Inspire

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The First Word

It is time for change. I like change. Change is good. This is not a party political broadcast, so don’t start mobilizing your union or cashing in your BA air miles just yet. But what change would you like to see? Do fancy changing a piece of equipment you have used for years? You know how it works, heck you probably helped design it. You know its limitations. You have even got to like the display you have been peering through since time memorial. Deep inside you want to try something new, something exciting and something that looks good. Well, just do it, because there are few opportunities in life when you can feel smug about a physiological assessment device and say ‘that’s mine that is.’

Well here is the start of the Inspire makeover which will hopefully evolve to provoke feelings of outrageous smugness. This is your Inspire. Four editions a year will try and reach out and cover a wealth of topics with input from the ARTP membership. The front cover is sympathetic to the previous editions. I guess what stands out more is the use of a photo to give us some indication of what might lay inside or indeed what might link certain individuals within the membership to everyday clinical assessments. This is not just a photo of some inflammatory cells. It is more than that. It should tell you that lung physiology is not just blowing into a tube. This photo, simple though it is, should remind all of us why we do what we do. Our roles are inexorably linked to the successful evaluation and treatment of airway disease. The physiological data read-outs we provide both in the clinic and in research allows us an opportunity to change things for the better. Better drugs, better assessments and a better understanding of airway disease.

In this issue we have wonderful examples of how we might change our understanding of how we should measure and treat conditions such as OSA and COPD. In units across the country, COPD is assessed not just for disease severity but also for the effect of treatment. New drugs are being tested. We are all integral to shaping how a disease like COPD should be assessed and treated and how these new drugs should be rigorously tested. The way we assess and treat COPD is constantly changing as we learn more about how the disease progresses and interacts with other systems. Our determination in delivering high quality clinical assessment and research impacts on how we ultimately manage airway disease. As clinical physiologists we are part of this change every single day. Embrace the change. Change is good.

Enjoy this issue,

Graham Clarke
Editor of Inspire
Therapeutic Head - Respiratory Phase 1
Quintiles Drug Research Unit @ Guy’s Hospital

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The image on the front cover is of a sputum sample taken from a healthy subject six hours following inhalation of Lipopolysaccharide (LPS).

Healthy subjects offer an opportunity in clinical research to investigate new drug entities and to develop methods and inflammatory models in what is referred to as proof of concept studies. Here, well established tools such as sputum induction procedures are employed to sample certain mechanisms of inflammatory disease such as LPS to induce a Th1 mechanism.

The pattern of inflammation induced by LPS inhalation in healthy subjects is qualitatively similar to that found in smokers and patients with COPD. Specifically it is associated with an acute, transient airway and systemic inflammatory response, characterised by blood neutrophilia and an increase in numbers of airway neutrophils, lymphocytes and monocytes together with their associated chemokines, cytokines and activation products[1,2,3,4]. Stimulation of human monocytes and neutrophils with bacterial endotoxin results in the release of a range of inflammatory mediators including the pro-inflammatory cytokines (e.g., granulocyte-macrophage colony-stimulating factor [GM-CSF], IL-6, IL-1β and TNF-α)[5,6] and the chemokines (e.g., monocyte chemoattractant protein-1 [MCP-1] and IL-8). Together, these play a crucial role in the recruitment and activation of leukocytes and the subsequent release of harmful proteases that may further perpetuate the inflammatory process.

Models which address Th1 immunological mechanisms of lung disease are crucial in understanding how we develop new drugs and treat diseases such as COPD.


EDITORS COMMENT:
The ARTP would like to extend a warm thank you to PHILIPS RESPIRONICS and DeVilbiss HEALTHCARE for their generous support of the ARTP conference and their generous prize raffles on the gala evening. PHILIPS RESPIRONICS kindly donated over £400 of prizes and DeVilbiss donated a Pulsox 2 system to the raffle.
This year the conference was flying high at the Park Inn, Heathrow. The rush for exhibition space took place last July when ARTP met with potential exhibitors to showcase the hotel. Within half an hour the prime locations in the exhibition hall had been snapped up. The exhibition appears to be going from strength to strength each year so much so that we had to decline several manufacturers this year.

With the introduction of ARTP Sleep in 2009 it was interesting to note that almost 40% of the exhibitors were selling into the sleep / CPAP/ ventilation market.

It was also interesting to note that 30% of exhibitors were promoting full cardiopulmonary exercise testing equipment. I guess the market is booming due to pre-op exercise assessment being in vogue with our anaesthetists.

One more point of interest was the number of manufacturers now selling single use disposable flow sensors. Some companies are claiming these are pre calibrated therefore removing the need for calibration. A great idea in theory, however, a word of caution, never assume that such devices are accurate without first verifying with a 3 litre syringe.

The exhibitors always rate the ARTP conference as the most entertaining they attend. It’s always fun to see the manufacturers taking part in the evening entertainment. This year we were “All shook up” as Lynn from Stowood Scientific decided to change his act from Tom Jones to Elvis for this year’s ARTP’s Got Talent competition.
Shouts of “Don’t be Cruel” and “Return to Sender” did not stop Lynn giving everything once again.

If you missed the conference this year, here is a brief overview of what’s new for 2010.

A newcomer to the respiratory market, Love Medical made their first appearance at the conference this year. Exercise systems from Geratherm Respiratory were being exhibited along side the Spirostik USB spirometry system. These German products appear to be well made and I am sure we will see more of these appearing in UK labs in the near future.

Another new face this year was the Taiwanese CPAP company - Apex Medical. Four devices were on display, ranging from the simple entry level model to the XT Auto adjusting machine. A range of masks, humidifiers and download software are also available for these machines.

As always, there was change to the top 10 sleep products on offer from Stowood Scientific. This year’s innovative products included the latest version of the Grey Flash battery powered home Visi sleep system and the latest version of software for downloading most makes of pulse oximeter. If you wish to view a trial version of the latest Visi-Download software, go to www.stowood.co.uk for your free trial copy.

An exclusive champagne launch for ResMed’s S9 CPAP range was made to ARTP members on Thursday evening. The design of the S9 is truly innovative, looking more like a piece of top end HiFi equipment rather than a CPAP machine. The other impressive feature of the S9 is its quietness. I remember in the early days when CPAP motors were so noisy, patients would drill a hole in the bedroom wall and run the tubing from the bedroom to the blower unit on the landing. Fortunately those days are long gone with such advances in technology.

Masimo technology continues to make advances in the interpretation of the pulse oximetry signal. Masimo was the first company to introduce adaptive filters to their pulse oximeter back in 1998. This technology removes the “noise” often encountered during exercise testing and ensures a reliable saturation measurement throughout the test. Masimo has now developed the technology further, such that the latest pulse oximeter can also measure total haemoglobin, carboxyhaemoglobin, oxygen content, methaemoglobin and perfusion index. These devices are not cheap, but could be used for non invasive Hb measurements in all patients prior to transfer test measurement.

Yet another newcomer to the cardio pulmonary exercise market was GE Healthcare. Well known for their CardioSoft ECG stress test software, GE Healthcare has teamed up with Ganshorn, a well known German lung function manufacturer, to produce the CASE ES cardiopulmonary exercise system. No doubt they will secure sales in the many cardiopulmonary labs throughout the UK.

Pharmaxis continue to increase sales of Osmohale (mannitol) in the UK and are continuing to expand into Europe. Marketed as an indirect osmotic bronchial challenge test in a box, Osmohale is much easier and quicker to administer compared with methacoline and histamine challenges.

Medical Graphics continue to develop their full lung function test systems. The latest Platinum Elite plethysmograph features easy access for all patients. Another feature which I liked is the introduction of a touch screen PC. I’m sure we will see other manufacturers introducing this technology in the future.

Breas were exhibiting the latest Vivo range of ventilators for both invasive and non invasive ventilation. With a maximum pressure of 60cmH2O, all models feature a four hour internal lithium battery with the option of an additional click on eight hour battery pack. Additional accessories may be plugged in to allow monitoring of FiO2, SpO2 and EtCO2, which can be extremely useful during initiation of ventilation.

For the first time Vitalograph used the conference to demonstrate the latest in hand held spirometers. The In2itive features a touch screen.
which provides real time flow volume and volume
time curves. Also new was the Vitalograph lung
monitor which is a simple device for home
monitoring of FEV1, FEV6, ratio and FEF. This
device is ideal for recording measurements made
in the home.

The strap line “TLCO on the go with the EasyOne
Pro” conjures up all sorts of images until you
realise that this is a portable transfer test /
spirometer. Mentioned in the last edition of
Inspire, this piece of kit attracted much attention
throughout the conference and during one of the
lunch time workshops. Intermedical is
distributing the EasyOne Pro in the UK on behalf of
NDD.

As we all know, assessment for long term oxygen
therapy was rightly bought into secondary care
several years ago. Patients are always asking about
travelling with oxygen and the best options
available. Oxygen cylinders are obviously
cumbersome and restrictive. To meet this
increasing demand Intermedical were exhibiting
several small lightweight portable oxygen
concentrators, all of which may be powered by
battery, mains or the in car 12v socket.

Whilst Radiometer had nothing new to exhibit
this year, I can announce that since the conference
Radiometer has just released the latest ABL90
cartridge based blood gas analysers. Provided the
price and running costs are competitive, I am sure
this new analyser will sell well in the UK market
place.

Latest disposable filters on offer from Air Safety
included the Spiroguard filter with built in
mouthpiece and a new filter specially designed for
peak flow meters.

Physiological Measurements are now the UK
distributor for the Cosmed range of spirometers
and full exercise testing equipment. In addition to
a wide range of spirometers, some with a
disposable flow sensor option, a range of exercise
equipment was also on display. The entry level is
called the “Fitmate Med” (just what some of our
obese patients could do with). Stripping out the
bells and whistles of a full test system, the Fitmate
employs just an O2 analyser and volume transducer
to assess oxygen uptake and derived parameters
such as anaerobic threshold and nutritional
assessment. This is certainly a small compact
portable unit which I guess would be well suited
to fitness centres. If it’s full cardiopulmonary
exercise equipment you require, this is also
available in the form of the Quark CPET.

Not a great deal of change to the products on
display at Care Fusion this year, but always great
to see the large pieces of kit on display such as
body box and exercise systems.

Clement Clarke has produced asthma
management products for almost 50 years.
Renowned for the “Mini-Wright” Peak Flow Meter,
Clement Clarke continues to expand its product
range. This year saw the launch of the Microneb
Medix nebuliser. Weighing just 300 grams, the
handheld pocket-sized nebuliser comes complete
with carry case and rechargeable batteries.

nSpire Health obviously got their act together
this year since they won the award for best trade
stand, then scooped the lung function
manufacturer of the year award. Best stand voting
may have been influenced by a prize draw for a
Fortnum and Mason wine hamper, but who
knows!

As oxygen services continue to develop across the
UK, so do the products being offered by the
oxygen providers. Air Products were displaying
the latest in Sequal and Inogen portable battery
operated concentrators.

If you want to check CPAP compliance whilst the
patient is at home, then DeVilbiss Healthcare has
developed the Smartlink and SmartCode for the
Sleep Cube CPAP machine. SmartLink data card
simply plugs in to the back of the Sleep Cube and
records up to 3 years of compliance data.
SmartCode is even simpler. Just call the patient at
home and ask for the compliance code which is
displayed on the machine. The code is then keyed
into a PC and DeVilbiss will provide a report detailing compliance for the last day, 7 days, 30 days and 90 days.

Until recently the measurement of nitric oxide was limited to a choice of two or three manufacturers, selling high priced equipment, with expensive running and service costs. Enter Bedfont Scientific. The NObreath is a hand held nitric oxide monitor which has realistic running and service costs. I tested the NObreath recently and found it gave comparable results to that of a more expensive competitor.

Carina VT specialises in top end ventilators and various devices designed to loosen airway secretions. New for this year is the updated LTV series of ventilators which are suited to acute care, sub acute care and home care. New secretion busting devices were also on display in the form of the Pegaso In-Exsufflator and the Uniko TPEP.

Philips Respironics were demonstrating the latest ComfortFusion mask. This is an exceptionally comfortable mask which should ultimately help improve long-time compliance. Also on display was the unique OptiLife CPAP mask which seals against the tip of the nostrils rather than covering the entire nose.

Pulmolink had their full range of PFT equipment on display. Ranging from simple spot pulse oximetry testing to bedside monitoring equipment, from simple stand-alone spirometers to full lung function testing kit, from exercise ergometer to specialised cardio-pulmonary exercise testing equipment, Pulmolink had it all.

And finally a big thank you to all members who helped raise £590 towards the Haiti earthquake appeal and to DeVilbiss Healthcare and Philips-Respironics for donating such excellent raffle prizes.

Next year we are flying up North to Glasgow once again. The conference will be held at the Marriott Hotel between 3rd - 5th February 2011.

At the end of the exhibition we always ask the exhibitors to complete an evaluation questionnaire. Here’s what they thought about this years conference compared with previous years.

![Manufacturers conference evaluation](image)
Background: Chronic Obstructive Pulmonary Disorder (COPD) is an under diagnosed disease, with approximately 2.8 million undiagnosed sufferers in the UK alone (1). The World Health Organisation currently estimates that 5% of deaths globally, per annum, are a result of COPD (2), making it the 4th biggest killer. If current trends continue, it is predicted to be the third biggest killer by 2020 (2).

Current prevalence estimates range from 9-10%, based on data between 1990 – 2004 (2), to 10.1-11.8% globally (3).

Recent reports have attempted to estimate COPD prevalence. SEPHO reported prevalence rates in the Milton Keynes area for the years 2004/2005, 2005/2006 and 2006/2007 as 1.15%, 1.19% and 1.21% respectively (4). Data provided by APOH (2009) currently estimates 2.3% of patients in the Milton Keynes PCT area have a confirmed diagnosis of COPD (5).

This data appears to indicate a short fall between the number of patients estimated to have COPD and those diagnosed.

Aim: A pilot study to investigate if the prevalence of COPD in the Milton Keynes area can be increased by opportunistic screening of people with a smoking history of over 10 pack years. The aim is to increase the prevalence in the Milton Keynes area by 1%.

Method: People in the catchments area of Milton Keynes general hospital were invited to the hospital to have their spirometry performed. The Adverts were aired on local radio stations the day before, and the morning of the screening. Players from the local football team were also invited to take part, to increase the profile of the screening. People over the age of 35, who have smoked for at least 10 years of their life, were the main target audience.

On the day, 3 spirometers and members of staff were situated in the hospital reception. Screens were placed to provide anonymity to participants and maintain dignity. All operators had had spirometry training, and their spirometry traces validated by a respiratory physiologist prior to the screening.

Participants were then asked to complete a form detailing smoking history, and possible contraindications. Spirometry was then performed in accordance with ATS/BTS guidelines (6).

A standardised results sheet was then completed and if a patient demonstrated airways obstruction, they were given a letter to present to their GP that detailed what has occurred, and the values obtained.

Results: A total of 66 patients were screened in a 5 hour period. One patient was excluded as they had an existing diagnosis of chronic asthma. Two more were excluded due to poor technique, giving a viable sample of 63 patients.

<table>
<thead>
<tr>
<th>Age</th>
<th>Mean</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>FEV1 % Predicted</td>
<td>97%</td>
<td>60 - 123</td>
</tr>
<tr>
<td>Pack Years</td>
<td>15.01</td>
<td>0 - 75</td>
</tr>
</tbody>
</table>

The main findings of this audit are;
- 28 subjects reported symptoms consistent with COPD.
  - 13 of these 28 had a significant smoking history (over 10 pack years).
- 41 subjects had a smoking history.

The NICE guidelines were then used to classify any airways obstruction (8).
- Of the analysed 63 subjects, 8 had FEV1 < 80% predicted. That is 12% of the sample population demonstrated airways obstruction on spirometry.
  - All 8 subjects had FEV1 which demonstrated mild airway obstruction.
• Of this 12%, 4 had a significant smoking history, with 3 current smokers.
• Of the 8 identified with obstructive spirometry, 5 had symptoms associated with COPD.
• 2 of the subjects with obstructive spirometry were under the age of 35.

Conclusions: This opportunistic screening day identified that 12% of the total sample had signs of mild airway obstruction. These individuals were undiagnosed. Symptom reporting was also recorded throughout the day. Subjects were asked to report if they suffered from wheeze, cough, sputum or chronic bronchitis. Of the 63 participants, 26 people (41% of the sample) reported symptoms consistent with COPD. Of this 41%, only 5 of these participants had a reduced FEV1. Therefore, 62.5% of the participants that had a reduced FEV1 also reported symptoms consistent with COPD. 37.5% of this group did not report any symptoms. 21 participants (33% of the total sample) reported symptoms consistent with COPD, but did not have a reduced FEV1 to support a diagnosis of COPD. These figures imply that neither FEV1 or symptoms alone are adequately sensitive to indicate disease severity.

This figure indicates that airways obstruction in the Milton Keynes area is undiagnosed and significantly underestimated. With correct investigation and treatment, this disease cohort can be effectively managed.

The sample was self-selecting as the screening session was performed at Milton Keynes general hospital. A large proportion of the sample was staff from the establishment. Further study in the Milton Keynes area is needed to validate claims of undiagnosed airway obstruction.

Further study is recommended to be performed in the community, away from the healthcare setting. It has been suggested, through research, that smokers are reluctant to seek medical advice for a variety of reasons (9). Therefore, by performing the screening within the confines of a health orientated organisation, many potential sufferers would have been discouraged from attending.

It is proposed that a future screening session before performed, but in the community. Ideally this could be the main shopping district of the town, which is frequented by many people every day. If this is to be completed fully, patients would need to be screened further. That is, only people who fulfil NICE recommendations (8) be screened. However, as has been demonstrated in this audit, this may eliminate a small cohort of sufferers who have either never smoked, or have COPD at a younger age.

This pilot study has demonstrated a need for further screening in the area of Milton Keynes.


Modelled estimates of CHD, stroke, hypertension and COPD by GP PRACTICE (updated Nov 09)


(9) Coleman, T., Barrett, S., Wynn, A. and Wilson, A. (2003) Comparison of the smoking behaviour and attitudes of smokers who believe they have smoking-related problems with those who do not. Family Practice Vol. 20, No. 5, 520-523
Audit of compliance using NICE guideline for Continuous Positive Airway Pressure (CPAP) for the treatment of obstructive sleep apnoea / hypopnoea syndrome
(Guideline no 139 March 2008)

Tracy Jones
Lead Clinical Respiratory/Sleep Physiologist
St Mary’s Hospital
Isle of Wight

Introduction

St Mary’s PCT Trust has large developments of its sleep/CPAP service over the last 5 years including Isle of Wight patients being offered the service locally instead of travelling to Southampton and full funding being made available for both new and yearly review CPAP patients.

With the publication of the NICE CPAP HTA in March 2008 and the 18 Weeks Referral to Treatment targets we have seen an increase in demand on the service.

The aim of the study was to assess Isle of Wight patients receiving CPAP treatment against the nationally recognised guidelines using the audit tool developed by NICE March 2008.

Methodology

This is a retrospective case note study looking at a random sample of 40 patients from a total of all those who received CPAP treatment between 1st December 2008 and the 1st December 2009.

This report will use the NICE audit tool 2008 and the criteria under investigation include:
Other criteria under investigation include:

<table>
<thead>
<tr>
<th>Standard</th>
<th>Target</th>
<th>Exceptions</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>All patients assessed with moderate or severe symptoms have been offered CPAP as a treatment option</td>
<td>100%</td>
<td>None</td>
<td>The severity of OSAHS is usually assessed on the basis of both the severity of symptoms and a sleep study. This will be evident from the case notes</td>
</tr>
<tr>
<td>All patients assessed as having mild symptoms affecting their daily life and where other treatments have been unsuccessful or inappropriate, have been offered CPAP as a treatment option.</td>
<td>100%</td>
<td>None</td>
<td>Assessed on the basis of the severity of symptoms and a sleep study. Lifestyle management involves helping people lose weight, stop smoking and / or decrease alcohol consumption. This will be evident from the case notes</td>
</tr>
<tr>
<td>All patients will be assessed by appropriately trained medical and support staff within a specialist service</td>
<td>100%</td>
<td>None</td>
<td>This will be evident from the case notes</td>
</tr>
<tr>
<td>All patients will be diagnosed and treatment commenced within 18 weeks of the initial referral.</td>
<td>100%</td>
<td>None</td>
<td>18 weeks commences upon the first point of clinical contact. This will be evident from the case notes</td>
</tr>
</tbody>
</table>

- Demographics (Age/gender)
- Drop out rates

The data were entered on a collection sheet with the data sent to an Excel spreadsheet for analysis to produce a report. The findings will be discussed within the department and an action plan formulated as necessary.

Results

Data collected was found within the patient CPAP records and included 40 random sample patients seen with the criteria dates. The 40 patient samples represent 66% of patients seen with in the department each year.
Gender of patient (n=40)

Male gender is a predisposing factor to apnoeas and hypopnoeas; 85% (34) of the patients sampled were male.

Age of patient (n=40)

Increasing age is a predisposing factor to apnoeas and hypopnoeas; of the patients sampled the mode age is 74 years, the age range is between 24 years and 76 years old. The average age (based on the patients sampled) is 50 years. 27.5% (11) of the patients sampled were between 51-60 years old.

Waiting time (n=40)

It is a criterion that all patients will be diagnosed and treatment commenced within 18 weeks of the initial referral. 87.5% (35) of patients sampled were seen within the 18 week period. The majority of cases (75%) are seen within 10 weeks from initial referral, 1 case however, waited over 52 weeks for an appointment from initial referral. The 1 case of over 52 weeks was investigated and found to be a breakdown in referral systems from consultant to Respiratory/Sleep Laboratory.

Attendance of Appointment (n=40)

<table>
<thead>
<tr>
<th>Did the Patient Attend?</th>
<th>%</th>
<th>number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>100</td>
<td>40</td>
</tr>
<tr>
<td>No</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

100% (40) of patients attended their appointment.

Has the patient been diagnosed with OSAHS? (n=40)

<table>
<thead>
<tr>
<th>Diagnosed with OSAHS?</th>
<th>%</th>
<th>number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>90</td>
<td>36</td>
</tr>
<tr>
<td>No</td>
<td>10</td>
<td>4</td>
</tr>
</tbody>
</table>
10% (4) of the patients sampled did not fit the criteria of NICE Guideline no 139 March 2008 to be illegible for the treatment of obstructive sleep apnoea / hypopnoea syndrome (OSAHS).

Severity of OSAHS (n=34)

The severity of OSAHS is usually assessed on the basis of both the severity of symptoms and a sleep study. Those patients with moderate and severe OSAHS must be offered CPAP as a treatment option. 88% (30) of the patients sampled diagnosed with OSAHS have moderate or severe OSAHS. 12% (4) of patients were diagnosed with having mild OSAHS, under NICE guidance all patients assessed as having mild symptoms affecting their daily life and where other treatments have been unsuccessful or inappropriate, must have been offered CPAP as a treatment option.

Basis of the severity of OSAHS (n=29)

72% (21) of the patients’ sampled severity of OSAHS was based upon their apnoea / hypopnoea index (AHI) index.

If mild OSAHS, what interventions were considered inappropriate? (n=3)

It is a criterion that all patients assessed as having mild symptoms affecting their daily life and where other treatments have been unsuccessful or inappropriate are offered CPAP as a treatment option. Lifestyle management involves weight loss, smoking cessation and a decrease in alcohol consumption. 67% (2) of the patients diagnosed with mild OSAHS were considered to be inappropriate for these lifestyle changes.

If mild OSAHS, does the patient have symptoms that affect their quality of life: (n=3)
100% of the patients that were diagnosed with mild OSAHS experienced symptoms that affected their quality life. No patients experienced symptoms that affected their ability to go about their daily activities.

Has the patient been offered treatment with CPAP? (n=40)

92.5% (37) of patients were offered treatment with CPAP, the 7.5% (3) of patients that were not offered treatment with CPAP were diagnosed as not requiring CPAP treatment.

Did the patient receive CPAP treatment? (n=40)

87.5% (35) of patients sampled received CPAP treatment. 3 out of the 5 patients that did not receive CPAP treatment were diagnosed as not suffering from OSAHS, the other 2 patients opted not to undergo CPAP treatment instead preferring to try lifestyle changes to improve symptoms.

Were the following carried out by a specialist service with appropriately trained medical and support staff?

100% (40) of the patients sampled were diagnosed by appropriately trained medical staff in a specialist service. All patients diagnosed with OSAHS were treated by the specialist service, 2 patients declined CPAP treatment and there was no evidence of sleep apnoea in 1 of the patients, therefore monitoring could not be performed.

Was the patient still receiving treatment 6 months after starting CPAP? (n=35)

80% of the patients sampled were still receiving treatment 6 months after starting CPAP, the majority of the patients were noted to have worn the mask for at least 6 hours overnight and an improvement in symptoms were identified.
37.5% of patients had an Epworth Score of 15/24 to 20/24, the mode Epworth score was 17/24 occurring within 15% of patients. The Epworth Sleepiness Scale is used to determine the level of daytime sleepiness. A score of 10 or more is considered sleepy. A score of 18 or more is very sleepy.

Discussion/Outcomes

<table>
<thead>
<tr>
<th>Standard</th>
<th>Target</th>
<th>Exceptions</th>
<th>Achieved</th>
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<td>All patients assessed with moderate or severe symptoms have been offered CPAP as a treatment option</td>
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<td>None</td>
<td>100%</td>
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<tr>
<td>All patients assessed as having mild symptoms affecting their daily life and where other treatments have been unsuccessful or inappropriate, have been offered CPAP as a treatment option.</td>
<td>100%</td>
<td>None</td>
<td>100%</td>
</tr>
<tr>
<td>All patients will be assessed by appropriately trained medical and support staff within a specialist service</td>
<td>100%</td>
<td>None</td>
<td>100%</td>
</tr>
<tr>
<td>All patients will be diagnosed and treatment commenced within 18 weeks of the initial referral.</td>
<td>100%</td>
<td>None</td>
<td>100%</td>
</tr>
</tbody>
</table>

The results from the audit shows that the Sleep/CPAP service complies with 3 of the 4 standards set out by the NICE guidelines for CPAP treatment of OSAHS. We failed to achieve on the 18 week Referral to Treatment targets on 1 patient. We also recognised the need for a patient leaflet outlining treatment, side effects and contact numbers for all new CPAP users, this complies with the others standards as set out by NICE.

Conclusions

The completed audit shows that the Isle of Wight PCT Pulmonary Function/Sleep Laboratory is working towards a high standard of care for our sleep apnoea patients, however we acknowledge that there are still improvements that can be made to raise the standard further.

1. Issue patient information leaflet to each new patient at the beginning of his or her treatment
2. In review CPAP and sleep policy and the care pathway
3. To start documenting height, weight, BMI and collar size when initialising treatment to allow improved Audit data collection
4. To produce a set of competencies to which new Physiologists are required to gain experience and training to a minimum standard as set out by the Association For Respiratory Technology & Physiology (ARTP May 2009). This demonstrates the proficiency of practitioners to perform such measurement and treatment.
5. To work within the 18 week targets as set by the Trust
6. To compare the Isle of Wight PCT audit results with other Trusts within our area and throughout the UK using the NICE audit tool

Resources

NICE CPAP Health Technology Appraisal, March 2008 [www.nice.org.uk](http://www.nice.org.uk)
Extraordinary Scientists, Extraordinary Careers, Extraordinary You

The unique work of healthcare scientists will be recognised in a new book, Health Minister Ann Keen announced today.

‘Extraordinary You – Science in Healthcare’ profiles the pioneering work of healthcare scientists within the NHS and details their reasons for choosing a career in science to encourage more people to join the profession.

The book was showcased at a reception in Number 11 Downing Street and was attended by key healthcare scientists profiled in the book, along with Health Minister Ann Keen and Chief Scientific Officer Professor Sue Hill.

The book includes the stories of:

- Dr Val Davidson who made £1m worth of savings from re-organising laboratory work so that she could provide DNA screening for hereditary breast cancer in her hospital in the West Midlands for DNA screening;

- Nuthar Jassam, once a stay-at-home mum with two children, who returned to the world of science having retrained in medical laboratory science and is now a trainee clinical biochemist at Leeds General Infirmary. Nuthar enjoys the balance of working with patients as well as the ‘detective work’ that surrounds being a biochemist. She recently helped doctors diagnose a puzzling metabolic disease without the patient having to endure invasive tests; and

- Dr Nick Stone made a move from British Aerospace when he realised that he could do something more worthwhile in the NHS. Now he is one of the international leaders in the field on biophotonics – using light to diagnose disease. While still a developing area, this technique has huge potential for less invasive cancer diagnosis and to check that cancer cells have been removed during surgery.

Speaking before the book launch, Health Minister Ann Keen said:

“‘Extraordinary You’ gives healthcare scientists the recognition they deserve – as a nurse, I know about the amazing work that they carry out every day to improve the quality of patient care.”

“It is so important that we change conventional views of scientists locked away in hospital laboratories to one that is more current. More and more healthcare scientists regularly engage face-to-face with patients as well as aiding doctors in up to 80 per cent of all clinical diagnosis.”

Chief Scientific Officer Sue Hill said:

“Healthcare scientists provide the most cutting-edge technology and science for patients in order to improve healthcare and ‘Extraordinary You’ profiles the vital research and patient care they provide.

“My work as a healthcare scientist for 20 years allowed me to carry out extremely rewarding work helping patients suffering from respiratory problems while carrying out research into longer term disease mechanism’s solutions to benefits patients in the future.

“I hope that the publication of ‘Extraordinary You’ will help patients, employers and commissioners recognise the work that they do and inspire others that a career in science in the NHS is an exciting and rewarding option.”
Obstructive Sleep Apnoea; management of patients through the sleep lab

Samantha Briscoe RPSGT
St Thomas’ Hospital, London

As a nation we are rapidly becoming more obese; Obstructive Sleep Apnoea (OSA) is a common disorder of sleep whose incidence can be linked to obesity. The prevalence of OSA is estimated to be at 4% of men and 2% of women in the general population. OSA is characterised by recurrent occlusions of the upper airway often leading to oxygen desaturation and arousal from sleep; it is the resulting fragmentation of sleep that leads to symptoms of daytime sleepiness in some individuals. These episodes of upper airway obstruction occur due to an increase in the collapsibility of the upper airway that occurs during sleep. Obesity and central adiposity (distribution of fat around the abdomen and trunk) are risk factors for developing OSA; increased fat deposition around the airway can increase the pharyngeal collapsibility either, through mechanical effects on the pharyngeal tissue or, through affecting the neurochemical control of airway patency.

With the rise in obesity levels combined with a greater awareness of OSA as a disease, referrals to our sleep lab have increased dramatically. This increase in demand has also led to an increase in the number of sleep apnoea diagnostic services being provided. In 2003, 155 providers reported a sleep service; in 2008 this number had increased to 275 (BSS sleep service audit data). This article is presented as a snap shot of our service in terms of managing sleep apnoea referrals and the pathways these patients follow.

Consecutive referrals for patients with suspected OSA were taken during the four month period between October 2009 and January 2010. These 284 patients, 69% of which were male, each had a two night home oximetry followed by a 15-20 minute follow-up appointment with the Consultant Technologist. The results and outcome of each patient were recorded.

The mean Epworth Sleepiness Score (ESS) for this group of patients was recorded as 11 out of 24 with 56% of patients being classified as ‘sleepy’ (ESS > 10). Based on the 4% oxygen desaturation index (ODI) these patients were classified in terms of the sleep disordered breathing (SDB) as either normal (ODI ≤ 5), mild (ODI > 5 ≤ 15), moderate (ODI >15 ≤ 30) or severe (ODI >30). 32% (n=89) of the patients were normal for SDB, 33% (n=93) were mild, 15% (n=41) moderate and 21% (n=58) were severe (table 1). 15% (n=42) of the patients were considered to have low baseline saturations (SpO2 ≤ 92%).

<table>
<thead>
<tr>
<th>Severity of Sleep Disordered Breathing</th>
<th>% (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal (ODI ≤ 5)</td>
<td>32 (89)</td>
</tr>
<tr>
<td>Mild (ODI &gt;5 ≤ 15)</td>
<td>33 (93)</td>
</tr>
<tr>
<td>Moderate (ODI &gt;15 ≤ 30)</td>
<td>15 (41)</td>
</tr>
<tr>
<td>Severe (ODI &gt;30)</td>
<td>21 (58)</td>
</tr>
</tbody>
</table>

The clinical outcome for this group of patients is summarised in table 2 below. 32% (n=91) of these patient were referred for CPAP therapy based on the 2 nights of oximetry results and the clinical history. CPAP initiation directly from clinic follows one of three routes depending upon the severity of OSA and other compounding factors such as occupation, understanding and co-morbidities.

1) Individual collections – the patient is issued an APAP on a one-to-one basis either, on the same day as the consultant technologist follow-up in the case of more severe patients or occupational drivers, otherwise the APAP issue will be arranged within 2 weeks.
2) Group collection – the patient is booked into a group APAP collection of up to 10 patients.
3) Daycase titration – an attended daytime respiratory (occasionally with EEG) screening study with CPAP in situ to (often manually) titrate the CPAP pressure and monitor respiration in detail. This is often done in patients with severe OSA, who drive for a living and/or have co-morbidities that may be affected by CPAP therapy.

8% (n=22) of the overall patient group (24% of the CPAP group) were initiated onto CPAP through a daycase titration, all were issued with a fixed pressure CPAP on the same day. One patient was
admitted to the respiratory ward the same evening for bi-level titration. At the time of writing several patients are awaiting review by the consultant with a view to possibly requiring bi-level therapy.

Following the APAP trial (usually 1-2 weeks in duration if done at home) if the patient chooses to continue with therapy, they are issued with a fixed pressure CPAP with humidifier and all patients are then followed-up annually. At this stage patients with mild OSA who have been unable to tolerate the APAP during the trial will be offered a further trial or referred for a mandibular advancement device. All patients are followed up by the consultant a few months after the APAP trial, regardless of the outcome.

Table 2: Outcome from Consultant Technologist clinic (follow-up of two night oximetry).

<table>
<thead>
<tr>
<th>Outcome</th>
<th>% (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mandibular advancement device (MAD)</td>
<td>31 (89)</td>
</tr>
<tr>
<td>Referral to ENT</td>
<td>11 (31)</td>
</tr>
<tr>
<td>Trialling tongue stabilising device</td>
<td>11 (31)</td>
</tr>
<tr>
<td>APAP/CPAP issue directly from clinic*</td>
<td>32 (91)</td>
</tr>
<tr>
<td>Daycase titration†</td>
<td>8 (22)</td>
</tr>
<tr>
<td>Overnight polysomnography (NPSG)</td>
<td>12 (34)</td>
</tr>
<tr>
<td>Overnight respiratory study</td>
<td>3 (8)</td>
</tr>
<tr>
<td>Referral to drug trial¥</td>
<td>3 (9)</td>
</tr>
<tr>
<td>Actigraphy</td>
<td>1 (4)</td>
</tr>
</tbody>
</table>

*APAP/CPAP either issued on the day or through group or individual collections within 2 weeks, also including the patients who underwent daycase titration.

† Daycase titration – attended daytime respiratory screening study with CPAP in situ to titrate the CPAP pressure and monitor respiration in detail.

‡ Drug trial prior to initiating CPAP therapy

15% (n=42) of patient’s required a more detailed sleep study; 3% (n=8) had an attended overnight respiratory screening study, whilst 12% (n=34) required an attended full polysomnography (with EEG). Of the 8 patients who attended for an overnight respiratory study, 3 are awaiting consultant follow-up, 3 were initiated onto CPAP and 2 were recommended to trial a mandibular advancement device. Of the 34 patients who attended for polysomnography (some with MSLT), at the time of writing 12 are awaiting consultant follow-up, 13 patients were diagnosed with other (non-respiratory) sleep disorders, 7 were initiated onto CPAP, 3 were recommended to trial a mandibular advancement device and 2 were diagnosed with OSA but declined CPAP therapy.

Including all routes for CPAP initiation 36% (n=101) of patients overall were initiated onto CPAP therapy. 32% of patients commenced CPAP following two nights of home oximetry and consultation; a further 4% commenced CPAP following further investigation via an attended overnight study (respiratory or NPSG). 33% (n=94) were recommended to trial mandibular advancement devices as an alternative to CPAP therapy.

At least 5% (n=13) of the patients referred for investigation of possible OSA were diagnosed with a non-respiratory sleep disorder; the list includes patients with narcolepsy, idiopathic (primary) hyperomnolence, insomnia, REM behaviour disorder (REM BD), periodic limb movement disorder (PLMD) and slow wave arousal disorders (sleep walking, sleep talking, sleep eating).

This study demonstrates the utility of pulse oximetry in the diagnosis of OSA when combined with a clinical history and examination. It is notable that 15% of patients referred for suspected OSA required a more detailed investigation. Centres providing a diagnostic sleep apnoea service need a good working knowledge of other non-respiratory sleep disorders and access to more advanced diagnostics, such as NPSG.

References:


SUMMARY REPORT OF MSC DISCUSSION WITH PROF. SUE HILL, CHIEF SCIENTIFIC OFFICER, DEPARTMENT OF HEALTH

Q & A SESSION DURING ARTP CONFERENCE AT PARK INN, HEATHROW 6.30PM JANUARY 28TH 2010.

C J Caldwell, Acting ARTP Honorary Secretary.

Background

Science and innovation are at the heart of high quality healthcare for patients and the public in the 21st century, underpinning the development and implementation of new, safe and effective diagnostics and treatments which have a major impact on health, wellbeing and on overall experience of the health and social care system. It is the healthcare scientist (HCS) workforce which makes the benefits of science and technology a reality for patients. The MSC document sets out proposals to transform the future training and career pathways of the healthcare science workforce to ensure that the healthcare science workforce is fit for the future in a rapidly changing and evolving healthcare environment. Extracted from the D of H website- http://www.dh.gov.uk/en/Consultations/Closedconsultations/DH_091137

Questions asked to Professor Sue Hill, Chief Scientific Officer, Department of Health, on behalf of ARTP Members by Trefor Watts, ARTP Education Committee Member.

• When will the MSC policy document be available?

Professor Hill stated that the document is in its final stages of clearance. She explained that once the document had obtained clearance that each of the 4 countries in the UK will communicate a UK policy response. Speaking with respect to England only, she confirmed that there would be a big push to communicate the policy to all relevant parties; hence it would be cascaded via several sources, which would include NHS & CSO bulletins, NHS websites, over arching bodies, local trusts & HR departments.

• Please can you explain how students on the proposed new degree will access “Work Based Training” in Hospitals – Will certain Hospitals be set up as “Training providers”, and how will training centres be funded to provide this training”

Professor Hill explained that the MSC programme would change from the existing apprentice style training programme to a 3 year compressed professional training degree, which for healthcare science practitioners will include some initial generic training then two themed options – Cardio/Respiratory & Neurophysiology/Sleep. Within this programme there would be a set specialist pathway, which would include rotational but local work based training that the HEI’s & Strategic Health Authorities (SHA) would oversee & negotiate placements within their local Trusts. She continued by stating that funding would follow the students during their training programme. Training department s & trainers would need to be fit for purpose such that the departments may be accredited & trainers would probably undertake different recognised formal training to ensure national standards are maintained. An Education & Training Board is currently being set up.

• Which Higher Education Institutes (HEI’s) will provide this degree?

Professor Hill confirmed that there was a provision need for a geographical spread of HEI’s across the UK & that this would probably involve some new HEI’s. She also noted that this health focused degree would also attract & recruit non NHS staff working within health science.

• How will MSC train practitioners in advanced Sleep procedures (i.e. Polysomnography etc)

Professor Hill conferred that the MSC pathway will cater for advanced sleep training at a higher level & acknowledged that there is still some development work to be done in this area.

• We have some students currently on a foundation degree and are paid employees doing this (block release) – They wish to then continue onto the degree programme on completion as part of their work/current job – will they still be able to do this or will they need to enrol on the new proposed full time degree?
Professor Hill explained that the MSC career structure document sets out proposals to transform the future training and career pathways of the healthcare science workforce, such that it will widen access for entry into this field. Thus as well as direct entry students, Trusts will still be able to “grow their own students”. Learning credits for acquired prior learning will enable these types of students to access the MSC route.

• What will happen to current professional exams, ARTP Parts 1 and 2 under the new proposal?

Professor Hill explained that the MSC career structure will incorporate to ensure that competency standards are maintained nationally. A Medical Educational & Training board in England will oversee the training programme & that national standards are maintained for practical assessment & all other aspects of the training. Whilst it was acknowledged that the training & assessment programme will change, it was hoped that the Professional Bodies would still be involved with specific aspects of the programme e.g. curriculum development & recommendations & accreditation of assessors & centres.

• Workforce planning – We have had a recent letter from the Workforce team asking our trust to review and correct the ESR details, acknowledging that their data is generally unreliable. We note that the coding of respiratory physiologists was poor and confusing. Without accurate and reliable workforce data, how can MSC be implanted and used locally/nationally to forecast workforce requirements

Professor Hill acknowledged that work still needs to be done within workforce planning; specifically getting the coding accurate for current staffing levels in order to project future healthcare science workforce needs. She confirmed the need for an integrated & tested work forced planning tool kit to obtain the statistics needed to reflect the current & future requirements. She stated that this was something that would hopefully be addressed in the near future.

Finally, Trefor Watts asked on behalf of the membership, for an Update on state registration progress for RCCP.

Professor Hill confirmed that there had recently been the first regulation meeting, kicking off the process for state registration. A generic protected title for RCCP members now has to be agreed & then the RCCP can work with the DH to focus on the next stages to take state registration forward.

Professor Hill concluded the session by stating that the ARTP membership should embrace the MSC proposals & grasp the opportunity to move forward with this initiative such that the HSC workforce would be fit for purpose in the future. She confirmed that she would be liaising closely with the ARTP Executive Committee on key issues of the MSC in the near future.

Trefor Watts ended the session by thanking Professor Hill for attending & answering the questions, the meeting closed at 7pm.

How will current physiologists/scientists etc be assimilated across to the new proposed MSC pathway?

Professor Hill stated that it was hoped that the MSC pathway could be implemented as early as September 2010, but that it would be a phased implementation, running alongside existing training programmes. Hence students already on existing training programmes could continue their current pathway. Postgraduate staff wanting to move up the career pathway would be able to have “top up” degree arrangements & would not be expected to move location or give up employment if there was a need locally for this career development. She stated that it was hoped that part of the remit for the England Medical Education & Training Board along with the HEI’s & SHA’s would be to monitor carefully recruitment to & delivery of, the MSC pathway against outcome aims locally & nationally.
The New ARTP Website
Home Page – An Overview

Some of the main features of the new website home page.

- **Login:** Sign in with your username and password. If you haven't received one via email contact ARTP Admin.
- **My Profile:** Where you can change your contact details which will let ARTP Admin know to change your entry on the membership database.
- **Sitemap:** An overview of the website pages.
- **Text Size:** Changes the font size if you have poor eyesight.
- **Search:** Internal search of the website.
- **Feature boxes & links:**
  - Bookmark this page: Clicking this inserts an entry for the page you are viewing in your ‘Favourites’ list.
- **MAIN MENU of the Public Site**
- **Link to the old website.**

**‘Breadcrumbs’**: On pages other than the home page a trail of what level you are in the website appears in this area. By clicking you can quickly jump back up the tree.

**The Directory and Contact Details for ARTP Admin can be found at the bottom of every web page.**

**The Directory is a list of quick page links that you are likely to use most often.** (NB: It can be ‘folded up’ by clicking the arrow).

**News, Courses and Vacancies Listings:** are updated automatically.
- **News:** Most recent at the top.
- **Courses:** Next few in date order.
- **Vacancies:** In order of closing date.

**Subscribe to RSS:**
Using the RSS function you can have notification of new entries emailed to you.

**More...**
Any of these panels may have more than can be displayed on the home page. This link takes you to the relevant page for full listings.
Well many of us have been left thoroughly unimpressed with the behaviour of our elected representatives in government who spent this summer draining their own moats, building their own duck-houses or generally moving house to claim even more removal expenses/mortgage allowances. The unaccountable expenses, the lack of receipts, the arrogance to charge for everything including the kitchen sink has left a cloud over what we thought was the mother of all parliaments, a government that the rest of the world looked to as an example of truly open democracy! I think in one summer the Seven Principles of Public Life have been broken many, many times (see appendix)

I was kindly invited by the BLF to attend a House of Commons reception organised by Kevin Barron MP, the Chair of the Health Select Committee, to see the Secretary of State for Health, Andy Burnham MP, give a speech on the “soon to be launched” clinical strategy for COPD.

Whilst this was an interesting invite and experience, it has to be said that the choice of date - World COPD Day cut little shrift with Westminster. It was the State Opening of Parliament – the parliamentary equivalent of Fresher’s Week at university, or “Yellow-Welly” day in school (the first day of term when gullible first years were told by older siblings that they had to wear yellow wellies all day – there was always one Kendrick that would wear them!!!). But this was no ordinary state opening of Parliament – this was the end of the incumbent governments third term of power, 6 months before a general election, straight after the summer of shame and in the middle of a war that couldn’t be won by anyone – apart from the Swiss and Russians who make the ammunition!

Getting into Houses of Parliament had the usual high level of security we see at airports, with an optional strip search (which of course I went for!!) and the obligatory MI5 photo for use on BBC Crimewatch at a later date. Daylight was fading and the buildings were fabulously illuminated in all their Cotswold stone and gilt gothic beauty. Suddenly I emerged into the vast Westminster Hall – a huge hall with its high elaborately ornate wooden vaulted ceiling (not a hint of artex!!!) and fine stained glass windows at each end. This vast cathedral of democratic government has presumably seen all the greatest and lowest of our land pass through throughout the years. A left turn went through Pugin corridors with tiled mosaic floors to the lobby hall where political editors from the BBC report on Today in Parliament. In fact Nick Robinson from the BBC was there with a film crew recording a news broadcast whilst I was there. (He’s the bald guy with the thick rimmed glasses that looks like Eric Morecambe – but a lot more serious, self-important and miserable!)

We were directed to a Committee Room – one of the many rooms which overlooks the brown swirling murky Thames and a brightly lit St Thomas’ Hospital. (Swirling, brown and murky – very fitting for politicians – I mean you wouldn’t expect clear, fresh and rushing water, would you?) Fresh tea, sandwiches without crusts and a plate of cakes was going to be lunch and tea today! (...so quintessentially English, don’t you know!)

Gradually the room filled up with some familiar faces - Prof Stephen Spiro, Prof Duncan Empey (of Empey Index fame – he was delighted I had even heard of it!), Dame Helena Shovelton, Kevin Holton of DH and a variety of BLF officers and members, with stalwart contingent of COPD patients from the local Breathe Easy Group – some with ambulatory oxygen – the very reason we were all here! Also present were the “brown-nosing”, ambitious, sycophantic “lobbyists” who sidle up to MPs and in a slippery way, emptily flatter, cajole and openly creep up to them to get across a point or remind

THE MOTHER OF ALL PARLIAMENTS
them of a favour. In the jungle, leeches can be removed with a burning cigarette end – not the done thing at a BLF lobbying event to promote the launch of the Chronic Respiratory Disease national Strategy!

I was introduced to a minor MP, who said he was only there to see what Andy Burnham had to say. He was told that apparently because of the Queen’s Speech, the Secretary of State would not be attending. As the china clinked, and the crustless butties were devoured, an air of disappointment came over the room – not to get the key player was a bit of a snub! However, it soon became apparent that another health minister Anne Keen was to speak on behalf of Gordon and the guys. Two flat screen monitors on the wall - one green, one red, indicated that the Queens Speech was on-going in the Commons (green) and that a particular MP was talking and for how long. The Lords screen (red) just appeared as ZZZzzzzzzzzzz!

The chief Scientific Officer and colleague disappeared out of the room to “brief the minister” on her speech. This is how the system works, in an attempt to reduce the gaffs and errors that the drooling media can’t wait to pounce on.

Eventually, the host Kevin Barron MP for Rotherham (and an ex-miner) addressed us and introduced the speakers. He was the driving force behind the smoking ban and is a greatest supporter of our cause. He came across as a streetwise politician who spoke his own mind and predominantly represented his constituents and not necessarily his party.

Anne Keen spoke and stated that as a trained nurse, she appreciated how important it was to provide quality care for patients with COPD. She reflected on how scary it was for patients, carers and even professionals when someone was so debilitating by an exacerbation/infection. She then struck a sound note when she mentioned to a Committee Room full of doctors, nurses and patients that diagnostics and the role of scientists in detecting COPD was hugely important and too often over-looked. “Briefing the minister” had just hit the jackpot!! (Weeks later she was asked to pay back money on her “second home”! How do we feel about what she had to say now? This is the reality of our politicians – maybe at the imminent election we should all vote for independent candidates only and smash the corrupt party system?)

She then handed over to Dr Mark Winter and consultant physician from Cambridge. If only he too had been briefed correctly! He delivered a speech that was too long and too medical for the audience present. He then scored the usual BTS gaff that “spirometry is a quick test that only takes a minute and that it is a simple test”. I rolled my eyes at the minister and nodded my head in disapproval – not sure she got my point.

Finally, Dame Helena Shovelton, BLF, gave a fabulous summing up speech imploring the ministers to launch the CRD-NS as soon as possible. After polite applause we broke up and some serious networking took place. I collared Kevin Barron and offered him any advice he may need on respiratory physiology diagnostics in the future. I told him what a fabulous piece of work the CRD-NS was and that implementing it was a certain vote-winner – an open goal for a Labour Party desperate to get votes in working class areas! (Hey this lobbying thing was easier than I thought!)

Sue Hill introduced me to Health Minister, Ann Keen as a “real scientist” and she listened as I explained the importance of getting the diagnostics quality right for finding the missing millions. (I couldn’t help thinking that the “missing millions probably means a whole lot more to any MP currently!!) Next, I offered Dame Helena my services as the first ARTP “scientist advisor” to BLF (why hadn’t we thought of that before??). The tea cups got cleared away, the sandwiches disappeared and the tables got re-arranged for the next lobbying reception….

Like it or not, this is how our political system works. It’s not pretty, it’s not fair, it doesn’t mean the best options get used – it all depends on the politics and the players and sadly not necessarily the issues. The lobbyists, while worthy of being despised by “normal people” are paid to play the system. Results are defined as “getting the changes asked for” – the means and deals are often unknown and probably irrelevant. Is it
democracy? Is it thump!

On the way out, I sat in the Lobby area and absorbed the atmosphere for about ten minutes. Having been to Downing St and seen Blair perform two days before starting the Iraq War, I am no happier with the system we have for government. The better politicians are at manipulation, deceiving and “spin” the more things get done. The corridors of government departments translate these policies into delivery, and then our local health management deliver on the ground. Our votes in an election every 4 years, don’t really change the decisions being made. The suspicion is that a group of “Sir Humphreys” actually run the system, with some steering from whatever hue of party is in power. The Lobby Area felt very approachable – belonging to the people – a place where you can apparently call your own MP and insist that they come and see you!

So would I go back to Westminster? Dead right, yes! I suspect I may yet even get to lobby the EU Parliament because of my links with ERS. If the Mother of All Parliaments sucks – Brussels- the Smother of All Parliaments could be a lot worse! Would I want to be an MP? Never! Selling your soul to the devil, and then compromising your principles, beliefs and values is not something I would be comfortable doing. Then again, the moat at home is getting a little clogged up................!

Big Ben struck 6:30pm as I walked out of Parliament, the busy rush-hour traffic thundered by. The receptions went on, the politicians went on meeting, planning and dealing. And somewhere, in a lonely flat in Peckham, another old man breathed his last wheezy breath, closed his eyes and became another victim of COPD!

COPD. Fortunately, the COPD National Strategy Consultation has been launched before the election and hopefully it will be delivered by a right, left or preferably hung (........drawn and quartered) Parliament!

Appendix: The Seven Principles of Public Life

Selflessness
Holders of public office should take decisions solely in terms of the public interest. They should not do so in order to gain financial or other material benefits for themselves, their family, or their friends.

Integrity
Holders of public office should not place themselves under any financial or other obligation to outside individuals or organisations that might influence them in the performance of their official duties.

Objectivity
In carrying out public business, including making public appointments, awarding contracts, or recommending individuals for rewards and benefits, holders of public office should make choices on merit.

Accountability
Holders of public office are accountable for their decisions and actions to the public and must submit themselves to whatever scrutiny is appropriate to their office.

Openness
Holders of public office should be as open as possible about all the decisions and actions that they take. They should give reasons for their decisions and restrict information only when the wider public interest clearly demands.

Honesty
Holders of public office have a duty to declare any private interests relating to their public duties and to take steps to resolve any conflicts arising in a way that protects the public interest.

Leadership
Holders of public office should promote and support these principles by leadership and example.
WHICH LUNG FUNCTION METHOD CORRELATES BEST WITH SYMPTOM SCORE DURING AN ACUTE PULMONARY EXACERBATION IN PATIENTS WITH CYSTIC FIBROSIS

CATEGORIES: A

Dixon, C., Respiratory Department, Bristol Royal Infirmary, England.

Pulmonary exacerbations (PEx) are a key aspect of Cystic Fibrosis (CF) care. Forced expiratory volume in one second (FEV₁) is routinely used in this patient group to assess decline in lung function, effects of treatment and help identify PEx. The test can be hard for patients as it requires cooperation, maximal effort and good technique. Other methods of testing are available to assess lung function in patients who are unable or unwilling to complete spirometry. One alternative method is impulse oscillometry (IOS) which has been shown to be sensitive in detecting and monitoring early airway obstruction before it becomes evident by a reduction in FEV₁.

Aim: To assess which lung function parameter and therefore which method of testing; spirometry or IOS is best related to total symptom score (SS) when being treated for an acute PEx.

Methods: 50 exacerbations in 32 adults (mean age 26 years ± 5.83) with CF and varying severities of lung function were studied. At the point of presentation and on completion of treatment for a PEx, spirometry, IOS and a symptom questionnaire were completed. The data was analysed using a Spearman’s correlation. Ethics approval was obtained for this study.

Results: Eleven of the 50 PEx were excluded as the patients failed to complete spirometry, IOS or the SS questionnaire after treatment, leaving 39 for analysis. Improvements were seen in SS in 34 patients and the majority showed improvements in lung function. PEF changed the most (mean increase 44 l/min) of all lung function parameters. Respiratory reactance (Xrs) at 5Hz became worse in 18 of the 39 cases. Respiratory resistance (Rrs) at 5Hz was the only parameter related to SS at presentation (p = 0.064). No relationship between lung function and SS was seen after treatment. The change in FEV₁ was significantly correlated with the change in SS (p = 0.03).

Table 1: Significance of changes in lung function and symptom score.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>p Value</th>
<th>Level of Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change PEF + Change Symptom Score</td>
<td>0.493</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>Change FEV₁ + Change Symptom Score</td>
<td>0.030</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Change FVC + Change Symptom Score</td>
<td>0.084</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>Change Rrs 5Hz + Change Symptom Score</td>
<td>0.346</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>Change Xrs 5Hz + Change Symptom Score</td>
<td>0.495</td>
<td>&gt;0.05</td>
</tr>
</tbody>
</table>

Conclusion: It is suggested that Rrs 5Hz may be a more sensitive method of detecting a PEx due to the relationship between symptoms and Rrs 5Hz at presentation. It also justifies the use of FEV₁ as a way of monitoring CF patients.

References:
A 40 YEAR-OLD MALE ELITE ATHLETE WITH PHRENIC NERVE INJURY POST-ABLATION FOR PAROXYSMAL ATRIAL FIBRILLATION.

**Introduction:** Atrial fibrillation (AF) is the most common cardiac arrhythmia and is caused by the normal electrical impulses from the sinoatrial node being overwhelmed by disorganised impulses that originate in the pulmonary veins. This condition can be treated with a pulmonary vein ablation (PVA). A catheter is passed into the heart and the tissue around the pulmonary vein is burnt. The right phrenic nerve (PN) is in close proximity to this vein, with a known complication of a PVA being PN injury leading to diaphragm palsy. This has a low incidence (0.48%) and complete recovery 4±5 months after the initial procedure [1]. It has been reported that in some cases even after 96 months recovery has not occurred.

**Case report:** A 40 year-old male GB triathlete (height 187cm; weight 79kg) was diagnosed with paroxysmal AF after having palpitations. He underwent a cryoballoon ablation with no reported complications. A week post-operatively he was reviewed by cardiology complaining of extreme fatigue and breathlessness and he was unable to partake in swimming. A chest x-ray showed slight elevation of the right hemidiaphragm suggestive of minor PN palsy. Three months later his symptoms had not improved. Supine spirometry was performed which showed a marked change between positions. A month after this consultation he was referred to a respiratory consultant. A diaphragm ultrasound and fluoroscopy of the thorax confirmed at least partial paralysis of the right hemidiaphragm. He underwent overnight oximetry and a cardiopulmonary exercise test (CPET). Supine spirometry and CPET have been performed on two occasions since. He has now been discharged from cardiology as they deem the surgery to be successful as the AF has been cured.

**Results:** Overnight oximetry was normal. Sitting and supine spirometry (Table 1) is highly suggestive of diaphragm weakness, with improvement on further visits.

**Table 1: Sitting and Supine FVC results.**

<table>
<thead>
<tr>
<th>Date</th>
<th>17/02/2009</th>
<th>02/07/2009</th>
<th>01/10/2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sitting FVC (L)</td>
<td>4.41 (SR -1.63)</td>
<td>4.94 (SR -0.77)</td>
<td>5.27 (SR -0.21)</td>
</tr>
<tr>
<td>Supine FVC (L)</td>
<td>3.44 (SR -3.21)</td>
<td>4.54 (SR -1.44)</td>
<td>4.60 (SR -1.29)</td>
</tr>
<tr>
<td>% difference</td>
<td>-22</td>
<td>-8</td>
<td>-13</td>
</tr>
</tbody>
</table>

The CPET results (Table 2) show that the patient is supra-normal but has decreased from pre-operative values (VO2 max 5.15 L/min or 64.3 ml/kg/min, reported by patient).

**Table 2: CPET results.**

<table>
<thead>
<tr>
<th>Date</th>
<th>16/04/2009</th>
<th>02/07/2009</th>
<th>01/10/2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>HR max (bpm)</td>
<td>169</td>
<td>175</td>
<td>183</td>
</tr>
<tr>
<td>VO2 max (L/min)</td>
<td>4.94</td>
<td>4.63</td>
<td>4.75</td>
</tr>
<tr>
<td>VO2/kg (ml/min/kg)</td>
<td>62.5</td>
<td>58.6</td>
<td>60.1</td>
</tr>
<tr>
<td>AT/VO2 (%)</td>
<td>85</td>
<td>79</td>
<td>65</td>
</tr>
<tr>
<td>VE max (L/min)</td>
<td>137</td>
<td>144</td>
<td>155</td>
</tr>
</tbody>
</table>

**Discussion:** There are limited studies into the prevalence of PN injury after cardiac ablation, this may be due to patients being asymptomatic. In this case the patient has been very sensitive to his diaphragm paralysis due to his initial conditioned state. The improvement in his sitting and supine spirometry would indicate a recovery in the paralysis. His training patterns and fitness have been affected significantly and are reflected in the CPET results observed to date.

Introduction: An audit was carried out from Jan 2008 to Dec 2008 on all chronic NIV patients setup in the Respiratory Physiology Unit at Glenfield Hospital Leicester with complete data. The aims of this audit were to investigate a number of variables that are commonly measured pre and post NIV therapy.

All patients were setup on NIPPY3 (B&D Electro medical) nasal ventilators on either Pressure Support ventilation (PSV) or Pressure Control Ventilation modes (PCV)

Method: All patients referred to the Respiratory Physiology Unit for NIV setup was entered into the audit between January 2008 and December 2008.

32 patients were thus audited, variables investigated were, the range of respiratory illnesses requiring NIV, the mean blood gas changes pre and post setup, the modes and mean pressures set on NIV, the mean compliance and interfaces commonly used. Mean time pre setup to review date was 38 days.

Results: There was 32 patients setup on NIV between January 2008 and December 2008, 12 male and 20 females with age ranging between 24 to 82 years.

The demographics of these are as follows 9 Motor Neurone Disease (MND) 16 COPD/Obesity hypoventilators, 7 Others which included- 3 Chest wall deformity, 2 Muscular Dystrophy, and 2 Cardiac. In the MND group 3 Rip’d before their review dates.

Interfaces used were 19 full face masks, 10 nasal masks and 3 nasal prongs.

The table below shows the differences in the blood gases between compliant and non-compliant patients on NIV.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Pre Setup</th>
<th>Post setup &lt;5hrs compliance</th>
<th>Post setup &gt;5hrs compliance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of patients</td>
<td>32</td>
<td>14</td>
<td>7</td>
</tr>
<tr>
<td>Mean days from setup</td>
<td>-----</td>
<td>37</td>
<td>40</td>
</tr>
<tr>
<td>Mean Po2</td>
<td>8.38(7.03-9.73)</td>
<td>9.18</td>
<td>9.33 (6.84-11.82)</td>
</tr>
<tr>
<td>Mean Pco2</td>
<td>7.15 (6.06-8.24)</td>
<td>7.17</td>
<td>6.38 (5.03-7.73)</td>
</tr>
<tr>
<td>Mean IPAP</td>
<td>-----</td>
<td>12.96</td>
<td>14.35</td>
</tr>
<tr>
<td>Mean EPAP</td>
<td>-----</td>
<td>4.0</td>
<td>4.2</td>
</tr>
</tbody>
</table>

The table below shows the mean pCO2 (kpa) in 3 Respiratory groups identified in our audit and possible differences in their pCO2 if compliant or non-compliant on NIV.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Mean pCO2 (kpa) Pre setup</th>
<th>Mean pCO2 (kpa) 5hrs compliance on NIV</th>
<th>Mean pCO2 (kpa) &gt;5hrs compliance on NIV</th>
</tr>
</thead>
<tbody>
<tr>
<td>COPD/Obesity Hypoventilators (n=9)</td>
<td>7.34</td>
<td>7.29</td>
<td>6.14</td>
</tr>
<tr>
<td>MND (n=4)</td>
<td>6.53</td>
<td>6.22</td>
<td>-----</td>
</tr>
<tr>
<td>Other (n=7)</td>
<td>7.46</td>
<td>7.7</td>
<td>6.73</td>
</tr>
</tbody>
</table>

Conclusion: The Respiratory Physiology Dept provides NIV for a diverse range of respiratory conditions. Patients who comply with NIV therapy (>5hrs/night) show a significant reduction in their PCO2 (kpa) p=0.0002 compared to the non-compliant group (<5hrs/night). This was also true regardless of the underlying respiratory disease (the MND group failed to comply) There was no significant difference in the PO2 pre and post NIV in both poor and good compliance groups. There was also no significant difference in the mean IPAP or EPAP in both of these groups. As far as interfaces are concerned 59% of patients used full face masks.

Is this a pilot study? No

Does this study use human subjects, human biopsy specimens or genetic material? Yes
COMPARISON OF EAR AND FINGER OXIMETRY READINGS DURING AMBULATORY OXYGEN ASSESSMENTS

CATEGORY: B

Barnett, EJ; Barraclough, R; Duck, A. North West Lung Centre, Wythenshawe Hospital, Manchester, England

Ambulatory oxygen requirements are routinely assessed and titrated using portable finger pulse oximetry. (BTS 2006) In practice, we found movement artefact or reduced circulation may adversely affect the measurement. Whilst using ear oximetry alongside finger oximetry on patients it was noted that the ear readings were often higher. These differences could potentially affect the prescription of ambulatory oxygen.

Objective: To evaluate the use of portable oximetry measurements taken from the ear and finger during ambulatory assessments.

Method: Over a period of 18 months 304 non-smoking patients referred for ambulatory oxygen assessment had ear and finger pulse oximetry measurements recorded pre, during and post a six minute walking test using the Konica Minolta Pulsox. The finger oximeter was sited on the middle finger of the right hand; the ear probe on the right ear lobe after vasodilation with thurfyl nicotinate (Transvasin) cream. Patients were instructed to walk at a comfortable pace for up to 6 minutes. Pre and post saturation and pulse were simultaneously recorded from the finger and ear oximeters.

Results: There was a significant difference between ear and finger measurements both pre and post exercise (p = <0.001 for both). The mean difference pre exercise was 1.9% (95% confidence interval -1.75% to 5.5%), and post exercise was 2.8% (95% confidence interval -3.5% to 9.1%). Earlobe measurements tended to be higher than finger measurements. There were no significant differences noted in pulse rate measurements. The observed differences in oxygen saturation could have altered the clinical outcome in 27% of the patients assessed (82 of 304).

Conclusion: There are clinically and statistically significant differences in the ear and finger probe measurements. In our observational study, an extra 25% of patients met the criteria for ambulatory oxygen therapy using finger oximetry compared with earlobe readings. This may impact not only on the patient, but also on the national ambulatory oxygen budget.
DO LONG PERIODS OFF WORK IN PEF MONITORING IMPROVE THE SENSITIVITY OF OCCUPATIONAL ASTHMA DIAGNOSIS?

CATEGORY: B

Vicky C Moore¹, Maritta S Jaakkola²,³, Cedd BSG Burge¹, Charles F Pantin⁴, Alastair S Robertson¹, P Sherwood Burge¹

¹Occupational Lung Disease Unit, Birmingham Heartlands Hospital, Birmingham, B9 5SS. U.K.
²Institute of Occupational and Environmental Medicine, University of Birmingham, Birmingham, UK
³Respiratory Medicine Unit, Department of Internal Medicine, Institute of Clinical Medicine, University of Oulu, Oulu, Finland
⁴Department of Respiratory Medicine, University Hospital of North Staffordshire, Stoke on Trent, UK

Serial peak expiratory flow (PEF) monitoring is a useful confirmatory test for occupational asthma diagnosis. Many workers regularly have weekends off work, but this may not be long enough to see potential recovery in their PEF. This study investigates whether the inclusion of longer periods off work in PEF monitoring improves the sensitivity of occupational asthma diagnosis.

Methods
Serial PEF measurements from workers independently confirmed as having occupational asthma (occupational asthma positives) and measurements from workers not at work during their PEF record (occupational asthma negatives) containing previously defined minimum data amounts and at least one rest period with ≥7 consecutive days off work were analysed. Diagnostic sensitivity and specificity of the Area Between the Curves (ABC) score from waking time and Oasys score for occupational asthma were calculated for each record in 3 ways: 1) including only consecutive rest days 1-3 in any rest period 2) including only consecutive rest days from day 4 onwards in any rest period 3) including all available data. Records with changes in treatment or respiratory tract infections were excluded.

Results
Analysing all available off work data (including long periods away from work of ≥7 days) increased the mean ABC score by 17% from 35.1 to 41.0 litres/min/hour (meaning a larger difference between rest and work day PEF values) (p=0.331) and the Oasys score from 3.2 to 3.3 (p=0.588). It improved the sensitivity of the ABC score for an occupational asthma diagnosis from 73 to 80% while maintaining specificity at 96%. The effect on the Oasys score using discriminant analysis was small (sensitivity changed from 85 to 88%). The degree of airflow obstruction (PEF % predicted) had no influence.

Conclusions
Sensitivity of PEF monitoring using the ABC score for the diagnosis of occupational asthma can be improved by having a longer period off work.

East Birmingham Ethics Committee have approved this study
This research is funded by a PhD fellowship from the COLT Foundation

Is this a pilot study? NO
Does this study use human subjects, human biopsy specimens or genetic material?* YES
*If YES, please provide evidence that ethics committee approval has been obtained, where necessary
DOMICILIARY MECHANICAL INSUFFLATOR/EXSUFLATOR (MI-E) - PATIENT AND CARER PERSPECTIVES

CATEGORY: B

CG Billings, AR Proctor, J Hobson, R Chatters, S Bianchi
Respiratory Function Unit, Royal Hallamshire Hospital, Sheffield.

Background: An MI-E is a device which simulates a cough by providing positive pressure rapidly followed by negative pressure. Case studies suggest that the domiciliary use of MI-E may play an important role in the prevention of respiratory morbidity and mortality in patients with neuromuscular diseases [1, 2]. However, little information has been published describing whether the patient and carer perceive the domiciliary use of the MI-E as beneficial. We have used MI-E in our Domiciliary Non-Invasive Ventilation (NIV) Service for a number of years. We wished to evaluate how the MI-E impacted on the patient and carer.

Methods: 11 patients with restrictive lung disease (10 on NIV, I not ventilated) using MI-E at home were contacted by mail. Using a visual analogue scale, patients were asked: 1. How easy is it to use the MI-E? (extremely difficult – extremely easy); 2. Do you find it reassuring to have the MI-E machine available at home? (Not at all reassuring – extremely reassuring); 3. Does using a MI-E increase the workload of caring? (significant increase in the workload – no increase in the workload); (If yes to 3) 4. Is an increase in the workload of caring acceptable? (totally unacceptable – totally acceptable). Patients were asked to record any comments they wished to make about using MI-E. Questionnaires were anonymised and patients reassured that their treatment would not be affected by their responses.

Results: Replies were received from 9 patients. Patient and carer satisfaction with the MI-E was found to be very high (Fig 1). It was very easy to use and patients felt reassured to have the machine at home. All but one patient/carer reported that the MI-E did not increase the burden of care. The only carer who reported an increase in workload felt that it was totally acceptable. They reported fewer and less severe chest infections. MI-E was thought to be less tiring and more effective than manual chest clearing techniques. Carers reported satisfaction at being able to assist the patient and all patients reported improvement in well being since using the machine regularly. Patients strongly wish to continue using the MI-E.

Discussion: The use of MI-E was felt by patients and carers to be very beneficial and no one reported that its use was unacceptably burdensome. A previous survey of the use of MI-E by 18 spinal cord injury patients with tracheostomies found MI-E faster, more convenient, and more effective than suctioning [3]. Our service review extends the range of patients shown to benefit from regular use of MI-E to a group with restrictive lung disease the majority of who were on domiciliary NIV. In addition to patient benefit, by reducing the need for hospital admissions in this group, use of MI-E should also be beneficial to healthcare providers.

References:

Is this a pilot study? NO
Does this study use human subjects, human biopsy specimens or genetic material?* NO
*If YES, please provide evidence that ethics committee approval has been obtained, where necessary.
Service Evaluation
EVALUATION OF PREDICTIVE EQUATIONS FOR HYPOXIC CHALLENGE TESTING

CATEGORY: B

CG Billings1, HL Wei2, P Thomas1, S Linnane1, B Hope-Gill1
Respiratory Medicine, Llandough Hospital Cardiff1 Department of Automatic Control and Systems Engineering, University of Sheffield2.

Background:
British Thoracic Society guidelines suggest that patients with severe disease or with a co-morbid condition worsened by hypoxaemia require assessment before flying [1]. Access to Hypoxic Challenge Tests (HCT), however may be limited and using simpler methods of screening such as the use of predictive equations may be a better approach. At present, these methods have not been shown to be as reliable as HCT. However, most previous studies have been small.

Aim:
We proposed to analyse retrospective data from the Lung Function Unit at Llandough Hospital to assess the utility of current predictive equations in predicting in-flight hypoxaemia and, using non-linear techniques, we aimed to produce and evaluate new predictive equations from the retrospective data.

Methods:
Clinical records, retrospective lung function and HCT data from all patients who have previously undergone hypoxia challenge testing at the lung function laboratory at Llandough Hospital were analysed (n=190). All HCT were performed according to the protocol of ROBSON et al. [2]. Subjects’ age, sex, height, weight, spirometry, capillary blood gas analysis and cardiorespiratory diagnosis at the time of HCT were recorded. Previously derived predictive equations were applied to this data and in-flight oxygen requirement predictions were compared with actual HCT results. The non-linear equations were developed using the NARMAX [nonlinear autoregressive moving average with exogenous input] modelling approach [3]. Statistical methods: An estimate of the population variance (MSE), was calculated for each predictive equation for the whole data and separate data subsets Bland and Altman plots were used to assess agreement between the values obtained from the predictive equations and from the HCT. The sensitivity and specificity of the predictive equations were also calculated using a cut off point of 55 mmHg.

Results:
Seven predictive equations were identified by the NARMAX method. The equations for predicting PaO2-N2 derived by the NARMAX method have been shown by a number of statistical methods to be superior to the previously derived linear equations. The non-linear equations use up to 10 variables but even those using only 1 or 2 most significant terms have lower variance than the linear equations. The Bland Altman plots showed that all the NARMAX models had a mean difference of ±0.00 mmHg and had higher levels of agreement than the linear models. The sensitivity/specificity of all the non linear equations was greater than the previous model (up to 98/97% compared to 75/72%).

Discussion:
We have shown using retrospective data that NARMAX methods provide a simple way to predict the need for in-flight oxygen. We have produced equations with high sensitivity and specificity which are easy to use and may be applied in primary and secondary care.

References:

Is this a pilot study? NO
Does this study use human subjects, human biopsy specimens or genetic material?* NO
IS AUDIT SEXY?
THE USE OF AUDIT TO IMPROVE THE SERVICE PROVIDED IN LUNG FUNCTION LABORATORIES

C. Oliver, E. Fettes and R. Lane
Lung Function Laboratory, Great Ormond Street Hospital for Children, London

The aim of the audit was to identify areas where the lung function service at Great Ormond Street Hospital (GOSH) could be improved. This was carried out to ensure a high standard of patient care and from the findings subsequently make plans for changes and improvement where indicated. The audit was set up with assistance and advice from the Clinical Audit and Outcomes Manager.

Methods: For one month a questionnaire was given to families attending the lung function laboratory at GOSH. They were asked to complete the questionnaire during their visit and leave the completed anonymous questionnaire in a designated box. The questionnaire consisted of 15 questions, mainly tick boxes and a comment section, which took a few minutes to complete.

Results: Ninety nine questionnaires were at least partially completed. Overall the results were positive and encouraging.

The average waiting time to be seen was 3 - 4 minutes (91 responders).

For the three questions related to the Physiologist having all the necessary paperwork, explanation of tests and the time given to the families to ask questions there were very positive responses at 98-99% satisfaction.

The main 3 areas of concern were the waiting area, ease of finding the laboratory and the cleanliness of the laboratory (see table below for results).

<table>
<thead>
<tr>
<th>Question</th>
<th>Number of responses</th>
<th>Very uncomfortable (6%)</th>
<th>Quite uncomfortable (20%)</th>
<th>Quite comfortable (64%)</th>
<th>Very comfortable (10%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>How comfortable was the waiting area?</td>
<td>95</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>How easy was it to find your way to the lung function laboratory? (For 27 people this was their 1st visit)</td>
<td>96</td>
<td>Very difficult (4%)</td>
<td>A bit difficult (15%)</td>
<td>Quite easy (34%)</td>
<td>Very easy (47%)</td>
</tr>
<tr>
<td>Were you happy with the cleanliness of the lung function laboratory?</td>
<td>94</td>
<td>Very unhappy (12%)</td>
<td>Quite unhappy (0%)</td>
<td>Quite happy (26%)</td>
<td>Very happy (63%)</td>
</tr>
</tbody>
</table>

The audit results were discussed and areas that could be improved easily, such as improving the signage to get to the laboratory investigated immediately. Due to the limited space available in the current department it is impossible to change the location or layout of the waiting area. We are going to paint the area and encourage children to colour pictures which can be displayed to brighten up the area. Until the department is relocated to a new building in 2011, we will have to make the best of the current waiting area, which is the main corridor in the department so it is difficult to provide adequate books and toys for the children to keep them occupied during their visit, even though out of 83 responders 46% felt what we currently provide was inappropriate.

Conclusion:
Overall the comments were positive and the children enjoyed their experience. The areas which were identified as needing improvement are being tackled.

The questionnaire will be repeated in 1 year to see if the changes that have been made have improved the patient experience as part of a closed audit. In 2011 a repeat audit will be carried out in the new department to hopefully demonstrate further improvements.

Our aim is to further improve patient care through continuous improvement in quality and safety.

No, audits are not sexy, but essential!!

Is this a pilot study? No
Does this study use human subjects, human biopsy specimens or genetic material? No

30
IN CHRONIC OBSTRUCTIVE PULMONARY DISEASE, DOES THE FEV1 DETERIORATE SIGNIFICANTLY FROM DIAGNOSIS TO THE FOLLOW-UP ASSESSMENT?

Aim: To determine if the forced expiratory volume in 1st second (FEV1) deteriorated significantly over 12-18 months from diagnosis to follow-up assessment. This would support or refute the National Institute for Clinical Excellence (NICE) guidelines for the frequency of spirometry testing.

Methods: A retrospective study reviewed changes in FEV1 across 52 primary care practices. Sample size was 83 patients (50 male; 33 female; median age 67 yrs, range 42 – 84 yrs). FEV1 was recorded and the data analysed for total population n=83 and as a subgroup with FEV1 decline (n=40). After significant literature review it was decided that a meaningful change would be represented by a deterioration of >200 ml during the study period. This would adjust for within person variation (120ml), equipment variation (50 ml) and normal decline with age (30ml). A paired T-test was used to statistically compare the means of the baseline FEV1 and the follow-up FEV1. Additional information was obtained with Chi-Squared analysis for gender and smoking status; One-way ANOVA with Tukey was performed for relationship of disease severity with the change in FEV1.

Results: Total population (n=83) showed no statistically significant change in FEV1 from baseline to follow-up assessment. Significant difference was seen between gender and smoking status n=83 and n40); and the mean change in FEV1 within disease severity (n=83). The subgroup (n=40) with deterioration in FEV1, showed significant difference in the mean change of the FEV1 (Table).

Summary of Significant Results.

<table>
<thead>
<tr>
<th>Population</th>
<th>Mean Change (ml)</th>
<th>SDEV</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>FEV1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>n=83</td>
<td></td>
<td>Baseline 678.2</td>
<td>Follow-up 642.8</td>
</tr>
<tr>
<td>Gender and Smoking</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male Smk 13</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male Ex 37</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female Smk 16</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female Ex 17</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FEV1 within Disease Severity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mild 49</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moderate 25</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Severe 9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FEV1</td>
<td></td>
<td>Baseline 678.2</td>
<td>Follow-up 642.8</td>
</tr>
<tr>
<td>Gender and Smoking</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male Smk 3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male Ex 23</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female Smk 8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female Ex 6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FEV1 within Disease Severity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mild 28</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moderate 8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Severe 4</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

FEV1 – Measure of mean change in FEV1 from baseline to follow-up. Gender and Smoking – Correlation of males and females with smokers and ex-smokers. FEV1 within Disease Severity – Measure of mean change in FEV1 within disease severity. SDEV – Standard deviation of difference between the sample groups.

Conclusion: In the total population (n=83), there was no statically significant change seen in FEV1, however in the group which deteriorated (n=40), there was a statistically significant change seen and 28% deteriorated >200ml of which 12% were >400ml. The findings appear to demonstrate that a percentage deteriorated significantly and some at a faster rate. This would support the NICE guidelines.


Acknowledgements: Dr. D. Dev, consultant lead in COPD at Stepping Hill Hospital, Stockport NHS Foundation Trust. Barbara Thornely, Head of Lung Function Department at Stepping Hill Hospital, Stockport NHS Foundation Trust. Dr. May Azzawi, project supervisor at Manchester Metropolitan University. Martina Lambert, Respiratory Physiologist and work based supervisor at Stepping Hill Hospital, Stockport NHS Foundation Trust.
The “Missing Millions with COPD”: Do the Nice Criteria add to those under-diagnosed.

CATEGORY: B

Carter R, Tourish R, O’Donnell D, Vaughn R.

Department of Respiratory Medicine, Glasgow Royal Infirmary

The Outreach Spirometry Service has been in operation since 2004 with an average of approximately 5000 patients referred each year. The Greater Glasgow and Clyde Primary Care Management Guideline has recently been reviewed and the NICE criteria for identification and assessment of severity of patients with COPD has been introduced. We have analysed the patients attending for spirometry in 2008 to assess the effect of this change compared to the GOLD Guidelines.

Methods
A retrospective analysis of patients referred to the Outreach Spirometry service in 2008. Comparison of identification and categorisation of severity of COPD using the GOLD and NICE Guidelines.

Results
In 2008, 4931 patients performed spirometry for this service. Using the GOLD Criteria, 1737 patients were identified as having COPD (547 MILD, 644 MODERATE, 123 SEVERE, 23 VERY SEVERE): NICE Criteria; 1190 patients identified (644 MILD, 453 MODERATE, 93 SEVERE). There was a category of patients who had an FEV1/FVC <70%, with no significant response to bronchodilator, but a post bronchodilator FEV1 >80% who could not be categorised as having COPD using the NICE Criteria (547 patients; 11.1%)

Discussion
Early diagnosis of COPD is vital as it allows patients to take steps to slow down the progression of the disease. However, not enough patients are diagnosed early enough. There are an estimated 3.7 million people in the UK with COPD, yet only 900,000 people diagnosed with the disease. This leaves approximately 2.8 million people that are unaware they have the disease which, if left untreated, could severely restrict their lives (British Lung Foundation). The use of the NICE Guidelines would appear to exacerbate this situation as it under-diagnoses patients with suspected early disease. This group of patients are exactly those who may benefit from early intervention in particular smoking cessation advice.
Greater Glasgow Health Board COPD Outreach Spirometry: 5 years on.

CATEGORY: B

Department of Respiratory Medicine, Glasgow Royal Infirmary

Methods
An initiative by the Greater Glasgow Health Board to provide enhanced diagnostic and therapeutic services for patients with COPD included the provision of spirometry to the primary care sector throughout Glasgow. Three trained Clinical Physiologists perform spirometry pre and post nebulised bronchodilator at various primary care sites distributed on a regional basis covering the GGHB area. Over the 5 years that the service has been in operation, over 25,000 patients have been evaluated.

Results
A. breakdown of outcomes for 2008 showed that of 4931 patients referred; 644 (13.1%) MILD COPD, 453 (9.2%) MODERATE COPD and 93 (1.9%) SEVERE COPD based on NICE Criteria. In addition the service was able to identify patients with a significant response to nebulised salbutamol (>400ml change) suggesting an asthmatic component (485, 9.8%) and also those in whom there was no airflow obstruction at baseline but showed bronchial lability (>200ml change) which may indicate possible asthma (452; 9.2%). In 2008, screening pulse oximetry was introduced to identify patients who may require formal oxygen assessment (92 patients; 1.9% had an SpO2 =<92%). In addition, the decision was made to change the referral criteria for pulmonary rehabilitation from one based on FEV1 (<50% predicted + optimal inhaler therapy) with a confirmed diagnosis of COPD to one based on a functional score (MRC Dyspnoea Score). Based on this criteria of 1190 patients with a confirmed diagnosis of COPD, 829 were on optimum therapy, of these 163 (20%) were suitable for referral to pulmonary rehabilitation with an MRC Dyspnoea Score of =>3. The service uses a flow based spirometer system which is able to produce full flow volume loop analysis. Using the maximum mid expiratory flow in patients with no obvious airflow obstruction (<50% predicted in patients under 50 years old) has shown a number who show changes associated with early airways disease (379; 7.7%) and therefore evidence to support reinforcement of smoking cessation advice.

Conclusions
This service does help to confirm specific abnormalities but also shows the need for accurate spirometry in aiding the correct diagnosis of COPD and in helping to identify some patients with asthma. It also confirms previous findings that asthma may be wrongly identified as COPD. However a number of patients with suspected asthma are not identified by routine screening and further assessment would be necessary to confirm or refute this diagnosis. It is used as a gateway to further management options including medication advice, pulmonary rehabilitation and oxygen assessment. It may also help to identify those patients with early changes associated with airways disease to allow reinforcement of smoking cessation advice and hence earlier intervention.
AN ASSESSMENT OF SENSITIVITY OF MEF50/25 AGAINST FEV1 IN THE CLASSIFICATION OF CHRONIC OBSTRUCTIVE PULMONARY DISEASE

CATEGORY: A


Chronic Obstructive Pulmonary Disease (COPD) is one of the world’s major causes of morbidity and mortality [1]. The forced expiratory volume in one second (FEV1) is commonly used to detect the degree of airflow obstruction within the larger and medium sized airways. However, the maximal expiratory flows at 50 and 25 % of the forced vital capacity (MEF50/25) may be more useful in detecting changes in airway function obstruction and therefore allow for an earlier diagnosis [2]. Consequently, earlier treatment can be administered, hence reducing the economic and social burden of the disease.

Aims: To compare:
1) The FEV1 and MEF50/25 to ascertain whether misclassification between the two measurements exists.
2) The percent predicted and standardised residuals (SR) obtained from the FEV1 and MEF50/25 was also compared to determine whether the classification of disease is consistent.

Method: A retrospective analysis of 240 flow-volume curves was performed (M:F – 141:99). The samples were classified into four groups based on the results obtained from the FEV1 percentage - normal lung function, mild, moderate and severe COPD - according to GOLD guidelines. A chi-squared test was performed to compare the discrepancy between the FEV1 and MEF50/25 using the percent predicted and SR values with a significance level of p = 0.05.

Results: A significant difference (p < 0.001) was found between each of the four groups using the FEV1 and MEF50/25.

Figure 1 shows a large proportion of the data indicating normality when using the FEV1 though when interpreting the data using the MEF50/25 values severe severity is indicated.

Figure 2 shows the MEF50/25 SR values ranging from normal to mild and are not categorised within the moderate or severe category whereas using the FEV1 the SR values range from normal to severe. Comparing figures 1 and 2, using the SR’s for the MEF50/25 tend to under-estimate the severity of disease when compared to the percent predicted throughout all of the three disease groups.

Conclusion: The FEV1 remains an appropriate index to detect COPD however the MEF50/25 may provide additional information particularly in the early stages of the disease. Overall, SR’s are good markers for determining abnormality; however the percent predicted provides the degree of abnormality which may be useful for patients who are located on the border of a severity group.


Character Count (with spaces) = 2752 (incl. table).
Word Count = 444
### Glasgow Outreach Spirometry Service: Who Should be referred to pulmonary rehabilitation?

**CATEGORY: B**

Vaughn R, Carter R  
Department of Respiratory Medicine, Glasgow Royal Infirmary

As part of a Glasgow wide initiative, Greater Glasgow and Clyde Health Board have produced a primary care guideline for the management of COPD which includes an integrated approach to management and includes direct referral to smoking cessation clinics and pulmonary rehabilitation with initial spirometric assessment being the gateway to these services. Following spirometry, a report is sent with advice on further assessment, options for management or changes in current medication in line with the COPD guideline to the referring GP. This service has been in operation since 2004 with a recommendation for referral to pulmonary rehabilitation if the patient was on optimum therapy for COPD and the FEV1 was =<50% predicted with a confirmed diagnosis of COPD in order to provide some control of the numbers being referred for assessment. The Glasgow Pulmonary Rehabilitation programme has previously been shown to be effective in producing symptomatic improvement, increased muscle strength and raised endurance exercise times in patients with COPD(1). Using the current criteria for referral there is some capacity in the pulmonary rehabilitation service and we are considering a move to a functional limitation assessment based on the MRC Score.

**Methods**

A retrospective analysis of 300 consecutive referrals to the Outreach Spirometry Service with assessment of spirometric indices and an MRC score taken at the time of testing.

**Results**

The FEV1 in these patients ranged from 24-136% predicted. There was no significant correlation between the %predicted FEV1 and the MRC Score for the 300 consecutive patients referred for spirometry (R² 0.14). In those with a confirmed diagnosis of COPD (N=96, R² 0.11)  Using the original criteria (FEV1 =<50% predicted) and confirmed diagnosis of COPD, 21 patients would have been appropriate for referral to pulmonary rehabilitation. Using functional criteria of an MRC Grade of =>3 , confirmed diagnosis of COPD and optimum drug therapy; 48 patients would be suitable for referral for pulmonary rehabilitation.

**Discussion**

The change in criteria for referral for pulmonary rehabilitation would results in a greater than two fold increase in patients suitable for pulmonary rehabilitation. Although there is some capacity in the system this level of increase will have implications for both staffing and access to this important therapeutic intervention in COPD. As expected there was no significant correlation between the level of the FEV1 and symptomatic limitation as assessed by an MRC score.
RESULTS OF A PRELIMINARY QUESTIONNAIRE TO ASSESS SPIROMETRY SERVICES IN GP PRACTICES IN THE CENTRAL MANCHESTER PCT.

Blain, S. Pulmonary Function, Department of Respiratory Medicine, Manchester Royal Infirmary, UK.

Intro: The Central Manchester COPD service is a multidisciplinary team with the aim to provide a seamless service across primary and secondary care for patients suffering with COPD in the Central Manchester PCT. The service encompasses Pulmonary Rehab, Oxygen and Ambulatory Oxygen Assessment, Spirometry, Nebuliser service, early intervention to prevent hospital admission and palliative care. In terms of spirometry the service is designed to provide support and education for GP practices and practice nurses to ensure that they are adhering to current guidelines regarding spirometry.

Methods: To ascertain current standards for spirometry in Primary Care a simple questionnaire was designed and sent out to the 39 Central Manchester PCT GP practices for the Spirometry practitioner to fill out and return to the pulmonary function department. The questionnaire contained questions about current training received, use of verification syringe, use of biological control, sterilisation protocol, use of metric height and weight measurement, use of nose clips, record keeping, is the practitioner confident interpreting results? and gauging interest in further training.

Results: 28 replies were received and the results are shown in table 1 below

Table 1

<table>
<thead>
<tr>
<th>QUESTION</th>
<th>yes</th>
<th>no</th>
<th>not stated</th>
<th>other</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Is Spirometry Available?</td>
<td>26</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Attended the ARTP/BTS Spirometry Foundation Course?</td>
<td>7</td>
<td>19</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Do you use a 3 litre syringe for verification?</td>
<td>8</td>
<td>18</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 Do you use a Biological Control for verification?</td>
<td>15</td>
<td>11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 Do you Sterilise your spirometry equipment?</td>
<td>11</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>6 Is Height Measured in metric?</td>
<td>25</td>
<td>0</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7 Is Weight Measured?</td>
<td>26</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 Do you use Nose Clips?</td>
<td>12</td>
<td>14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9 Is a Hard Copy Kept for all Results?</td>
<td>20</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 Does the practitioner feel adequately trained?</td>
<td>18</td>
<td>3</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>11 Do you feel confident interpreting results?</td>
<td>20</td>
<td>4</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>12 Are you interested in a 2 day training course?</td>
<td>14</td>
<td>10</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>
Questions 3, 4 and 5 had the sub question ‘How often?’ the results of which are shown in table 2.

### Table 2

<table>
<thead>
<tr>
<th>QUESTION</th>
<th>FREQUENCY</th>
</tr>
</thead>
<tbody>
<tr>
<td>How often do you use your 3L syringe?</td>
<td>Before each use: 2</td>
</tr>
<tr>
<td></td>
<td>daily: 1</td>
</tr>
<tr>
<td></td>
<td>weekly: 3</td>
</tr>
<tr>
<td></td>
<td>3 monthly: 1</td>
</tr>
<tr>
<td></td>
<td>6 monthly: 1</td>
</tr>
<tr>
<td></td>
<td>none: 18</td>
</tr>
<tr>
<td>How often do you perform your Biological Control?</td>
<td>Between every 3-4 patients: 1</td>
</tr>
<tr>
<td></td>
<td>weekly: 3</td>
</tr>
<tr>
<td></td>
<td>monthly: 1</td>
</tr>
<tr>
<td></td>
<td>3 monthly: 2</td>
</tr>
<tr>
<td></td>
<td>6 monthly: 2</td>
</tr>
<tr>
<td></td>
<td>yearly: 1</td>
</tr>
<tr>
<td></td>
<td>not stated: 5</td>
</tr>
<tr>
<td></td>
<td>do not use bio control: 11</td>
</tr>
<tr>
<td>How often do you sterilise your equipment</td>
<td>no answer: 5</td>
</tr>
<tr>
<td></td>
<td>do not sterilise: 4</td>
</tr>
<tr>
<td></td>
<td>after each use: 3</td>
</tr>
<tr>
<td></td>
<td>daily: 1</td>
</tr>
<tr>
<td></td>
<td>weekly: 6</td>
</tr>
<tr>
<td></td>
<td>sterilise but not stated how often: 1</td>
</tr>
<tr>
<td></td>
<td>use soap+water or alcowipe: 6</td>
</tr>
</tbody>
</table>

**Conclusions:** The questionnaire has identified a lack of training/education in 4 main areas the first being a lack of accredited training in spirometry. Although there is no requirement for accreditation of primary care practitioners performing spirometry1 the Central Manchester COPD service will offer all the practitioners the opportunity to attend the ARTP/BTS Spirometry Foundation Course run at the MRI and encourage them to complete the ARTP Certificate in Spirometry therefore providing the practitioner with a qualification in spirometry as recommended by Levy et al 2009. The second area was a lack of use of spirometer verification with only 8 out of 26 practices using a verification syringe. Of those that did verify, the frequency was wide ranging between daily and 6 monthly. There was also poor results in the use of a biological control, although slightly better than the use of a 3L syringe with 10 out of 26 practices doing so. The fourth area identified for further training was the use of sterilisation of equipment with only 9 out of 26 practices sterilising equipment regularly (weekly or more often). All these areas will be covered in the ARTP/BTS Spirometry Foundation Course. The COPD service will provide each practice with current guidelines on these topics and will support the GP practices by means of regular practice visits by a qualified respiratory physiologist and providing telephone support weekdays from 8-4. The service will then assess the success of the educational intervention by repeating the questionnaire in 12 months time.

**References**

Lung function measurements are important in the clinical assessment of respiratory disease, but without appropriate reference values results cannot be interpreted accurately. The aim of this project was to assess whether the current British Thoracic Society recommended reference values for dynamic (spirometric) and static (plethysmographic) lung volumes are valid for children currently being seen at Great Ormond Street Hospital (GOSH).

Methods: Spirometry and plethysmography were performed in healthy white children aged 6-12 years. The children were measured according to a strict laboratory protocol and international guidelines for the measurement and interpretation of results. Lung function results were expressed as Z-scores based on the Rosenthal paediatric prediction equations to adjust for sex and height (1,2). Student t-tests with 95% confidence intervals of the difference from predicted (95%CI) were used to determine any statistically significant differences (p<0.05) between observed measurements and those predicted; expected mean (SD) Z-score from healthy children being 0 (1) if no difference exists. A difference in 0.5 Z-scores was considered clinically significant.

The study was given ethical approval by Barking and Havering Research Ethics Committee.

Results: Technically satisfactory measures were obtained in 44 healthy white children (21 males), mean age 8.1 (range 6.4-12.1) years. Statistically significant differences of clinical importance were observed for FEF75 (mean [95% CI]): -0.51[-0.76, -0.25] z-scores, and FRCpleth (-0.70 [-0.95, -0.46]). Statistically significant differences were also found in FEV1/FVC (-0.31 [-0.56, -0.07]); PEF (0.41 [0.13, 0.68]); RV (-0.26 [-0.51,-0.01]).

Conclusion: These results suggest that the Rosenthal predictions may not be valid for the current GOSH population, which could potentially lead to over- or under-diagnosis of disease and misclassification of disease severity. Although all age reference ranges for spirometry have now been published, improved reference ranges for static lung volumes measurements in children are urgently required (3).

THE VALIDITY OF AN INSTRUMENTED GARMENT TO MEASURE RELATIVE 
CHANGES IN RESPIRATORY PARAMETERS DURING QUIET BREATHING AND 
EXERCISE

Category: A

Lo, WL¹; Bruton, A²; Barney, A²; School of Health Sciences¹ University of Southampton, 
Southampton, England; Institute of Sound and Vibration Research², University of Southampton, 
Southampton, England

Monitoring of breathing pattern outside a clinical setting is desirable in patients with respiratory 
disorder to acquire a more accurate picture of patients’ normal breathing pattern during real life 
activities. Various instrumented garments have been developed which claim to allow accurate 
breathing monitoring outside the clinical setting.

Aims: To explore the validity of respiratory data from a garment incorporating respiratory inductive 
plethysmography (RIP) during quiet breathing and exercise.

Methods: This study was approved by the School of Health Sciences ethics committee, University of 
Southampton. This study used a concurrent design where respiratory parameters were simultaneously 
measured by a garment with RIP and a pneumotachograph (PNT). The RIP garment was calibrated 
with a variation of the Qualitative Diagnostic Calibration method¹. Eleven healthy volunteers (aged 
between 18-35) were recruited. Tidal volume (V_t) and expiration time (T_e) were calculated on a breath 
by breath basis from data collected of 35 minutes of quiet breathing and 25 minutes of mild exercise 
on a cycle ergometer.

Results: The mean V_t from the RIP garment and the PNT were significantly correlated (p<0.01) during 
quiet breathing (r=0.8) and during exercise (r=0.8). The mean breath by breath V_t coefficient of 
variation between devices was also significantly correlated (p<0.01) during quiet breathing (r=0.8) 
and exercise (r=0.8). The mean difference in T_e between devices was 0.5 sec during quiet breathing 
and 0.1 sec during exercise. However, statistically significant individual differences in T_e between 
devices were observed in all participants during quiet breathing and in seven participants during 
exercise (p<0.05). Bland and Altman analysis showed that RIP overestimated T_e. The 95% limits of 
agreement for T_e during quiet breathing and exercise were -1.0 to 1.9 sec and -0.69 to 0.74 sec 
respectively. The ICC for T_e was 0.8 during quiet breathing and 0.9 during exercise. The standard error 
of measurement for T_e was 0.5 sec during quiet breathing and 0.3 sec during exercise.

Conclusions: The results demonstrate that the RIP garment can accurately measure relative changes 
in tidal volume during both quiet breathing and exercise. Results also suggest that the RIP garment is 
as valid as the PNT in measuring V_t variability. Although a statistically significant difference in T_e was 
oberved between devices, the differences were relatively small and are unlikely to be clinically 
significant.

1. MILLARD, R. K. (2002) Key to better qualitative diagnostic calibrations in respiratory inductive 

Is this a pilot study? NO

Does this study use human subjects, human biopsy specimens or genetic material?* YES

*If YES, please provide evidence that ethics committee approval has been obtained, where necessary.
And the winner is..........  
Manufacturer’s survey report 2009/10 
Compiled by Nigel Clayton

With the introduction of ARTP Sleep in 2009 it was decided that two manufacturers awards would be made – one for best lung function manufacturer and one for best sleep manufacturer. As always we received some highly relevant and some amusing feedback, so once again, a big thank you to all heads of department who took the time to complete the survey. As always the feedback will be passed back to the companies in the hope that we will see improvements to service.

From a mail shot of 256 departments we received 91 returns, giving us a return of 36%. This was a slight reduction on previous year’s returns, but still sufficient to give an accurate rating for each company where we received more than ten replies. As mentioned above, the survey was split into 2 categories and we asked for each company to be rated on a scale of 1-5 in each of the 17 sections listed below.

Written comments
The main gripes, as always, refer to service and maintenance issues. I know that over the last year several companies have improved the way their service departments are run, but once again we see the all too familiar comments. Those that are printable are shown below. See if you can guess which companies they relate to!

- All spares are kept overseas & this delays resolution of problems. Also reduces ability to probably solve/rectify on first visit. We are also disappointed by the time taken to get engineers on the site despite a comprehensive service contract; this has taken 2/52 on some occasions.
- Despite new technology support engineer – who is very accommodating & supportive – the company continues to let us down with regards to getting back to me about queries, questions they should be able to answer while on site but promise to contact me once they have checked with someone in back office etc. I constantly get the feeling that they are muddling through & don’t fully understand the systems they are selling. They continually tell us that it is our computers/IT system/Network that is causing the issues & never their software. They don’t offer viable solutions to technical glitches etc. The fact that they won’t give out personal phone numbers is infuriating & means no accountability. Although I find & now know the software well & find it relatively easy to negotiate, if I could replace the system I would not choose this product again based on their customer service.
- For Gods sake please employ somebody who actually knows the way your equipment is supposed to work.
- Within 1 month our new upgrade/PC broke and took > 1 week to resolve the problem, and when was fixed was still left with minor problems which have taken > time to resolve.
- Transferred through several customer services reps and ended up speaking to someone in Europe and had some mis-communication.
- Very expensive to run – consumables & Physiologist time.
- No training given.
They have recently raised the service cost of this product so I have not renewed. It is 9 yrs old however so somewhat dated.

Our engineer is very good when he gets here but we sometimes have to wait for days for him to come.

It’s always a pleasure to see comments praising individual company employees. Many of them do work exceptionally hard and deserve a mention.

- Really impressed with the attention to detail from the service engineer Nigel Turner, he always double checks that any problem has been solved (Pulmolink).
- We have an excellent sales rep in Stuart Bennett. Very helpful and punctual for appointments. Our engineer Kenny is very good (CareFusion).
- Chris Ferrie performs a valiant job keeping equipment going that has an older design age than myself (nSpire Health).
- Lytton Pays should be singled out for particular praise – he is so helpful & knowledgeable (nSpire Health).
- Lynton from the service team provides an excellent service making sure to come before or after lab patients are due and is prompt at returning phone messages (nSpire Health).
- Engineer Lynton Elcocks is great (nSpire Health).
- Jonathan Lake, Darren Murray & Tim Allen (Service engineer) have provided excellent service and help to us on software issues and the one time of intermittent fault on equipment (CareFusion).
- I have known Fred Whittle from a previous hospital where I have worked and he is still providing excellent service cover (Vitalograph).
- Lyn is always very knowledgeable and helpful (Stowood Scientific).
- We continue to have excellent support from Jim Ashton (Protec Medical).
- Steve Wallace deserves particular praise for his rapid response to service enquiries and his amicable nature and attitude (CareFusion).
- Darren Murray has been invaluable in assisting with the set up and training of the exercise system (CareFusion).
- The service engineer Adrian has been very good in rectifying the problems (Medical Graphics).
- Darren Kershaw is very approachable and always willing to provide support and advice (Fisher and Paykel).
- Mike Fagin Hall represented the company very well (Radiometer).
- Particular thanks to Steve Birchall and Neil C (ResMed).
- Chris Wingfield & Oliver Pix will always go the extra mile to help the department (ResMed).
- Steven King is absolutely brilliant at his job – nothing is ever too much trouble (ResMed).
- Steve Birchall – Sales rep for Southwest is an excellent support & source of knowledge & great point of contact, I would like to highly commend him for his level of customer service (ResMed).
- Rachel Simpson deserves praise for her efforts (Respironics).
- Katie Farrow the rep is excellent (Respironics).
- Paul Wilton deserves particular praise for his professionalism and countless limitless knowledge of the product. He is friendly and courteous at all times (S-Med).

And the winner is …………………

A minimum of ten returns for each company had to be received before they could be considered for the award. Unfortunately only two sleep companies met the criteria. The final scores were out of a maximum of 85.

Sleep Category

<p>| | | |</p>
<table>
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<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>ResMed</td>
<td>73.63</td>
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<tr>
<td>2</td>
<td>Respironics</td>
<td>73.18</td>
</tr>
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</table>

Lung Function Category

<p>| | | |</p>
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<tr>
<td>1</td>
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<td>2</td>
<td>Pulmolink</td>
<td>71.03</td>
</tr>
<tr>
<td>3</td>
<td>Vitalograph</td>
<td>68.77</td>
</tr>
</tbody>
</table>
The ARTP wishes to congratulate nSpire Health for being the first company to win the lung function manufacturer of the year award. Once again ResMed scooped the sleep manufacturer of the year award, just pipping Respironics to the post. Both nSpire Health and ResMed were thrilled to pick up their awards at the conference gala dinner.

The future

Once again, the survey will be repeated towards the end of 2010. Remember that written feedback (good and bad) will be going back to the companies, so please make it fair and constructive.

Please direct any comments regarding the survey to ARTP Manufacturers Liaison: manufacturers@artp.org.uk
Reply to the editor

In the last edition of Inspire I incorrectly stated that Ganshorn Medical owns the ultrasound technology used by NDD and has licensed it to them. It is actually owned by NDD.

The following letter from Dr Christian Buess is both interesting and inspiring, as it describes how he developed the ultrasound technology as part of a PhD thesis which eventually led to the development of the NDD Easy One spirometer.

Dear Nigel Clayton

I saw that you published an article about ultrasonic flow sensors.

In this article it seems as if Ganshorn Medizintechnik developed the original ultrasonic flow sensor and licenses it to ndd Medizintechnik.

Since a lot of the history of ultrasonic flow sensors is directly related to my work (and publications) I would like to take the chance and explain a bit about the history of ultrasonic flow sensors.

From 1979 to 1984 I was a student at the ETH Zürich (Swiss Federal Institute of Technology). In 1985 I began to work as an assistant. My main project was a prototype of an ultrasonic flow sensor that did not work very well. In collaboration with the University of Zurich I improved the performance of the flow sensor step by step. During that time I also learned that there were many other attempts to develop ultrasonic flow sensors for gas flow measurement in physiology. Until that time most attempts failed: The sensors had a very poor flow baseline stability and could not be used in humid environment. Perkin Elmer tried to develop an ultrasonic flow sensor; there were also attempts at the University of Birmingham, where an institute tried to develop a sensor to measure breathing in horses.

I think our development was the first that achieved good performance in ultrasonic flow sensors for the measurement of gas flow in patients. We filed a first (Swiss) Patent and also made publications (e.g. in the IEEE Transactions on Biomedical Engineering 1986 and in the JAP 1986). I also published my thesis ÅgTransit-Time Ultrasonic Airflow Meter for Medical ApplicationÅh in 1988. The basic operation principle of ultrasonic flow sensors cannot be patented since it is known since at least 1925 (first publication that I am aware of).

After university I had contact with Prof. K. Harnoncourt and we decided to start the company ndd Medizintechnik. We also filed new patents, e.g. for the disposable breathing tube. At early times of ndd Medizintechnik, we also had contact with the company Ganshorn. We considered to cooperate with this company, since ndd was very small at this time. During that phase Ganshorn saw our technology. We then decided to develop our own products and did not continue to cooperate with Ganshorn.

In order to make the technology ready for the mass market we developed an ASIC (Application Specific Integrated Circuit) that made it possible to develop a small instrument with low power consumption. The newest version of this ASIC is the core technology in all ndd products (handheld flow sensors and EasyOne). If you have any questions regarding the technology, please feel free to contact me.

Incidentally, the full ndd product line will be displayed during the coming ARTP. If you have any other queries, I invite you to visit IntermedicalÅfs booth, our UK Distributor, where my colleague, Mr. Francois Ruchet will be pleased to meet with you.

Best regards
Christian Buess

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