0.95 and AUC of 0.86 (Figure 1b).

Conclusion
FOT performs well in children unable/with difficulty to be perform FVS. There was significant within-subject variability in FOT measurements and the strength of correlation between lung function parameters remained modest, but correlations in BDR were strong. FOT may be a useful diagnostic tool when assessing BDR in children unable to perform FVS.

Figure 1 Receiver operator characteristic (ROC) curves of a) lung function (n=83) as categorized FOT Resistance at 8 Hz against categorized FEV1/FVC-ratio and b) bronchodilator responsiveness (n=70) as categorized FOT change in resistance at 8 Hz (ll Rrs8) against categorized change in FEV1 (ll FEV1) in 3-17-year old children.



1a: Abnormal Rrs8 vs. FEV/ FVC-ratio. Sensitivity 0.81, specificity 0.71, area under the curve (AUC)=0.85.
-Rrs8 2:120% percent predicted (by Calogero et al at <8 years old or Ducharme et al in 2:8years old children)
-FEV/ FVC-ratio below GU -Lower limit of normal



1b: Abnormal L1Rrs8 vs . L1FE V_1
Sensitivity 0. 75, *specificity 0.95, area under the curve (AUC)=0.86.*
-L1Rrs8 (38% decrease in %-predicted)
-L1F E V_1 (12% decrease in absolute volume)

The impact Of Optiflow On Reducing Transfers To Other Hospitals In A Busy District General Paediatric Department

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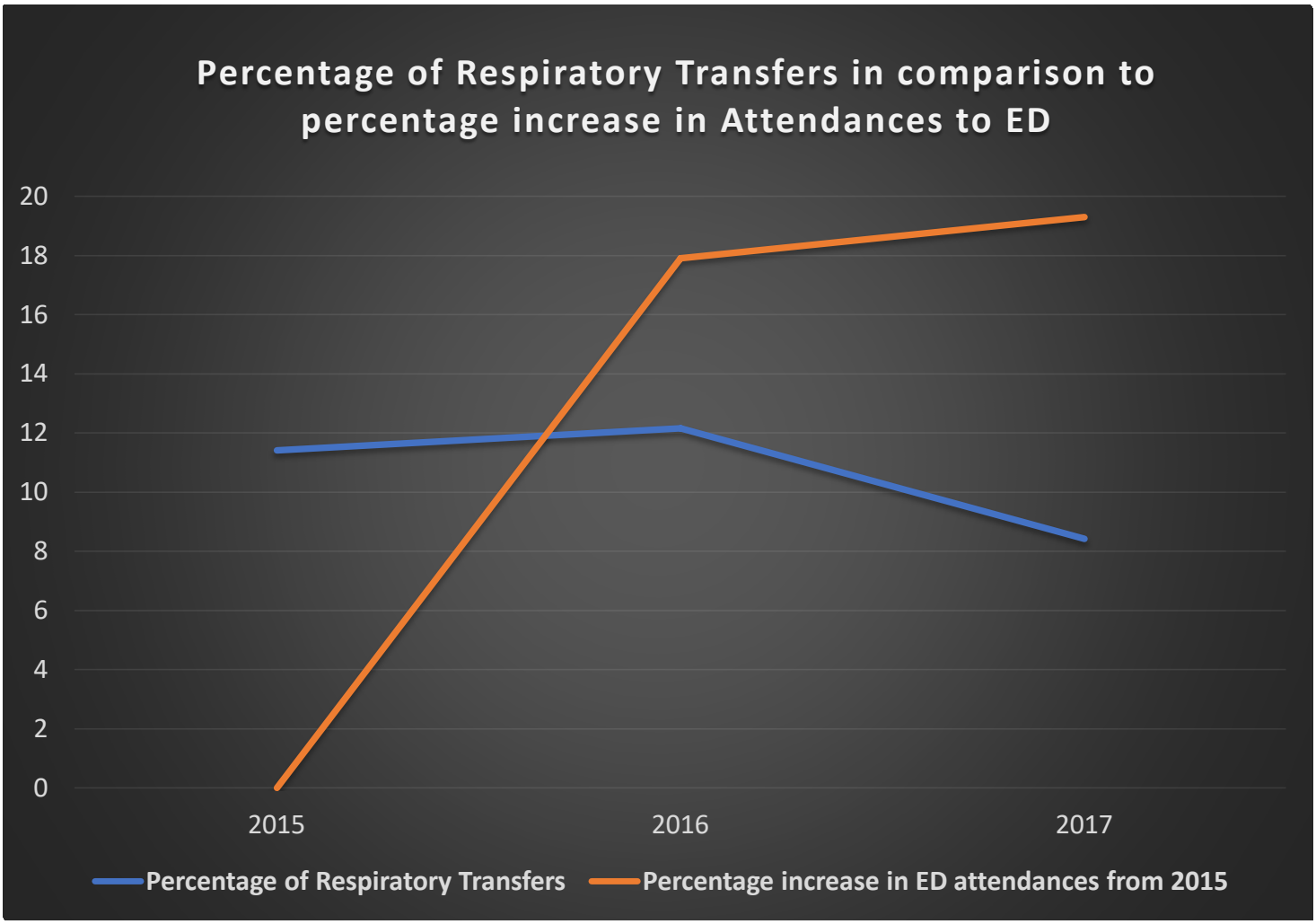
Introduction:
Optiflow is a low-technology heated-humidified oxygen therapy which has revolutionised treatment for respiratory conditions such as bronchiolitis, lower/upper respiratory tract infections and viral induced wheeze. It works by reducing work of breathing and thus the need for intubation.

Aim:
Following implementation of Optiflow in our Paediatric Emergency Department (ED) and ward we evaluated and assessed its effectiveness in reducing the number of respiratory transfers (when patients are sent via ambulance to another paediatric unit– this includes retrievals to Paediatric Intensive Care).

Methods:
We initially trialled Optiflow for 4 weeks and developed a guideline/policy and education plan for implementation. Following implementation in February 2017, we evaluated its effectiveness including transfers to other paediatric units. We compared this to the same 6-month period (February-September) in the 2 preceding years (2015 and 2016), and collected data on ED attendances and ward admissions.

Results:
From 2015 to 2017 there was a 19.7% increase in ED attendances in keeping with national trends. In 2016 to 2017 there was a 6.3% increase in ward admissions. Between 2015-2017, there was a 36% increase in total transfers (for all conditions) to other paediatric units. However of these, there was a reduction in respiratory transfers following the implementation of Optiflow, with percentage respiratory transfers (respiratory transfers/total transfers) reducing from 11% and 12% (2015 and 2016) to 8% in 2017 (See graph below). There were no complications from the use of Optiflow in this cohort of patients.

Conclusion:
Optiflow is safe and well tolerated. Despite the increased ED attendances and ward admissions in 2017, there was a reduction in respiratory transfers following the implementation of Optiflow. This suggests that this technique has led to an improvement in respiratory care.


Percentage of Respiratory Transfers in comparison to percentage increase in Attendances to ED
20
18
16
14
12
10
8
6
4
2
0
2015
2016
2017
Percentage of Respiratory Transfers
Percentage increase in ED attendances from 2015

Title
A study reporting the 3% desaturation index in healthy children under 12 years using Masimo technology.

Background
Pulse oximetry is often used to determine the presence or absence of sleep disordered breathing (SDB). Short pauses in breathing result in transient falls in oxygen saturation, detectable by modern pulse oximeters with short averaging times.

Criterian most frequently used to detect abnormality are the mean oxygen saturations (SAT50), the 4% desaturation index (DI4) and the delta 12 index (DI12s). 3% desaturation indices (DI3) are increasingly reported since the criteria for scoring hypopnoeas were amended from a 4% desaturation to a 3% desaturation in 2012 (American Academy of Sleep Medicine). Limited normative DI3 data exists.

Methods
Healthy children under 12 years underwent nocturnal home pulse oximetry using Masimo Rad-8 pulse oximeters. Data analysis was performed using Visi-Download software (Stowood Scientific, UK); artefact was automatically extracted. Parents completed a sleep log ensuring accurate analysis of sleep periods and a sleep questionnaire.

Adequate studies required at least 4 hours of artefact free recording time (AFRT). Data was collected on DI3, DI4, SAT50, minimum SpO2 (SATmin) and percentage of time spent with SpO2<88% (SAT88).

Results
Of 80 sleep studies 72 provided an adequate AFRT. No child had clinical evidence of SDB.

The median (IQR) age of participants was 7.0 years (5.0 to 9.8 years). The median (IQR) value for DI3 was 2.52 (1.65 to 3.84) and for DI4 was 0.89 (0.51 to 1.44). The mean (SD) values for SAT50 and SATmin were 97.59% (0.81) and 90.68% (6.00) respectively.

Conclusion
This is the largest cohort to report DI3 data using a modern oximeter with short averaging times. Results support existing data on other saturation indices. Further work is required to define the relationship between DI3 on standalone oximeters and the apnoea-hypopnoea index as determined by polysomnography.

4th King's John Price Paediatric Respiratory Conference 2018

Role of CO_2 monitoring in the diagnosis and management of paediatric sleep disordered breathing

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[2]National Heart and Lung Institute, Imperial College, London

Background and Aims. Home sleep studies are potentially a cost-effective way of diagnosing paediatric sleep disordered breathing (SDB). The majority however, do not include CO_2 measurement.

We hypothesized that CO_2 data does not change management in healthy children with SDB, unlike in those with comorbid conditions, when added to cardio-respiratory polygraphy (CRPoly).
We aimed to determine how often overnight CO_2 monitoring changed management of patients when added to CRPoly.

Methods. Retrospective analysis of two years data on children who underwent a first CRPoly and transcutaneous CO_2 study. Age, gender, underlying disease and SDB symptoms were recorded.
Management recommendations were firstly made blinded to CO_2 data, then after considering transcutaneous CO_2. Mean CO_2 was abnormal if>6.5kPa. SDB was defined as Apnoa Hypopnoea Index (AHI)>1[1].

Results. There were 513 patients, 311 (61%) male, median age 4.5 years (IQR 2.3-7.9). 13/513 were on overnight oxygen (O_2), 1/513 on Continuous Positive Pressure (CPAP) and O_2, 1/513 on non-invasive ventilation (NIV). 130/513 were healthy with obstructive sleep apnoea (OSA) symptoms. 383/513 had co-morbidities (138 upper-airway, 79 lower-airway, 48 heart disease, 112 neurological syndromes, 6 obesity) and 189/383 had OSA symptoms.
107/130 otherwise healthy patients had SDB; CO_2 data did not change management. Conversely, either high mean levels (17/20) or elevated CO_2 during REM sleep (3/20), changed management in 20/383 (5%) patients with co-morbidities; in 16/20, CPAP or NIV was established (Table).

Conclusions. Overnight CO_2 monitoring is not necessary for the diagnosis of SDB in otherwise healthy children, but is crucial for the management of patients with co-morbidities.

[1] J Clin Sleep Med. 2012 Oct 15; 8(5):597-619

	OSA symptoms (y)	Median CO_2 kPa (IQR)	Changes after adding back CO_2 data (n)	Outcome after adding back CO_2 data
Healthy	130/130	5.9 (5.6-6.2)	0/130	N/A
Upper-airway disease	75/138	5.8 (5.6-6.1)	3/138	Start NIV (3/3)
Lower-airway disease	43/79	5.9 (5.6-6.2)	1/79	Further investigations (1/1)
Heart disease	16/48	5.9 (5.5-6.2)	2/48	Start NIV (1/2) Change O2 (1/2)
Neurological syndromes	52/112	6.0 (5.6-6.4)	12/112	Start NIV (12/12)
Obesity	3/6	5.9 (5.7-6.3)	2/6	Start CPAP (2/2)
Total	319/513		20/513	

Authors

Florian Gahleitner, Jennifer Westwood, Natasha Liddle, Paula Lowe, Johanna Gavlak, Hazel J Evans

all: Paediatric Respiratory Department, Southampton Children's Hospital

Title

The Impact of Artefact-Free Recording Time on Oximetry Outcome Variables

Introduction

Nocturnal Pulse oximetry (NPO) is often used to evaluate sleep-disordered breathing (SDB) when polysomnography is unavailable. Commonly used criteria to detect abnormality are mean oxygen saturations (SAT50), 3% and 4% desaturation indices (DI3, DI4) and delta 12 index (DI12s). The minimum artefact-free recording time (AFRT) on which prediction of SDB can be made is unclear. This retrospective study aimed to evaluate this.

Materials and Methods

Children underwent NPO using Masimo Rad-8 oximeters. Studies with ≥8 hours of AFRT were analysed using Visidownload®. SAT50, DI3, DI4, and DI12s were reported. Limits of agreement (LOA) were calculated for the last 4 and 6 hours of sleep compared to 8 hours. Positive and negative predictive values (PPV and NPV) of 4 and 6 hours AFRT versus 8 hours were determined for DI4 being above or below 1.3. This was the threshold for normality based on the upper 95% confidence interval (CI) for our healthy cohort. McNemar test was used to analyse paired data.

Results

Thirty-nine children (15 female), median age 4.6 years (range 0.4 – 17.4) were analysed. Study indications were obstructive sleep apnoea (n=21), ventilation titration (n = 10), oxygen weaning (n = 6), hypoventilation (n = 2). For DI4 the median (IQR) values were 2.39 (1.13 – 5.44), 2.51 (0.92 – 5.07), and 2.24 (0.75 – 3.71) for 8, 6 and 4 hour AFRT respectively.

The mean difference, LOA (SD, 95% CI), and PPV & NPV comparing 6 and 4 versus 8 hours AFRT are presented in table 1.

	SAT50	DI4	DI3	Delta 12	Switch below or above upper 95% CI for DI4 (1.3)
6 versus 8 hours	0.16 (0.18, -0.2 – 0.62)	0.25 (0.98, -1.71 – 1.06)	0.36 (1.37, -2.38 – 3.1)	0.01 (0.04, -0.07 – 0.09),	n=1 PPV = 96.2% NPV = 100% McNemar: p=1.00
4 versus 8 hours	0.28 (0.47, -0.66 – 1.22)	0.58 (1.96, -3.34 – 4.50)	0.86 (2.79, -4.72 – 6.44)	0.04 (0.07, -0.1 – 0.18)	n=5 PPV = 91.7% NPV = 80% McNemar: p=1.00

Table 1.

Conclusions

Mean differences are small between measurements for different AFRT. LOA remain clinically important possibly reflecting sample size. Importantly shorter AFRT accurately predict normality/abnormality in the vast majority of cases and absolute changes in parameters were very small. On this basis we recommend a minimum AFRT of 4 hours.

Evaluation of the sleep history in predicting Sleep Disordered breathing in children

Molla Ahmed[1], David Luyt[1]

1. Department of Paediatrics, University Hospitals of Leicester

Introduction:
Children are frequently referred to ENT clinics with symptoms of sleep disordered breathing (SDB) presumed due to enlarged tonsils and/or adenoids. However in many instances the clinical examination does not confirm the parent reported symptoms and thereby creates uncertainty about the need for ablative surgery. In these instances further assessment through polysomnography (PSG) helps guide management, but it is not widely available.

Aims:
To identify symptoms from a sleep questionnaire that correlated with the diagnosis of SDB on PSG.

Methods:
This is a retrospective study reviewing all diagnostic Level 2 paediatric PSG studies in children <18 years old following referrals from ENT from 2011-2016.Responses from a parent completed sleep questionnaire (40 questions in 5 domains: sleep habits, breathing in sleep, daytime symptoms, daytime breathing and feeding) were compared with the outcome of PSG (negative or positive–either increased upper airway resistance or obstructive sleep apnoea).

Results:
We performed 396 studies; 40 were excluded from analysis (11 were inadequate studies and 29 had inadequate history). Of the 356 studies, 202 (56.7%) were positive showing SDB. We performed logistic regression analysis correlating positive symptomatology with PSG outcome. Our study showed that reported symptoms of difficulty in breathing (p 0.001) and stopping breathing during sleep (p 0.039), difficulty waking in the morning (p 0.007) and persistent runny nose (p 0.034) correlated with a diagnosis of SDB on PSG in this patient cohort.

Conclusions:
We analysed the correlation of symptomatology with final diagnosis on PSG in children referred to the sleep service from ENT over 6 years. We identified symptoms predictive of confirmed SDB to possibly aid clinicians to identify patients with SDB on history. We noted however that most symptoms classically related to SDB (e.g. snoring) could not identify between positive and negative PSG.

Non-Invasive Ventilation Therapy: Intervention is Key to Management

Eze-John, P; Choudhury, R; The Royal London Hospital; Barts Health NHS

Background: Non-Invasive Ventilation (NIV) is the ventilatory support for the upper airways using a mask or other interfaces to deliver positive pressure to support breathing. 'The first month is the most important and several visits may be necessary to adjust interfaces, settings…as well as building patient confidence in using this technique in the home environment' *Leger et al, EuropeanRespiratoryJournal2002.*

Aim: To define a pathway for the Children's Respiratory and Sleep Physiology Service at The Royal London Hospital for all patients initiated or established on NIV to have therapeutic intervention within the first 3-4 weeks of therapy, ensuring safe management at a high standard of patient care according to current evidence-based practice.

Case Study: A case study was reviewed. This is a 6 years-old child with a BMI=31kg.Patient had diagnosis of Global Delay Syndrome, Asthma and unsafe swallow. She had grade 3 tonsils and referred by ENT for a sleep study querying Obstructive Sleep Apnoea (OSA) with associated symptoms.

Initial sleep study performed in February 2012, showed severe oxygen desaturation throughout the study with the lowest recorded SpO2 at 73% and a total of 41minutes spent with SpO2<90%. Patient had raised pCO2 (7.02kPa). The study was classified at moderate OSA (8 dips/hour in oxygen saturation with >4% drop).

Patient underwent adenotonsillectomy surgery (February 2012) and performed a total of 10 sleep studies in 5years (2012-2017), with various NIV machines and pressure settings, however, all sleep studies were classified as moderate-severe OSA and patient did not tolerate NIV therapy.

An MDT review of this patient in November 2017 addressed the need for intervention for non-compliance with NIV therapy. Interfaces, settings and confidence in use of the device were discussed on a one-one basis. Patient was issued an APAP machine (4-12cmH2O) for 1-week trial at home with a full-face mask. After the trial APAP download data showed 100% compliance with therapy (>7hours usage for 7days with optimal pressure at 11cmH2O).

Recommendations: Patients on NIV therapy should be reviewed to address concerns and compliance.

Development and Evaluation of a Community Paediatric Sleep Clinic in 2 Inner London Boroughs.

Sally Hobson[1], Jenna Vyas-Lee[2], Kelly Wood[2], Naila Haitham[1], Jessica Turnbull[1]

1= Guys and St Thomas's Foundation Trust 2= South London and Maudsley Foundation Trust

Aims

Using survey studies we identified a high rate of burdensome sleep problems in the Community Paediatric populations of Lambeth and Southwark. Sleep difficulties in children cause problems with physical and mental health, cognitive performance, behaviour and family wellbeing.

We have developed and are evaluating the effectiveness of a multidisciplinary cross borough Community Paediatric Sleep clinic to address this problem.

Methods

Referral criteria: child aged 18 months - 18 years with neurodevelopmental difficulties and significant sleep problems.

Impact of presenting sleep problems assessed using 3 measures;

Composite Sleep Disturbance scores (higher scores indicating more severe problems).

Australian score; (after Hiscock et al) classifies sleep problems as large/moderate=significant; or small/no problem= not significant

Burden of sleep problems for parents, family, and degree of anxiety related to sleep.

Sleep severity scores are re-recorded after conclusion of intervention and 3 months post discharge.

Results/Conclusion

The service has received 159 referrals; 99 have been assessed clinically to date. Main reason for referral: sleep initiation/maintenance problems.

Satisfaction with the clinic is high - 73% very likely to recommend (25 % likely); 87% felt needs very well met (12 % well met).

Sleep severity scores at assessment (n=78) indicate significant problems and high levels of dissatisfaction.

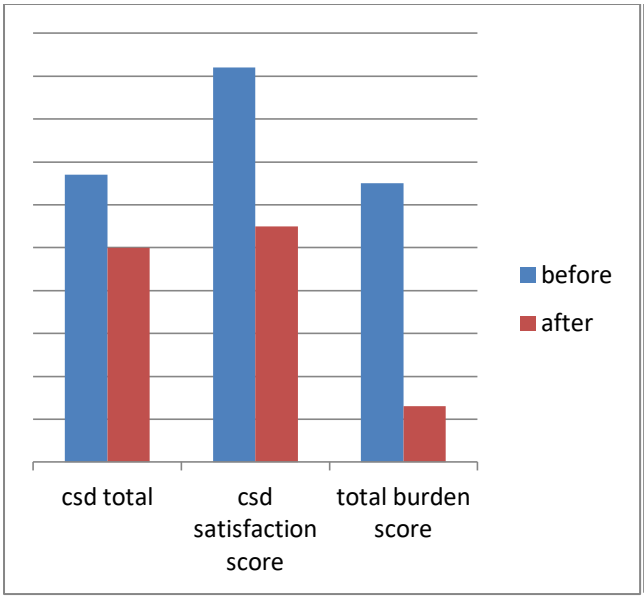
74/78 rated problem as moderate/large. CSD index averages 8.4/12 and dissatisfaction scores 4.5/5.

Investigations requested include 26 sleep studies, 30 blood investigations.

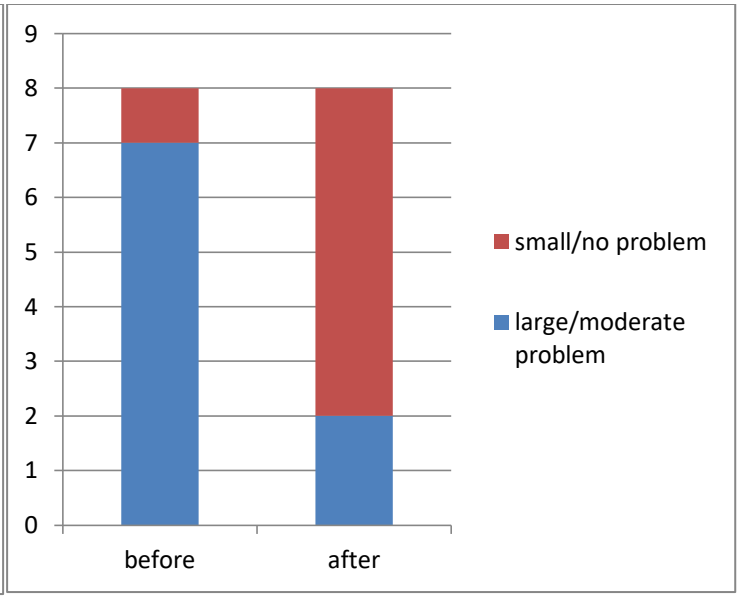
2 children have been referred to tertiary sleep clinic.

Others have been referred to our behavioural workshop and follow up.

For 8 children intervention and repeat outcome recording is complete, showing improvement in all measures.



Scored outcome measures (percentage of maximum)



Parent rating of sleep problems before and after intervention

We have demonstrated high demand for our service from clinicians and patients' families; the service is very well received. Early outcome measures suggest this service is effective for our population of patients.

Dr William Daw[1], Dr Ruth Kingshott[1], Prof Heather Elphick[1]

[1] Respiratory Unit, Sheffield Children's Hospital, Sheffield, UK,

Wide variation in practices for measuring respiratory rate in children

Background:
Respiratory rate (RR) is an important vital sign used in the initial and ongoing assessment of acutely ill children. It is also used as a predictor of serious deterioration in a patient's clinical condition. RR has been described as the most difficult and time consuming of all the vital signs to measure accurately in children and as such there variation may exist in how it is measured.

Aims:
The aim of this study was to establish local paediatric healthcare professionals practices when measuring respiratory rate in children of different ages.

Method:
This was a qualitative study using questionnaires. Paediatric healthcare professionals who regularly measured children's respiratory rates as part of their normal working role were approached to complete the questionnaire.

Results:
164 Paediatric healthcare professionals completed the questionnaire. 28% of respondents reported measuring a RR for a full 60 seconds with 44% opting to measure over a period of 30 seconds. 22% measured over 15 seconds. Junior nurses were more likely to measure the RR over 60 seconds whereas more senior Paediatricians opted for a shorter time period of measurement. For all ages of children the observation of chest and abdominal movements was the most popular method used (63%). Palpating breaths was the least frequently used method of measurement (6%). A wrist watch (33%) or wall clock (33%) were most likely to be used to time the measurement. 3% of respondents described an internal sense of time used to take the measurement.

Conclusion:
There are wide ranging practices used by paediatric healthcare professionals, from different measurement times to a variety of measurement methods. These vary between different healthcare professionals. Difference in practices will clearly have an impact on the accuracy and reliability of measurements obtained.

Word count: 296

Dr William Daw[1], Dr Ruth Kingshott[1], Prof Heather Elphick[1]

[1] Respiratory Unit, Sheffield Children's Hospital, Sheffield, UK,

Ordinal scales are not accurate to assess and measure respiratory rates in children

Background:
Respiratory rate is an important vital sign used in the initial and ongoing assessment of acutely ill children. It is also used as a predictor of serious deterioration in a patient's clinical condition. Predefined ordinal scales to assess respiratory rate may be used to increase the reporting of respiratory rate where a count is potentially deemed too time consuming and laborious.

Aims:
The aim of this study was to assess the agreement in respiratory rate assessment when a ordinal scale was used.

Method:
100 healthcare professionals who regularly measured children's respiratory rates as part of their normal working role were shown videos of five different children of varying ages breathing at different rates. They were then asked to use a pre-defined scale of very slow, slow, normal, fast and very fast to grade the child's respiratory rate.

Results:
There was a moderate to fair agreement between observers when a pre-defined ordinal scale was used to assess respiratory rate, with a Fleiss Kappa statistic of 0.333. Within different groups of healthcare professionals there was a similar level of agreement seen, with a Fleiss Kappa statistic for paediatric nurses of 0.334, paediatric doctors 0.365 and other healthcare professionals 0.318. At higher respiratory rates there was better agreement observed.

Conclusion:
An ordinal scale may be of use where a standard visual count is not practicable, however the level of agreement found between healthcare professionals is unlikely to be high enough for this method of respiratory rate assessment to be taken and used regularly in clinical practice.

Word Count: 269