Abstract Booklet for the 3rd King's John Price Paediaitric Respiratory Conference, 2017

A. Asthma

A1.

Does Direct Observed Therapy (DOT) in children with asthma improve symptom control and quality of life?

Alex Paes, Anil Shenoy

Bradford Royal Infirmary

Introduction and aims

Children with poorly controlled asthma often have suboptimal compliance.

DOT involves coordination of asthma prophylaxis administration by an Asthma Specialist Nurse and Schools. The nurse also supports the children and their families. We aim to analyse whether DOT improves symptoms and quality of life, and reduces acute exacerbations.

Methods

In Bradford, there have been 5 children in the DOT service since its creation. We retrospectively collected data on them using hospital notes, electronic discharge summaries, and GP records (System1). Markers of asthma control are listed in the table below. We were unable to obtain school attendance for all the children. We compared data for the year before and the year after commencing DOT.

Results

2 children received DOT due to frequent inhalers use and steroid courses. In the 2 year period they had no hospital admissions.
A 9 year old boy had reduced need for reliever inhalers (pre: 9, post: 1) and steroids (pre: 3, post: 0) post-DOT. A 14 year old girl had no GP or hospital records since 2014. Her school attendance is 94%.

3 other children collectively showed a reduction in admissions and use of steroids, and improved school attendance, post-DOT.

		Hospital Admissions and level of treatment required							Prescriptions from GP		
PATIENT		Admissions	Days in hospital	Oxygen	Aminophylline IV	Salbutamol IV	Steroid courses	Antibiotics	Blue inhalers	Steroid Courses	Antibiotic Courses
13 year old boy	Pre-DOT	4	8	1	1	1	3	0	14	6	5
	Post-DOT	0							15	5	2
13 year old girl	Pre-DOT	7	9	0	0	0	5	2	13	7	5
	Post-DOT	1	6	1	1	1	1	1	15	0	4
15 year old girl	Pre-DOT	14	34	5	6	3	11	2	13	2	0
	Post-DOT	9	16	1	3	0	4	1	16	1	0

The 13 year old girl's school attendance improved from 69% in 2014-2015, to 93% post-DOT. The 15 year old girl's school attendance improved from 74% in 2014-2015, to 87% in 2015-2016 post-DOT, and is currently 94%.

Conclusion

In these 5 children, DOT improved asthma symptoms, as evidenced by reduced number and severity of admissions, and improved school attendance. This reflects improved quality of life and general health for the children, and suggests DOT can be used on a larger scale for poorly controlled asthma.

A2.

Reducing Paediatric asthma admissions and length of stay through patient and family centred care

Hesham Abdalla, Sarah Freeth
Walsall Healthcare NHS Trust

Walsall's Paediatric Asthma Team was set up in 2014 as Walsall Healthcare NHS Trust hospital had admissions due to asthma 20% higher than national average. Annual BTS audits also showed quality of care for these young patients was inadequate. Our aims were to reduce hospital admissions and improve the quality of asthma care for children attending the hospital.

The team formed a guiding council including a consultant, GP, community nurse and parent representative who prioritised interventions and engaged primary and secondary care in a Quality Improvement programme. 12 months later, the trust has now seen a reduction in beds days for asthma by 23% and average length of stay has reduced by 10% to 1.39 days. In that year, 142 attendances/ admissions for asthma were prevented by interventions from the team including telephone triage and advice, equating to a cost saving of between £20,000 and £40,000 per year.

The team have done this through introduction of an extensive education programme across primary and emergency care and embedding an Asthma Discharge bundle based on NICE Quality Standards. Subsequent re-audit has shown a dramatic improvement in standards of care. For example in 2014 all children presenting to ED received nebulized treatment, irrespective of severity of asthma exacerbation. In 2015 this has now reduced to 20%, as severity is now recorded and assessed. This consolidates the children's self-management plans which were issued to the majority of attendees. All patients now receive prednisolone, if indicated within 1 hour of attendance. We are proud to have manifestly improved quality of care whilst improving staff experience and reducing costs.

A3.

Literature Case Review: Vocal Cord Dysfunction- Is it Croup or Asthma?

Amjad Imam, Najma Iqbal & Mukta Jain
Dept. of Paediatrics, George Eliot Hospital, Nuneaton, Warwickshire, CV10 7DJ

Introduction: Vocal cord dysfunction (VCD) or paradoxical vocal fold Movement (PVFM) in older children and adolescents can manifest as intermittent daytime wheezing, dyspnoea, chest or throat tightness and cough. It can be confused with recurrent croup or chronic asthma (1).
Case Review: An 11 year old girl was referred to the paediatric clinic with croup-like symptoms with occasional exercise induced wheeze since infancy. She had frequent attendances to the child assessment unit (CAU) and admission to University Hospital of Coventry and Warwickshire (UHCW), for which she was treated with steroids & bronchodilators. She recently had worsening hoarseness with loss of voice and underwent intensive investigations including spirometry, barium swallow & laryngo- tracheo-bronchoscopy before a final diagnosis of vocal cord dysfunction (VCD) was made.
Discussion: VCD should be kept as a differential when facing children with unremitting respiratory symptoms particularly symptoms of recurrent croup and wheeze not responding to treatment. Early recognition of VCD will prevent needless interventions, diagnostic studies and medications. VCD often coexist with asthma & croup causing considerable confusion in both diagnosis and treatment in children~~'s~~ presenting with chronic symptoms of dyspnoea, wheeze, cough and throat tightness. Many children with VCD had stresses at home (as in our case), school or were high achieving athletes. The precise role of psychopathology in development of VCD is still under research (2).
Learning Points:

- VCD should be considered as a rare, though important cause of severe & unremitting respiratory symptoms to prevent needless interventions
- There is little evidence available on how to diagnose and manage dysfunctional breathing in children. The evidence from adult studies cannot be extrapolated to our population.

References:

1. Christopher KL, Wood RP, Eckert RC, Blager FB, Raney RA, Souhrada JF, Vocal cord dysfunction presenting as asthma. N Engl J Med 1983; **308:** 1566-1570
2. Selher JC, Staudenmaier H, Koepka JW, Harvey R, Christopher K, Vocal cord dysfunction: the importance of psychologic factors and provocation challenge testing. J Allergy Clin Immunol 1987; **79:** 729-733

A4.

Children's Asthma Project- Leeds West Paediatric Asthma Steering Group

Emma Guy on behalf of Leeds West Paediatric Asthma Steering Group

Introduction

The asthma project was established on the background of NHS Leeds West CCG local priority of reducing hospital admissions for children and YP with long term conditions. Asthma was picked as suggestions from local evidence showed variation. A community based paediatric asthma service has been funded by the CCG for 2 years (2015-17).

Aims

- Improve Quality of life for children and YP with asthma
- Improve asthma control and self-management
- Improve asthma diagnosis in accordance with BTS/NICE guidelines
- Reduce avoidable A+E attendances and unplanned admissions from paediatric patients in Leeds West

Methods

Asthma Steering group established.

A clinical lead for paediatric asthma was employed by the CCG to deliver a community-based paediatric asthma service, supported by 2 practice nurses.

A children's Asthma Nurse Educator was employed to deliver training in schools and early years.

Protocols, and a recording template have been developed to standardise care and reduce variation in primary care.

Preliminary results

1. **Engagement:** 370 people through survey, focus groups and video.
2. **Schools and early years:** 21 schools received 'asthma friendly' status and 13 children's centres received training.
3. School children help coproduce resources to remind children to carry their inhaler with them at all times: https://www.leedswestccg.nhs.uk/health/campaigns/dont-forget-asthma-inhaler-summer-holidays-never-know-youll-need/
4. **Primary care** training in 28 practices and risk stratification tool and recording template set up in 34 practices.
5. Increase in use of asthma plans by 38% and 43% improvement in assessing asthma control at asthma review.
6. **Information webpage established:** http://www.leedswestccg.nhs.uk/health/healthy-living/children/asthma/

A5.

A Survey of Parent experience in Children presenting with Acute Asthma

1. Dr. Aditi Sinha, ST3 Paediatrics, Email: asdiinthia@doctors.org.uk

2. Dr. Naveen Rao, Consultant Paediatrician, Email: naveen.rao@uhsm.nhs.uk

University Hospital South Manchester NHS Foundation Trust, Southmoor Rd, Wythenshawe, Manchester M23 9LT

BACKGROUND

Asthma readmission rates in the North West of England are well above the national average posing a significant burden on A&E departments. Lack of 'Asthma Care Pathways', which include regular follow up, educational interventions, personalised action plans and access to asthma specialist nurses are key to symptom control & self-management. Addressing these may help lower emergency hospital admission rates.

AIMS

- To ascertain reasons patients attend secondary care services (A&E/Paediatrics) at Wythenshawe Hospital during an exacerbation of asthma.
- To gather information surrounding understanding of asthma medications, inhaler use and awareness of the asthma multidisciplinary team.

METHOD

A `Patient and Parent Questionnaire' was created as part of the paediatric Asthma CQUIN. Between November and January 2014, 100 questionnaires were distributed to patients over 2yrs attending with an acute asthma exacerbation. 32 questionnaires were returned.

RESULTS

Though questionnaire return was poor, we were able to identify some important trends. 50% of patients attended hospital between 12-8pm and 63% of children had been unwell for 12 hrs prior to attendance. The reasons for attending A&E included; GP surgery closed, unaware of out-of-hours service or due to clinical deterioration of the child. 1 in 5 respondents had a recent inhaler technique review and used a preventer inhaler only during an exacerbation. 60% of patients had an action plan. 50% of patients were under asthma follow up with a GP or Paediatrician, with 16% seeing an asthma nurse.

CONCLUSION

Timing of admissions and duration of illness suggest missed opportunities to manage symptoms. Education and self-management plans may have helped avoid these. Knowledge of asthma treatment was poorly answered suggesting asthma education needs to be improved. Only a small number of parents were aware of the asthma multidisciplinary team and therefore we must look at how we can promote awareness and access to these services.

A6.

Seasonal pattern and risk factors for exacerbation of childhood asthma

Doxa Kotzia[1], Graham Roberts[2], Katharine C Pike[3]

1 Great Ormond Street for Children NHS Foundation Trust

2 University of Southampton

3 UCL Great Ormond Street for Children Institute of Child Health

Background: Clinical trials of asthma management generate cohorts of highly characterised individuals managed according to standardised guideline-based care. Secondary analysis of trial data can identify risk factors for exacerbation.

Objective: To identify risk factors for future asthma exacerbation from amongst demographic factors, atopic status, previous exacerbation history, and indicators of asthma control, severity and treatment adherence.

Methods: 90 children with moderate to severe asthma, aged 5.9 - 16.2 years, participated in a trial, comparing guideline-based asthma management to guideline-based management modified according to fractional exhaled nitric oxide (FeNO). Participants were extensively characterised at baseline and invited to six 2-monthly follow-up visits, where episodes of exacerbations and upper respiratory tract infection (URTI) were reported. Exacerbations requiring oral steroids or hospital admission were classified as moderate/severe. Mean rates of exacerbation per participant enrolled within the trial were calculated for each month. Potential risk factors were related to occurrence of an exacerbation during the 12 month's follow-up using Poisson regression.

Results: Exacerbations demonstrated a seasonal pattern with peaks in May and September; this particularly pronounced when the analysis was limited to exacerbations associated with URTI. Risk of moderate/severe exacerbation was not associated with gender, ethnicity, BMI, age at enrolment or at asthma diagnosis, baseline FeNO or FEV_1. Exacerbation risk during follow-up was associated with exacerbation history during the previous year; 13% increase in risk per course of oral steroid and 2% increase per day of hospital admission. There was a 59% increase in exacerbation risk associared with exposure to smoking. Risk of exacerbation was positively associated with asthma severity and medication adherence and inversely associated with asthma control at baseline.

Conclusions: Seasonal factors appear to determine asthma exacerbation frequency. Modifiable risk factors, such as tobacco smoke exposure and asthma control should form the basis of targeted interventions to reduce exacerbations.

A7.

Community children's asthma nursing team in Croydon reduce ED attendance rates: a retrospective case-control study.

E Greenhalgh, L White, M Asharia, S Azizi, O Laking, E Iannou, E Holloway
Deapartment of Paediatrics, Croydon University Hospital, Croydon, UK

Background:
Paediatric emergency admissions for asthma in Croydon, UK, were the highest in London in 2014-15 (Healthy London Partnership Baseline Audit). The Croydon Children's Asthma Community Nurses (CACN) team was formed and started work in April 2015. The team offer a home visit and follow-up phone consultation to assist education and management of asthma in patients aged 1-18 years. We hypothesised the ED attendance rate would improve after the CACN team intervention.

Methods:
A retrospective case-control study using electronic patient records. Cases were identified as any child who had been referred to the CACN during the first 6 months of service (01/04/2015-30/09/2015) over the age of 1 year and who had attended an ED for asthma/wheeze at least once in the 12 months prior to referral. ED attendance rates were compared for the 12 months pre and post-referral.
Controls were identified as those who had attended ED with asthma/wheeze in the year pre-initiation of the CACN service (2014-2015) and ED attendance rates for that year compared to the previous 12 months (2013-2014).

Results:
132 patients (median age of 60.1 months, 68% male) were included in the intervention group with a mean attendance of 2.4 attendances per year improving to 0.99 attendances per patient per year in the 12 months post-referral.
115 control patients (median age of 48 months, 60% male) were identified who showed an attendance rate of 2.0 attendances per patient per year, compared to an attendance rate of 2.4 per patient in the following 12 months.
Student's two tailed t test was applied showing a statistically significant difference in ED attendance rates between the two groups (p value <0.0001).

Conclusion:
The CACN service reduced the ED attendance rate for asthma/wheeze by 59% showing that community asthma nursing is an effective and potentially cost-saving intervention.

B. Cystic Fibrosis

B1.

Hearing Surveillance in Children with Cystic Fibrosis

Audit

Dr M Diaconu, Dr Noreen West

Sheffield Children's Hospital

Patients with cystic fibrosis require higher doses and longer antibiotic courses. Aminoglycoside (iv, nebulised) are frequently part of the treatment. Ototoxicity can be irreversible and patients may not have symptoms during treatment. Ototoxicity can be SNHL , initially manifested by diminution of high tone acuity, or vestibular toxicity.

The aim of the audit was to observe the indications for referrals for pure tone audiometry (PTA) and their outcome in children with CF receiving multiple courses of iv/nebulised aminoglycosides (Tobramycin, Amikacin). The audit was conducted retrospectively over a 2 year period (01.01.2011-31.12.2012) and the patients included were aged 5-15 years (DOB 1997-2006) and followed up only by the Sheffield Cystic Fibrosis Team. 33 patients were included, 12 being new referrals (36%) and 2 already under follow up with Audiology. The indications for referrals were: clinical concerns (3 patients), before starting nebulised Tobramycin/before starting Amikacin/ on regular iv aminoglycosedes (10 patients), other (2 patients already under follow up in view of family history of hearing loss and known with SNHL respectively and 1 referral because of overdose of Tobramycin). 2 patients had more than one reason for referral. The PTA was conducted at 0.5 to 8 KHz. PTA results were normal for 11 patients (79%) and only 1 patient had SNHL. The patient with SNHL was 15 years old and had had 44 courses of iv Aminoglycosides (Tobramycin/ Amikacin) since birth. In 2011, the PTA showed mild hearing loss at 4 KHz and moderate to severe hearing loss at 6Khz and 8 KHz respectively.

Worldwide there is no clear guidance on how to monitor hearing effectively in children with cystic fibrosis. Early detection of hearing damage is important before it reaches frequencies important for speech discrimination (0.5-8kHz) but children are not routinely tested at frequencies above 8 kHz.

B2.

Reducing Pseudomonas rates in Cystic Fibrosis: a quality improvement initiative.

L Archer, C Baker, N Dlamini, V Currie, C Wogan, L Butler, L Hull, S Denniston.
Heart of England NHS Foundation Trust, Birmingham.

Background: In 2013, through a peer review of Cystic Fibrosis services, and the National Port CF Database, high rates of chronic Pseudomonas aeruginosa (PsA) infection were identified in our paediatric clinic (approx. 40 patients). Our clinic had 25% chronic infection compared to 7.5% in the local CF Centre and 8% amongst paediatric patients nationally.

Aim: To reduce the rates of chronic PsA infection in our paediatric clinic to match local regional and national rates.

Methods: We introduced and reinforced a raft of infection control measures

- Isolation of patients in clinic with zero time in waiting area.
- Dedicated scales and height sticks in each room
- Reinforced segregation of clinics into non-PsA and PsA.
- On wards we prioritised en-suite cubicles where possible
- nebuliser cleaning policy at home and on ward.
- Colomycin doses were maximised in patients with recurrent isolations, and TOBI was considered earlier
- Samples were sent for PsA subtyping to ensure no epidemic strains.
- Annual re-audit

Results: Rates of chronic PsA infection fell significantly from 25% (n=10/40) in 2013 to 13.2% (n=5/38) in 2014, 5.1% (n=2/39) in 2015 (p=0.01) and 9.3% (n=4/43 patients) in 2016 (Chi-square for linear trend, p = 0.02) whilst rates of intermittent PsA infection trended downwards from 22.5% in 2013 to 16% in 2016 (p=NS).

Conclusion: We achieved a significant reduction in chronic PsA rates by enforcing strict infection control strategies, and maximising ongoing treatment. Whilst causation cannot be proven, our policy revision and efforts to maintain infection control have been reinforced by the significant reduction in chronic PsA.

C. Respiratory Infections

C1.

Wear your CAP backwards: Why do doctors deviate from the British Thoracic Society (BTS) guidelines on Paediatric Community Acquired Pneumonia (CAP)?

Robinson P, Ahmed B, Calton E, Rogerson K, Checketts S, Page A, Kelly J and Barry W. Paediatric Department, Queen Elizabeth Hospital, Woolwich.

Background: Previous National Audits of the BTS guidelines on Paediatric CAP have consistently highlighted overuse of investigations (chest X-ray (CXR), acute phase reactants (CRP) and blood cultures), broad-spectrum oral antibiotics and intravenous (IV) antibiotics in the management of uncomplicated CAP (Bowen, Thorax, 2013). The reasons for deviations from national guidelines are unclear. We hypothesised that these arise from diagnostic uncertainty by the treating clinician.

Methods: Retrospective analysis of clinical records of 20 children, aged over one, admitted to a paediatric ward with CAP from November 2016 to January 2017, as part of the BTS national audit. Survey of 22 front-line doctors' reported practice, awareness of and rationale for deviating from the BTS CAP guidelines.

Results: 100% of children had a CXR, 85% a CRP, and 80% a blood culture. No children received the recommended first line antibiotic (oral amoxicillin) and 57% of children who could tolerate oral medicines were given IV antibiotics. Reasons for deviation from BTS guidelines included: lack of awareness of the guidelines (36%) and contradictions with local antimicrobial policy. However 55% of clinicians made active decisions to deviate from BTS CAP guidelines. The most commonly sited reasons were the need to exclude differential diagnoses suggested by other national guidelines, such as NICE "Fever in Under 5's" or "Sepsis Six"(50%), overriding clinical judgment and use of investigations to assess severity.

Discussion: Local findings mirror national audit findings, highlighting over-reliance on investigations and underuse of oral antibiotics in CAP management. However, to our knowledge, this is the first study to investigate why clinicians deviate from BTS guidelines. This is not just due to lack of awareness, but active decisions based on differential diagnoses and severity assessment for a febrile child. Does setting standards based on a priori diagnosis mean we are considering CAP backwards?

C2.

Risk Factors and Mitigation of Influenza Among Indigenous Children in North America, Australia, and New Zealand: A Systematic Review

Crystal Mcleod

Abstract

Background

Indigenous children of Australia, Canada, United States, and New Zealand experience disproportionately high rates of respiratory infection. A notable example of this disparity is the disease burden created by influenza, which gained global attention during the 2009 pandemic year, and continues to appear in greater incidence among Indigenous children.

Objective

This review considers prominent risk factors and mitigation strategies of influenza among Indigenous children worldwide.

Methods

A systematic search of 6 electronic databases and grey literature from the period of 1997- 2017 was completed. Articles selected for inclusion discussed the presence of influenza within Indigenous individuals, communities, and populations. Ancestry searches of articles matching the study criteria was also undertaken to discern seminal research in this topic area.

Results

From review of twenty-three primary research studies, marked risk factors and mitigation strategies of influenza among Indigenous children were identified. Notable risk factors included age under four years, smoke exposure, presence of a chronic illness, crowded living conditions, previous respiratory infection, and diminished access to vaccination. Successful mitigation of influenza in Indigenous communities included strategies to improve vaccine coverage, provide health education to remote Indigenous communities, and policy change to improve Indigenous peoples' quality of life. Majority of literature discussed in this review was derived from an Australian epidemiological context.

Conclusions

In the past, the impact of influenza upon Indigenous communities has been devastating for both children and their families. Health promotion programming is urgently required to prevent future outbreaks, and halt the evolution of increasingly invasive forms of influenza within this population. Utilizing existing public health infrastructure and collaborating with culturally unique Indigenous groups, preventive action for Indigenous children at significant risk of contracting influenza can be realized.

Funding

None to Declare.

C3.

Chest radiographs in paediatric pneumonia: we are getting better

Dr Charlotte Rampton, Dr Natasha Mackinnon, Dr Peter Sebire

Wexham Park Hospital, Slough

Background: Pneumonia is one of the most common causes of death in children worldwide, yet we still struggle to diagnose it clinically. Recent British Thoracic Society (BTS) guidelines state that chest radiographs (CXR) should not routinely be performed for children with community acquired pneumonia. The 2011/12 BTS paediatric pneumonia audit found that CXRs were performed in 90% of children audited.

Aims: To explore the use of CXR as a diagnostic tool for children with pneumonia in a district general hospital.

Methods: A retrospective audit of records for all children, age 1 to 16 years, coded with a diagnosis of pneumonia from the 1st of November 2016 to the 31st of January 2017. We evaluated: how many patients had a CXR; what the CXR findings were; who ordered the CXR; and whether it changed clinical management.

Results: We audited 151 children with pneumonia, 81 (54%) had a CXR during their admission. 33 (41%) CXRs had lobar changes. The CXR did not change the clinical management of 53 (65%) patients. In 12 cases the clinician thought the CXR was abnormal and started antibiotics, despite the CXR subsequently being reported as normal.

Conclusion: A CXR was organised in only 54% of children diagnosed with pneumonia, a positive outcome reflecting improved guideline adherence. In only 20% of cases the CXR result altered clinical management, but in most it confirmed a clinical diagnosis and suggests we could continue to reduce ordering this investigation.

A CXR remains a simple, relatively harmless diagnostic aid. We continue to order too many, however, this audit shows we are improving.

D. Chronic Lung disease

D.1

East London NICU Bronchopulmonary Dysplasia Home Oxygen Graduates – characteristics and readmissions

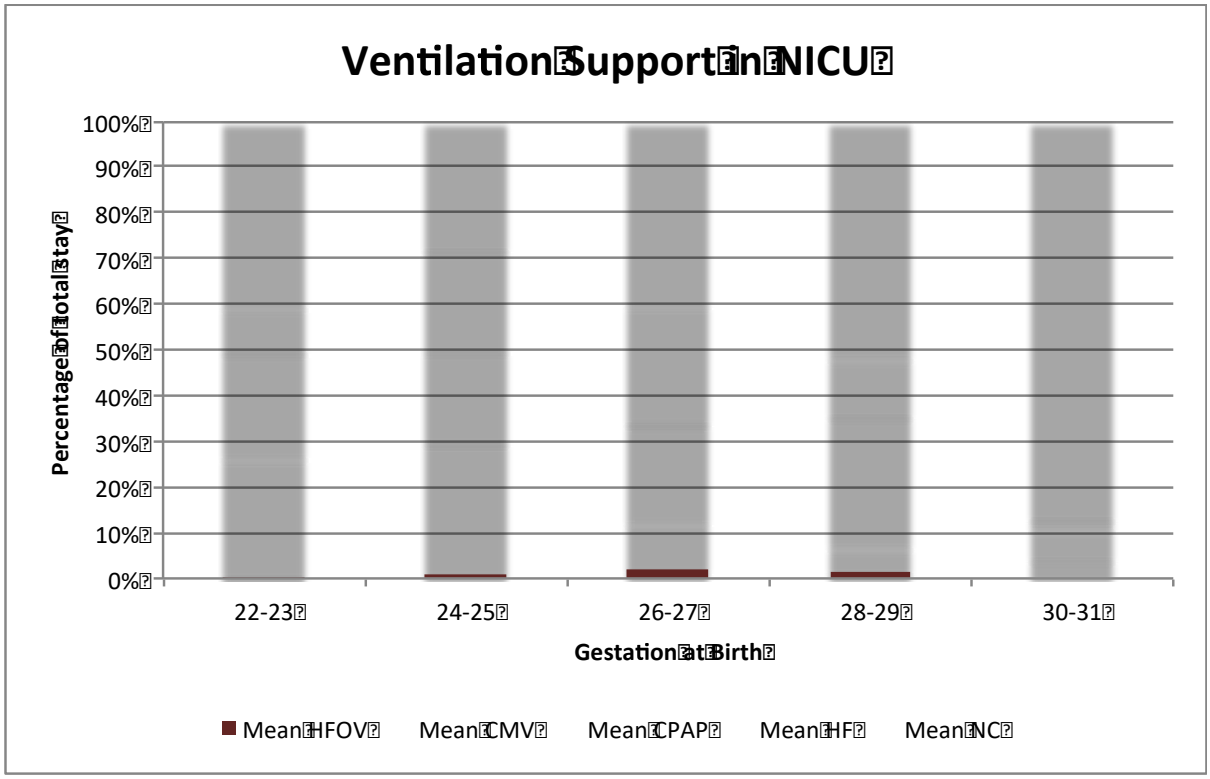
Raymand Pang, Prita Rughani, Cristina Ilea, Ghada Saleh, Michael Hird, Caroline May
Neonatal Unit, Royal London Hospital

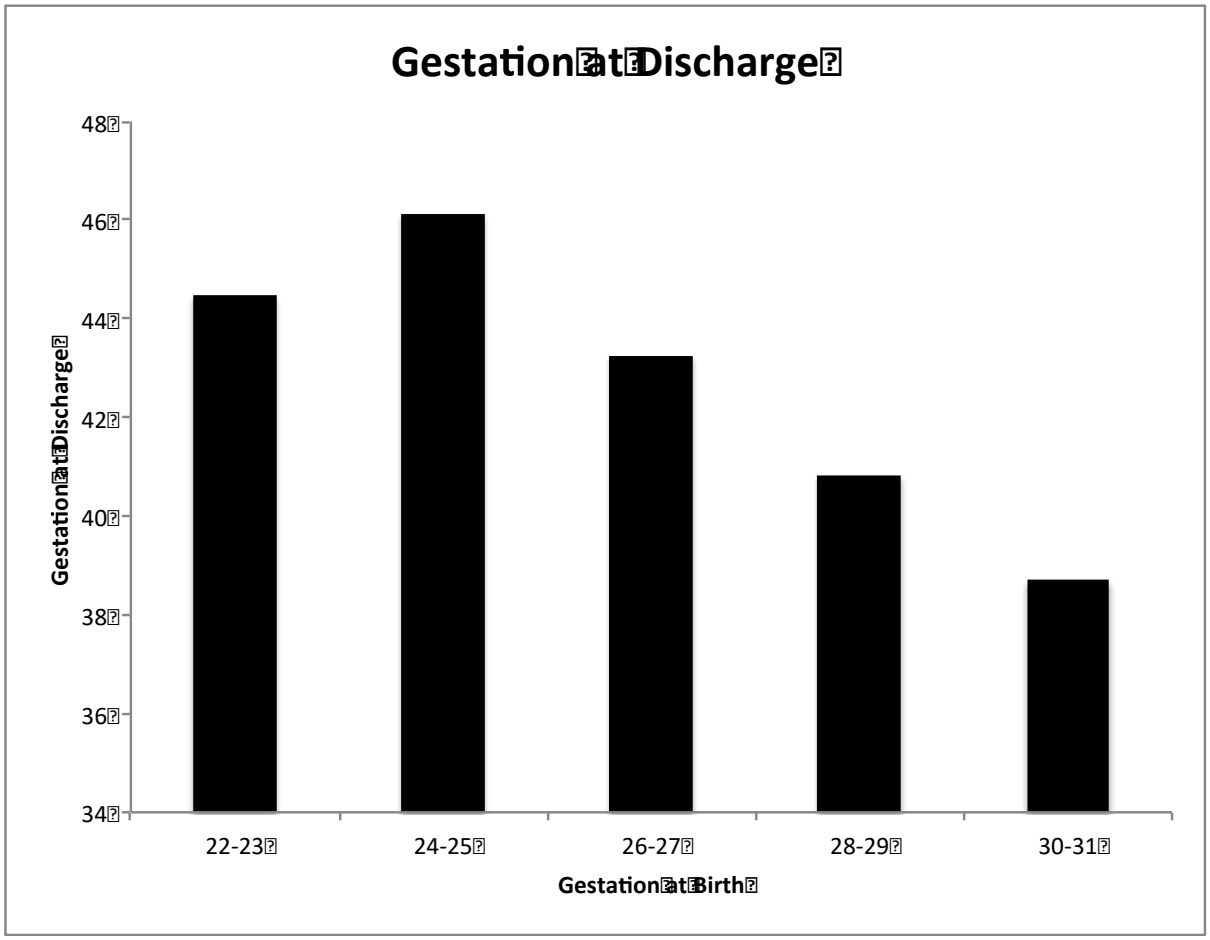
Background: Preterm babies with Bronchopulmonary Dysplasia (BPD) are amongst the most vulnerable group of NICU graduates. Home oxygen enables infants to be discharged earlier, allowing time for growth and bonding with family. We carried out an audit looking at the characteristics of the infants' care on the NICU and subsequent readmissions.

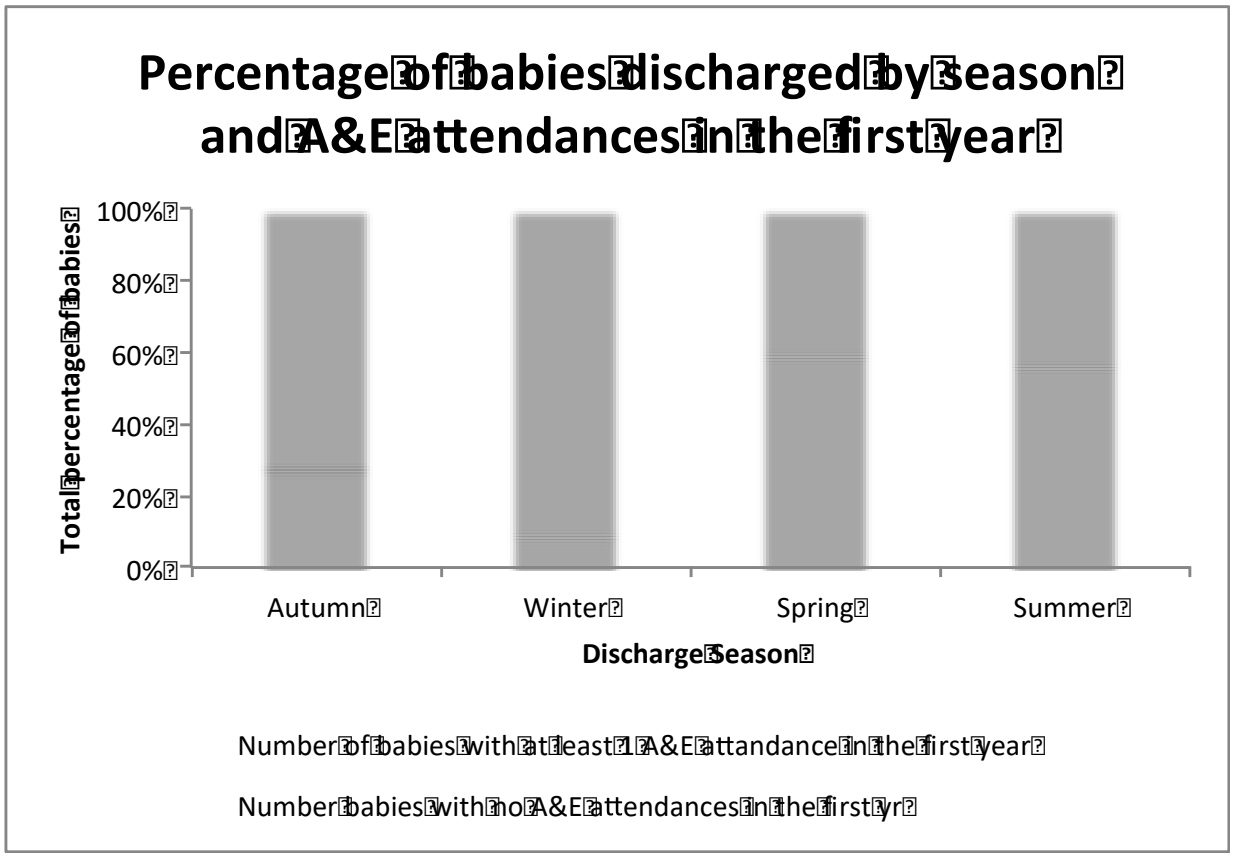
Method: Data was collected retrospectively from BadgerNet and electronic patient records for infants born at the Royal London Hospital between 2011 and 2014 who were discharged on home oxygen and followed up in the chronic lung disease clinic until 2 years of age.

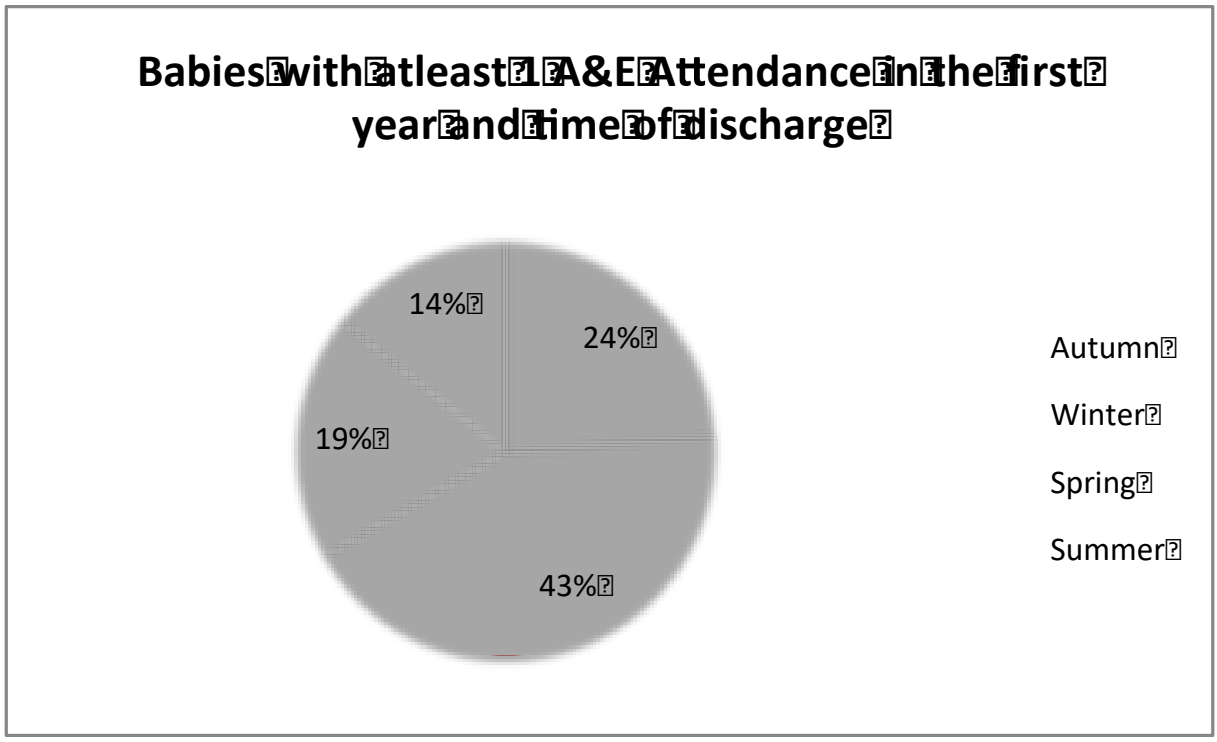
Results: 37 Infants were born between 22 and 30 weeks gestation, weighing on average -0.68SD of the mean weight corrected for gestation and sex at birth, and were discharged at -1.27SD. We observed a longer duration of ventilatory support in those born at 22-25 weeks. Interestingly time on low flow oxygen remains similar across all gestations. The infants spend on average 114 days on the unit, with our most preterm infants being discharged at 44-46 weeks gestation and more mature infants discharged at 38 weeks corrected gestation. 58% of infants attended A&E during the first year after discharge with 81% of these infants requiring at least 1 admission. Only 6 PICU admissions occurred in the first year, all from babies discharged during the winter months.

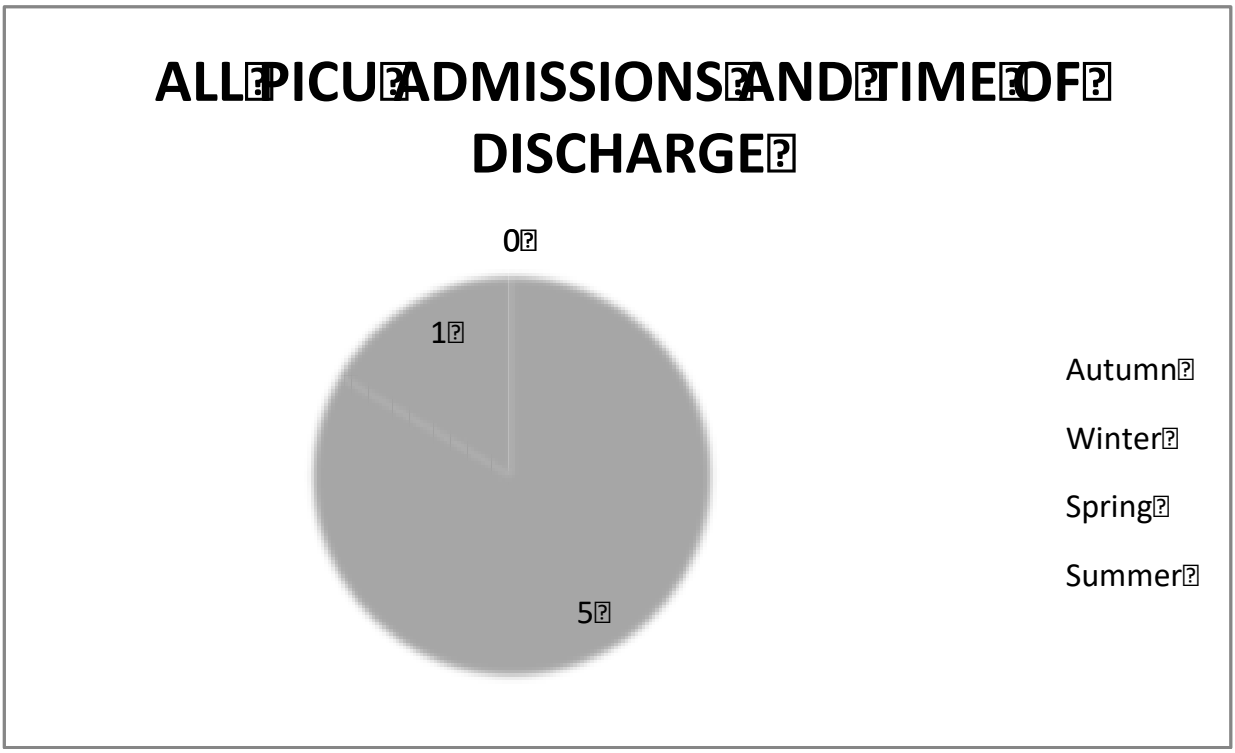
Conclusion: Our preterm infants' weights are below the mean for their gestation at birth and are even smaller at discharge. Our most extremely preterm babies spend longer on the ventilator but their time on low flow oxygen is not significantly different to more mature infants. We must be mindful with babies discharged during the winter months as a large proportion of these babies attend A&E, and require admission.


Ventilation Support in NICU
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Percentage of total stay
22-23
24-25
26-27
28-29
30-31
Gestation at Birth
Mean HFOV
Mean CMV
Mean CPAP
Mean HF
Mean NC


Gestation at Discharge
48
46
44
42
40
38
36
34
Gestation at Discharge
22-23
24-25
26-27
28-29
30-31
Gestation at Birth


Percentage of babies discharged by season and A&E attendances in the first year
Total percentage of babies
100%
80%
60%
40%
20%
0%
Autumn
Winter
Spring
Summer
Discharge Season
Number of babies with at least 1 A&E attandance in the first year
Number babies with no A&E attendances in the first yr


Babies with atleast 1 A&E Attendance in the first year and time of discharge
14%
24%
19%
43%
Autumn
Winter
Spring
Summer


ALL PICU ADMISSIONS AND TIME OF DISCHARGE
0
1
5
Autumn
Winter
Spring
Summer

D2.

Quality Improvement project for improving awareness for target saturation in preterm babies

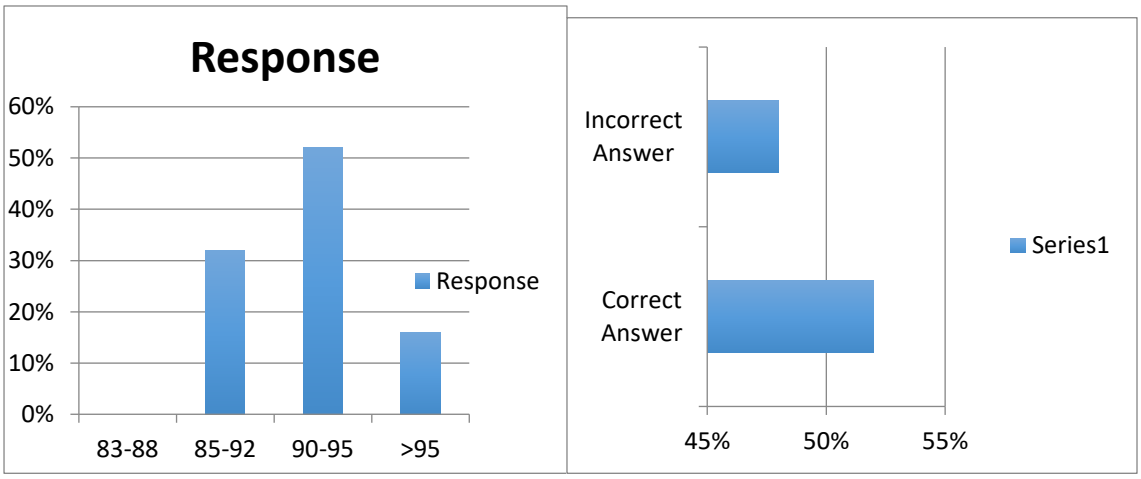
S. Ramdeny, A. Jabbal, I. Oyibo, A Sharma

1. Problem

There was uncertainty about the target saturation for preterm babies among team members. A survey was performed on the neonatal unit to assess the existing awareness on the unit practice of oxygen saturation targets. A questionnaire was circulated. 50 anonymous responses were obtained from nurses and doctors.

1.The target saturation in delivery room at 10 min of age for a 34 weeker

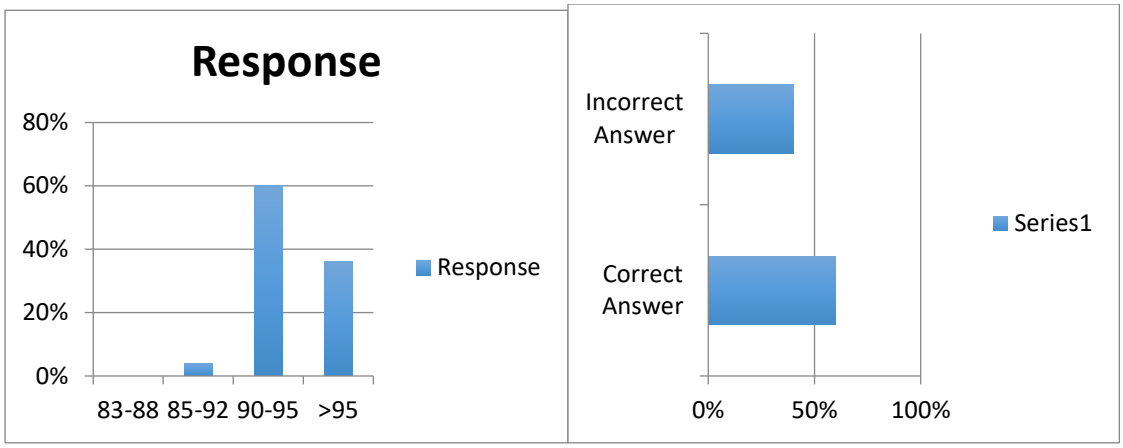
- A 83%-88%
- B 85%-92%
- C 90%-95%
- D >95%



Answer : C

2. The target oxygen saturation for a 34 weeker on day 2 of life

- A 83%-88%
- B 85%-92%
- C 90%-95%
- D >95%



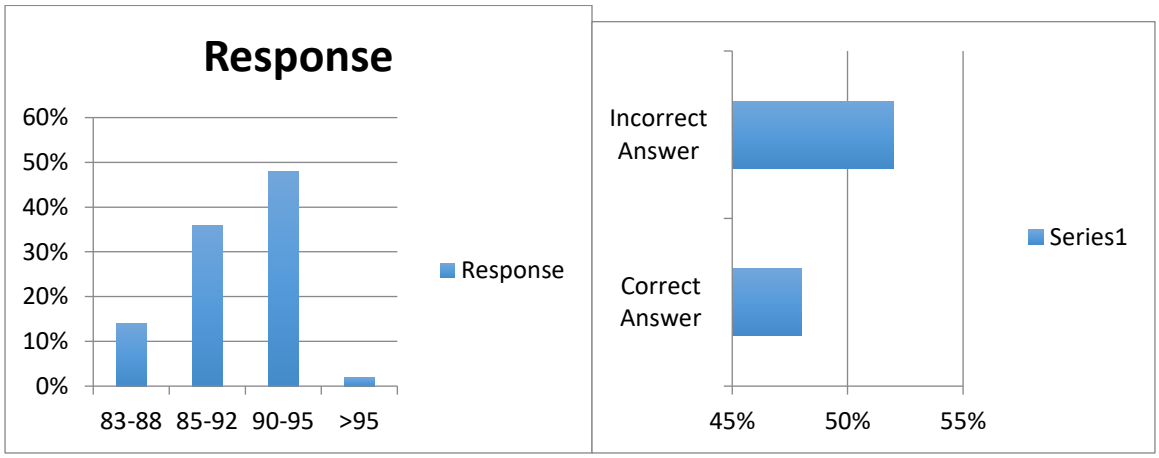
Answer: C

3. The target oxygen saturation in delivery room at 10 min for a baby of 26 weeker
   A 83%-88%

   B 85%-92%

   C 90%-95%

   D >95%



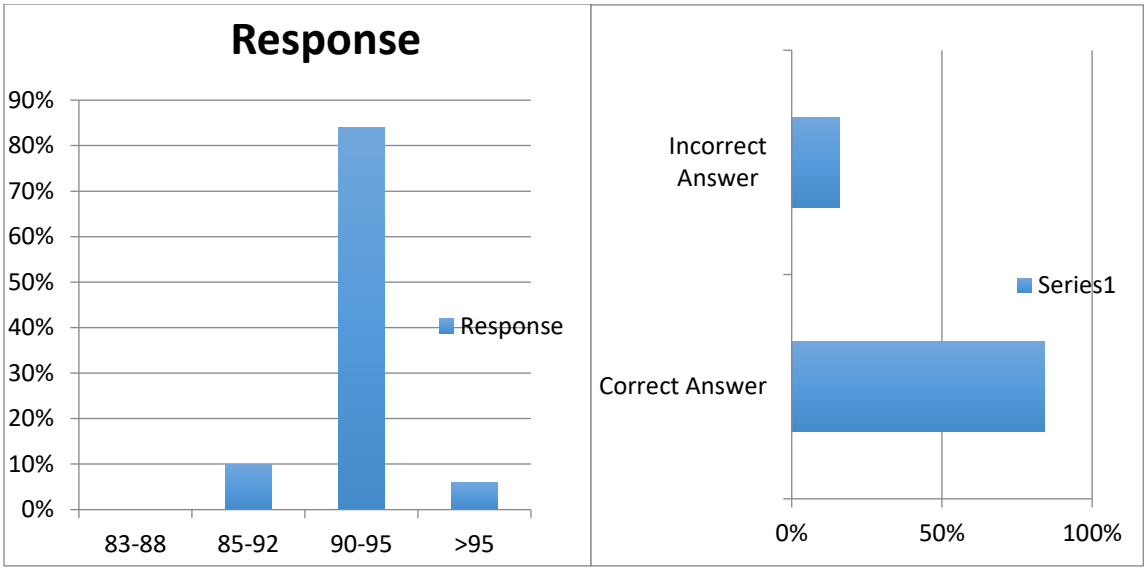
Answer : C

4. The target oxygen saturation for a 26 weeker on day 2 of life
   A 83%-88%

   B 85%-92%

   C 90%-95%

   D >95%

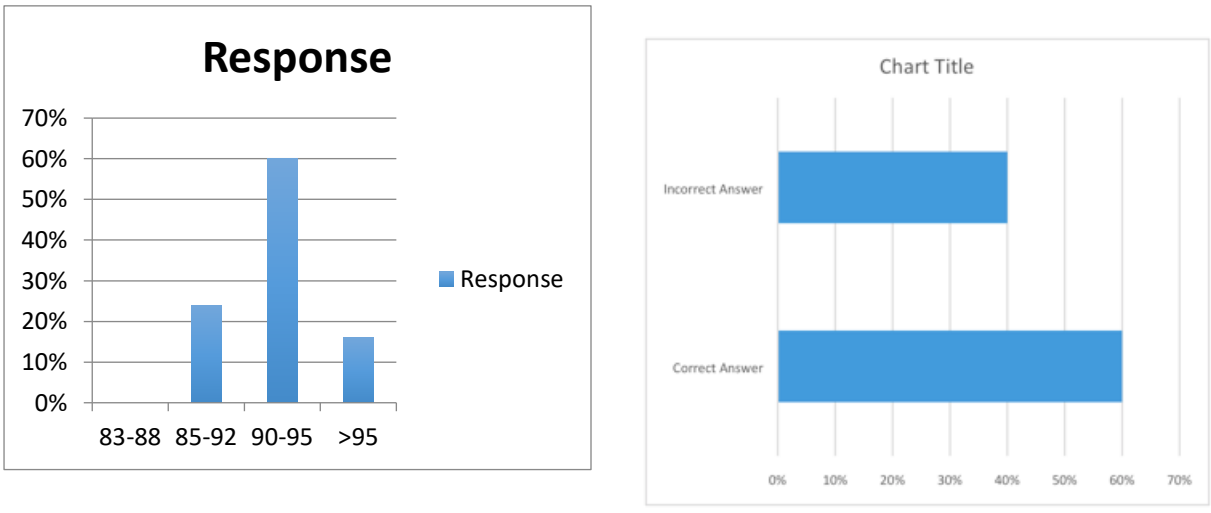


Answer : C

Question 5

The target saturation for an ex-preterm with chronic lung disease on home-oxygen

- A 83%-88%
- B 85%-92%
- C 90%-95%
- D >95%



Answer: C

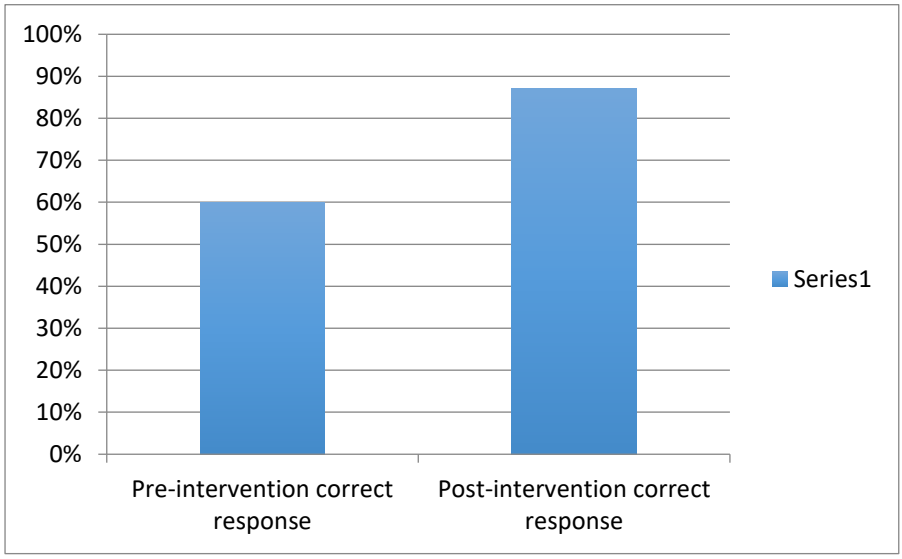
5. Intervention

The results of the survey were presented in the local meeting. The target saturation which is displayed on the neonatal unit was updated to the table shown below

Gestation at birth	Air/Oxygen	Target Range	Monitor Alarm Limit
Preterm <37 weeks	Oxygen	91-94	90-95
Term >37 weeks	Oxygen	91-94	90-98
All infants	Air	>91	90-100
PPHN/CCHD	Discuss with Neonatal	And Cardiology	Consultant

6. Measurement of improvement

The survey was repeated. 39 annonymous responses were obtained.
The result showed an improvement from 60% to 87% in the awareness of staff.



Conclusion

Education and training of clinical staff have been shown to be an effective tool for improving and maintenance of knowledge.

References

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Non Invasive ventilation

E1.

Investigation of the impact of environmental changes and different breathing systems on oropharyngeal temperature and humidity delivered by heated humidified high-flow nasal cannula (HFNC) therapy

Zheyi Liew[1,2,3], Wan Montil[2], David Summers[2], Alan Fenton[2], Sundeep Harigopal[2], Calum Roberts[4], Malcolm Brodlie[1,3] and Christopher O'Brien[1]

[1]Department of Paediatric Respiratory Medicine, Great North Children's Hospital, Newcastle upon Tyne, UK.

[2]Department of Neonatal Medicine, Royal Victoria Infirmary, Newcastle upon Tyne, UK.

[3]Institute of Cellular Medicine, Newcastle University, UK.

[4]The Royal Women's Hospital, Melbourne, Victoria, Australia.

Objective:

We investigated how changes in external environment or different types of breathing system affect oropharyngeal temperature (OT), humidity and rainout volume (RV) during HFNC therapy in a 3-D airway model.

Method:

OT and relative humidity (RH) were measured using a thermohygrometer in incubator (IS) and open cot settings (OCS). Humidification and heating were delivered by Fisher and Paykel MR850 heated humidifier via two flow drivers (Air-Oxygen blender & Acutronic). Flow rates were 1, 4 and 8l/min. Two types of humidification chambers and breathing circuit systems (Optiflow & AquaVENT-NEO) were compared with low flow oxygen (LFO_2 - 0.5l/min). Absolute humidity (AH) was calculated. RVs in each breathing circuit pre and post commencing HFNC were calculated by the difference in weight (g).

Results:

LFO_2 resulted in lower OTs (23.7°C vs. 28.1°C), RHs (9% vs. 32%) and AHs (1.6g/m^3 vs. 7.6g/m^3) compared with HFNC with OCS worse than IS (Table 1 Detail Results

Flow Driver	Breathing circuit cystem	Flow Rate	Incubator (Temperature set at 34°C, Humidity at 60%)				Oper	
			Median Temp, °c (Range)	Median RH, % (Range)	Median AH, g/m3 (Range)	Rainout Volume(g)	Median Temp, °c (Range)	M
LFO2	Salter	0.5	28.1	32.0	7.6	n/a	23.7	
Air-Oxygen Blender	Optiflow	1	33.3 (32.5-33.5)	99.9 (98.6-99.9)	33.2 (31.2-33.6)	2.5	28.2 (27.6-28.6)	99
		4	34.5 (34.4-34.5)	99.9 (99.5-99.9)	35.6 (35.2-35.6)	1.4	31 (30.9-31.3)	99
		8	35.2 (33.6-35.2)	94.7 (88.9-99.9)	35 (29.9-37.1)	1.55	33.5 (29.3-33.6)	99
Air-Oxygen Blender	AquaVENT NEO	1	33.7 (33.6-34.1)	99.8 (98.6-99.9)	36 (33.3-34.8)	2.3	29.9 (29.3-29.9)	99
		4	34.7 (34.7-35.2)	96 (92-99.9)	34.5 (33-37.1)	2.15	33 (32.8-33.1)	99
		8	35 (33.6-35)	88.5 (86-89.5)	32.3 (28.8-32.6)	1.95	33.8 (28.2-34)	99
Acutronic	Optiflow	1	33.8 (33.5-33.9)	94.2 (92.6-97)	32.1 (31-33.3)	0.85	28.4 (28.2-28.4)	99
		4	33.7 (33.5-34.1)	99.9 (98-99.9)	34(32.9-34.8)	1.1	30.8 (30.3-31.3)	99
		8	35.1 (34.4-35.3)	99.9 (99.9-99.9)	36.9 (35.4-37.3)	1.1	33.7 (28.6-33.9)	99
Acutronic	AquaVENT NEO	1	34.7 (34.4-34.9)	99.9 (99.9-99.9)	36 (35.4-36.4)	0.65	28.6 (28.6-28.7)	99
		4	34.9 (34.8-34.9)	99.9 (99.9-99.9)	36.4 (36.2-36.4)	0.95	33.2 (33.1-33.3)	99

		8	35.3 (35-35.5)	94.9 (94.3-95)	34.5 (34.3-35.8)	1.8	34.3 (34.2-34.4)	99

). Temperature, AH and RVs were lower in OCS compared to IS (Table 1 Detail Results

Flow Driver	Breathing circuit cystem	Flow Rate	Incubator (Temperature set at 34°C, Humidity at 60%)				Oper	
			Median Temp, °c (Range)	Median RH, % (Range)	Median AH, g/m3 (Range)	Rainout Volume(g)	Median Temp, °c (Range)	M
LFO2	Salter	0.5	28.1	32.0	7.6	n/a	23.7	
Air-Oxygen Blender	Optiflow	1	33.3 (32.5-33.5)	99.9 (98.6-99.9)	33.2 (31.2-33.6)	2.5	28.2 (27.6-28.6)	99
		4	34.5 (34.4-34.5)	99.9 (99.5-99.9)	35.6 (35.2-35.6)	1.4	31 (30.9-31.3)	99
		8	35.2 (33.6-35.2)	94.7 (88.9-99.9)	35 (29.9-37.1)	1.55	33.5 (29.3-33.6)	99
Air-Oxygen Blender	AquaVENT NEO	1	33.7 (33.6-34.1)	99.8 (98.6-99.9)	36 (33.3-34.8)	2.3	29.9 (29.3-29.9)	99
		4	34.7 (34.7-35.2)	96 (92-99.9)	34.5 (33-37.1)	2.15	33 (32.8-33.1)	99
		8	35 (33.6-35)	88.5 (86-89.5)	32.3 (28.8-32.6)	1.95	33.8 (28.2-34)	99
Acutronic	Optiflow	1	33.8 (33.5-33.9)	94.2 (92.6-97)	32.1 (31-33.3)	0.85	28.4 (28.2-28.4)	99
		4	33.7 (33.5-34.1)	99.9 (98-99.9)	34(32.9-34.8)	1.1	30.8 (30.3-31.3)	99
		8	35.1 (34.4-35.3)	99.9 (99.9-99.9)	36.9 (35.4-37.3)	1.1	33.7 (28.6-33.9)	99
Acutronic	AquaVENT NEO	1	34.7 (34.4-34.9)	99.9 (99.9-99.9)	36 (35.4-36.4)	0.65	28.6 (28.6-28.7)	99
		4	34.9 (34.8-34.9)	99.9 (99.9-99.9)	36.4 (36.2-36.4)	0.95	33.2 (33.1-33.3)	99
		8	35.3 (35-35.5)	94.9 (94.3-95)	34.5 (34.3-35.8)	1.8	34.3 (34.2-34.4)	99

).

Increasing HFNC flow rate from 1 to 8l/min increased temperature in all situations. All devices regardless of breathing circuit combination delivered RHs >85%. Different breathing circuits produced different RHs, AHs and RVs. The Optiflow achieved lower RVs, better RHs and AHs than AquaVENTs at higher flow rates of 8l/min during IS. The AquaVENTs achieved better temperature than Optiflow during OCS with both achieving equal RHs.

Air-Oxygen blender flow driver was better at delivering RHs at flow rates of 1l/min than Acutronic (99.9% vs. 94.2%) and this was reversed at flow rates of 8l/min (94.7% vs 99.9%) when using the same circuit during IS.

Conclusion:

In our model, ISO recommendations for humidification were not always reached in OCS at low flow rates.

Clinicians should be aware that different circuit/flow driver combinations may generate different levels of humidification and OTs.

Table 1 Detail Results

Flow Driver	Breathing circuit cystem	Flow Rate	Incubator (Temperature set at 34°C, Humidity at 60%)				Open Cot (Temperature set at 34°C)			
			Median Temp, °c (Range)	Median RH, % (Range)	Median AH, g/m^3 (Range)	Rainout Volume(g)	Median Temp, °c (Range)	Median RH, % (Range)	Median AH, g/m^3(Range)	Rainout Volume(g)
LFO2	Salter	0.5	28.1	32.0	7.6	n/a	23.7	9.0	1.6	n/a
Air-Oxygen Blender	Optiflow	1	33.3 (32.5-33.5)	99.9 (98.6-99.9)	33.2 (31.2-33.6)	2.5	28.2 (27.6-28.6)	99.9 (99.9-99.9)	24.5 (23.6-25.1)	1
		4	34.5 (34.4-34.5)	99.9 (99.5-99.9)	35.6 (35.2-35.6)	1.4	31 (30.9-31.3)	99.9 (99.9-99.9)	29 (28.8-29.5)	1.1
		8	35.2 (33.6-35.2)	94.7 (88.9-99.9)	35 (29.9-37.1)	1.55	33.5 (29.3-33.6)	99.9 (99.9-99.9)	33.6 (26.1-33.8)	0.6
Air-Oxygen Blender	AquaVENT NEO	1	33.7 (33.6-34.1)	99.8 (98.6-99.9)	36 (33.3-34.8)	2.3	29.9 (29.3-29.9)	99.9 (99.9-99.9)	27.1 (26.1-27.1)	0.15
		4	34.7 (34.7-35.2)	96 (92-99.9)	34.5 (33-37.1)	2.15	33 (32.8-33.1)	99.9 (99.9-99.9)	32.6 (32.2-32.8)	1.05
		8	35 (33.6-35)	88.5 (86-89.5)	32.3 (28.8-32.6)	1.95	33.8 (28.2-34)	99.9 (99.9-99.9)	34.2 (24.5-34.6)	0.95
Acutronic	Optiflow	1	33.8 (33.5-33.9)	94.2 (92.6-97)	32.1 (31-33.3)	0.85	28.4 (28.2-28.4)	99.9 (99.9-99.9)	24.8 (24.5-24.8)	0.65
		4	33.7 (33.5-34.1)	99.9 (98-99.9)	34(32.9-34.8)	1.1	30.8 (30.3-31.3)	99.9 (99.9-99.9)	28.6 (27.8-29.5)	0.75
		8	35.1 (34.4-35.3)	99.9 (99.9-99.9)	36.9 (35.4-37.3)	1.1	33.7 (28.6-33.9)	99.9 (99.9-99.9)	34 (25.1-34.4)	0.95
Acutronic	AquaVENT NEO	1	34.7 (34.4-34.9)	99.9 (99.9-99.9)	36 (35.4-36.4)	0.65	28.6 (28.6-28.7)	99.9 (99.9-99.9)	25.1 (25.1-25.2)	0.65
		4	34.9 (34.8-34.9)	99.9 (99.9-99.9)	36.4 (36.2-36.4)	0.95	33.2 (33.1-33.3)	99.9 (99.9-99.9)	33 (32.8-33.2)	0.65
		8	35.3 (35-35.5)	94.9 (94.3-95)	34.5 (34.3-35.8)	1.8	34.3 (34.2-34.4)	99.9 (99.9-99.9)	35.2 (35-35.4)	0.95

E2.(This abstract has previously been presented)

Barts Health NHS
NHS Trust

CPAP Hood: Experience of the only UK centre with regular use

S.Lampariello, S.Pierce, C.Ronan

Paediatric Critical Care Unit, Barts and the London Children's Hospital

Background and Aims

- CPAP is a well-established therapy for acute respiratory failure. This is normally delivered by oro/nasal mask, with leaks, pressure areas and poor compliance as complications. There is limited information about delivery of CPAP via a hood in the UK.
- The effects of the CPAP hood on oxygenation have been shown to improve PaO_2/FiO_2 ratios (Chidini, 2010).
- In our centre, patients are sometimes started on CPAP hood even when in type 2 respiratory failure.
- The effect of CPAP hood therapy on $PaCO_2$ has not been previously investigated in paediatrics and appears to be non-significant in adults (Luo, 2016).

Method

- All UK NHS Paediatric Critical Care Units (PCCUs) (except NI) were surveyed to establish use of the hood.
- Patients admitted to PCCU receiving CPAP hood therapy between February 2015 and February 2016 were identified retrospectively. Data were collected using a set proforma.

Results

- Of 29 PCCUs, none used the CPAP hood regularly. Four had previously used it occasionally, with 1 still using it occasionally.
- 57 patients received CPAP via hood and 28 notes were accessible.
  - No adverse effects were documented
  - No sedation was required
  - 10% of patients had previously failed to tolerate another interface
  - 14% required invasive ventilation

	Mean (range)
Age (yrs)	2.49 (0.3-11)
Weight (kg)	13.88 (4.4-43)
PEEP (cmH_2O)	5-10
Duration (hrs)	48.6 (4-360)

- A non-significant mean reduction of 3.1% in $PaCO_2$ was seen at the first post-CPAP gas, (change in absolute values of +1.48KPa to -3.87KPa). In hypercapnic patients, $PaCO_2$ reduced by 11%. A significant correlation was seen between $PaCO_2$ and time on CPAP, with reduced $PaCO_2$ as duration increased (r= - 0.44).

Conclusions

- This study continues to demonstrate that CPAP hood is a safe, well-tolerated paediatric interface and provides provisional data on reduction of $PaCO_2$.

F. Case Reports

F1.

Case Report: Survival at 31 weeks Gestation with Postnatally Diagnosed Right-Sided Congenital Diaphragmatic Hernia.

1 Dr Stylianie Tsilika, Paediatric ST6, Nottingham University Hospitals, Nottingham, United Kingdom

2. Dr Salma Ali, Paediatric ST5, Nottingham University Hospitals, Nottingham, United Kingdom

Background: Congenital diaphragmatic hernia is a rare defect, diagnosed antenatally or postnatally, in both preterm and term babies. Survival is dependent on the extent of respiratory failure, degree of pulmonary hypoplasia, presence of persistent pulmonary hypertension and any associated congenital anomalies. Antenatal diagnosis enables preparation for delivery and controlled management of resuscitation including intubation, ideally before the first breath, followed by gentle ventilation. Antenatal screening detects CDH in >70% of cases[1] and three-quarters of live-born infants with CDH will be born at term. We report our experience with an infant who falls within the other <25% having been born *premature* with a right sided congenital diaphragmatic hernia that was diagnosed postnatally.

Case: The neonatal team attended the birth of a male infant born at 31+5 weeks gestation, birth weight 1.9Kg, with a background of polyhydramnios and placental abruption. He was born in poor condition, and required intubation and ventilation at delivery. Chest X-ray demonstrated an unexpected right sided diaphragmatic hernia. He required prolonged ventilatory support, including high frequency oscillatory ventilation alongside nitric oxide, and inotropes to manage his persistent pulmonary hypertension. The diaphragmatic hernia was repaired on day 15 of life. He was ventilator dependent until day 30 and following extubation has remained on non-invasive support at present.

Discussion: Using prospectively collected data Tsao et al (2010) showed preterm infants were significantly less likely to undergo operative repair of their diaphragmatic hernia compared to term babies.[2] Amongst the preterm cohort (> 31 weeks) >40% survive following CDH repair although survival has been shown to be significantly lower compared to term babies.[2] Despite his fragile neonatal course our preterm baby with congenital diaphragmatic hernia underwent repair and has survived to term. Future assessment of neurodevelopmental outcome will be important in terms of assessing long-term impact and morbidity.

References:

1. Kotecha S et al, ERS Task Force Report Congenital Diaphragmatic Hernia, Eur Resp J 2012; 39: 820-829

2. Tsao K et al, Congenital Diaphragmatic Hernia in the Preterm Infant, Surgery 2010; 148 (2): 404-410.

F2.

An Unusual Complication of Mycoplasma Infection

Dr Louise Selby1, Dr Catriona Middleton1, Dr Theofilos Polychronakis2

1Addenbrookes Hospital, Cambridge, 2Royal Brompton Hospital, London.

We present the case of an 8 year old boy with an unusual complication of mycoplasma pneumonia. He presented to his local hospital with cough, coryza and fever for 9 days. He developed significant respiratory distress and commenced intravenous antibiotics, but required escalation of respiratory support to optiflow, CPAP, then required intubation, ventilation and further escalation to high frequency oscillation.

Initial chest x-ray showed dense consolidation of the right lung, which progressed to a right sided white out.

He was treated with intravenous antibiotics with atypical cover. Pleural tap was negative for bacterial growth and nasopharyngeal aspirate for extended respiratory viruses was negative but serology was positive for mycoplasma pneumonia.

He developed a swollen right leg; Doppler ultrasound showed thrombus from the right external iliac to the popliteal vein. He commenced anti-coagulation and his case was discussed with Great Ormond Street. He had a CTPA performed showing extensive bilateral pulmonary emboli, consolidation and infarction with hepatomegaly.

After three weeks he was extubated to CPAP and remained tachypnoeic but not hypoxic. An IVC filter and clot extraction were discussed because of sub-therapeutic anti Xa levels, however it was felt the risks outweighed the benefits. He remained on bedrest until his factor Xa was therapeutic due to risk of further emboli. Repeat CTPA was performed in view of persistent temperatures and to reassess the clot burden and right lung. This showed consolidation and cavitating infarctions with an enlarging effusion.

Conservative management with intravenous antibiotics was continued; two weeks later oral antibiotics and warfarin introduced. His pulmonary pressures normalised on echocardiogram and he continued to make good progress.

There is one case of pulmonary infarction secondary to mycoplasma infection in the literature. We present a complicated course and interesting images requiring multi-disciplinary and multi-site discussions eventually achieving excellent outcomes for the child.

F3.

Case Presentation: Dysfunctional Breathing in an Adolescent with Difficult to Control Asthma.

Iqbal N, Gautier J. Department of Paediatrics, George Eliot Hospital, Nuneaton CV10 1DJ.

Introduction

Dysfunctional breathing (DB) is a spectrum of respiratory and non-respiratory symptoms arising from 'an alteration in the normal biomechanical pattern of breathing'[(1)]. Diagnostic uncertainty arises because of the significant overlap in symptoms with other chronic respiratory conditions. Primary care studies have suggested it to be a common co-morbidity in the adult asthmatic population[(2)].

The diagnosis is much less readily identified in the paediatric asthma population, despite SIGN/BTS guidelines[(3)] which advise the consideration of DB in adolescents with difficult to control asthma.

Buteyko, and other such breathing techniques, have been suggested as a reasonable adjunct to treatment in asthma where there is DB[(4)]. The benefits cannot be understated; with a significant reduction in morbidity.

Case Study

Our patient was a fourteen year old Caucasian female, with increasingly difficult to control asthma. By age five, she was on alternate day steroids, but with little improvement. A difficult asthma assessment at seven years of age, revealed little subjective evidence of asthma, high compliance with medications and pre-bronchiectatic changes on CT scan. Antibiotics were considered as part of her therapeutic intervention, with an initial improvement in her symptoms. This was short-lived, and by eleven, she was having up to twice monthly attendances to the Children's Assessment Unit. In October 2015 Omalizumab was initiated, with no obvious immediate response.

Buteyko technique was taught in December 2015, and there was an immediate reduction in perceived symptoms; with only one acute exacerbation requiring steroids since then. She has required further antibiotics course though.

Learning Points

Correct diagnosis of DB can hugely reduce the pharmaceutical load and morbidity in paediatric asthma.

DB needs better evaluation and early consideration in difficult paediatric asthma.

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2. Thomas M, McKinley RK, Freeman E, et al. (2001) Prevalence of dysfunctional breathing in patients treated for asthma in primary care: a cross sectional survey. BMJ,322:1098–100.
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F4.

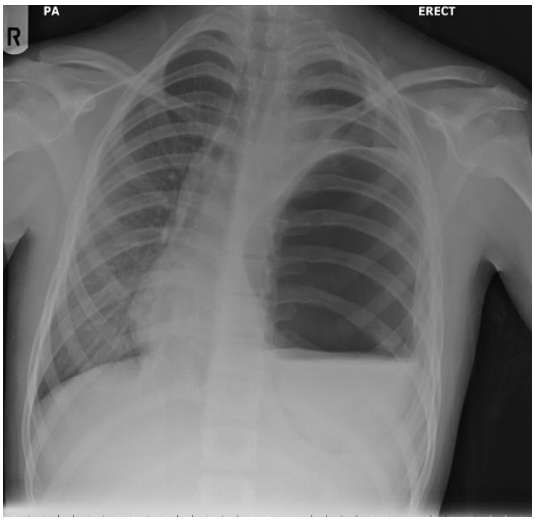
An unusual cause of vomiting and chest tightness.

Dr Charlotte Rampton[1], Miss Kokila Lakhoo[2], Dr Peter Sebire[1]

[1]Wexham Park Hospital, Slough and [2]John Radcliffe Hospital, Oxford

Case Presentation:

A 13-year-old boy presented to a district general hospital with a 48-hour history of abdominal pain, vomiting and diarrhoea. His examination and blood tests were normal on admission. He was given anti-emetics and IV fluids, but continued to vomit. On day 4 he suffered from acute shortness-of-breath. On examination he had reduced air entry to his mid-zone on the left with dullness to percussion, his trachea was central and his observations were normal. His CXR is below.



What is the cause of this patient's symptoms and CXR findings?

What is your management plan?

Ongoing case management:

At the tertiary centre he was suspected of having a diaphragmatic hernia with compromised bowel and was taken to theatre after challenging resuscitation. At laparotomy a hiatus hernia was noted with necrotic lower oesophagus and proximal stomach. He required staged multiple interventions and spent 4 weeks in PICU/PHDU due to: pleural effusions, pneumothoraces, sepsis and abdominal collections. At 1-month outpatient follow-up he had regained 75% of his weight loss and was able to tolerate a normal diet.

Discussion:

A hiatus hernia is a protrusion of an organ through the oesophageal hiatus, it can be congenital or acquired. Hiatus hernia are present in 0.1% of the paediatric population. They

are difficult to diagnose clinically due to very non-specific symptoms: vomiting, failure-to-thrive, anaemia, and dysphagia. Differential diagnosis includes: pneumothorax, diaphragmatic hernia, lung abscess, congenital lung cysts, hydatid disease, contained perforations, and epiphrenic diverticulum. Diagnosis is often suspected when herniated bowel is noted on plain chest radiograph. Complications are prevalent in congenital hernias, therefore elective surgical repair is needed at diagnosis.

Conclusion:

Awareness of hiatus herniae is important for paediatric respiratory specialists because examination and CXR findings can mimic other pathologies.

F5.

Challenges of managing bronchiectasis in a low resource setting

Caroline Harris, ST4 Paediatrics, Northern Deanery

Background

Bronchiectasis is managed by an extensive multi-disciplinary team in high resource settings. In the developing world the burden of disease is significantly higher despite treatment options being limited[1]. I describe a recent case of a paediatric patient with bronchiectasis from Queen Elizabeth Central Hospital, Malawi.

Clinical case

KL presented at 7 months old with shortness of breath, cough and fever. He improved with antibiotics, but continued to have frequent lower respiratory tract infections on a monthly basis. By 11 months of age he was having a daily productive cough with associated shortness of breath. He was HIV negative.

Chest X-ray showed bilateral streaky perihilar and upper lobe bronchiectatic changes. A CT scan showed bilateral dilated and thickened bronchi. Immunology and sweat testing was unavailable to determine the underlying cause of bronchiectasis.

There was no medium for respiratory culture. He was placed on alternating courses of antibiotics for 1 month at a time – Co-amoxiclav, Azithromycin, Co-trimoxazole and Ciprofloxacin. During acute exacerbations he was treated with Salbutamol nebulisers, Prednisolone and IV Ceftriaxone. Parents were shown how to perform daily chest physiotherapy. He was given “Chiponde” to eat, a high fat “peanut butter” used for children with malnutrition.

By the time he was 23 months pulmonary hypertension led to right sided heart failure. Furosemide and Spironolactone were commenced. Oxygen saturations became lower and exercise tolerance negligible. A palliative care team were involved and he sadly passed away age 2 years 3 months.

Discussion

Epidemiological global data of bronchiectasis is limited. There are few guidelines in the developing world. Use of broad spectrum antibiotics, vaccination programmes and HIV prevention strategies are thought to be making some impact on the burden of this disease.

References

McCallum G. , Binks M. The Epidemiology of Chronic Suppurative Lung Disease and Bronchiectasis in Children and Adolescents; *Frontiers in Pediatrics*; 2017. http://journal.frontiersin.org/article/10.3389/fped.2017.00027/full