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INSPIRE

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FIRST WORD

After another successful ARTP conference, how many of us have stuck to our New Year resolutions. Eat less, spend less, be nice, and I have met several people who have completed January dry-athons, looking quite frankly worse for it. Thank goodness for conference to re-address the liver balance and gain that healthy yellow jaundice hue. Conference is, apart from the health benefits, a time to reflect on the strength and diversity of our profession, promoting talent emerging from the ranks, to learn and re-learn and an opportunity to connect and re-connect with the organisation. Thank you to the conference committee for arranging the programme, which looks, as ever, an amazing pastiche of all that is great and good about the wonderful science and the work we do to help people.

After over 4.5 years this is regrettably my last Inspire acting as Editor. Frankly it has flown by, but it is time to pass the baton to another who will inject their own personal style and take Inspire to new and greater heights. Aidan Laverty from Great Ormond St Hospital will be taking over the helm taking Inspire further into the digital age. The last edition was our first electronic version. This has given us greater flexibility and potential in the type of production we want to produce for our membership. It gives us greater penetration to whom it can be sent, thereby promoting our profession further and also gives us greater value for money to its members. You will have an opportunity in the next edition to learn more about Aidan and over the editions the direction he will take with Inspire. In this edition, we have as always some wonderful articles from the great and the good of our profession.

Enjoy the read and farewell,

Dr Graham Clarke
Editor of Inspire

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Investigating Arterilised Earlobe Capillary Blood Gases: The role of sampling in relation to the COPD population – a survey of practice

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The practical application of blood gas analysis has been historically achieved by means of arterial puncture (Eaton, et al 2001) but in recent years the use of capillary blood gas sampling has been deemed sufficient (Pitkin et al, 1996). This exploratory investigation seeks to examine the earlobe capillary blood sampling technique adopted within adult respiratory medicine by reviewing the physiology that supports this theory and exploring the research that underpins the technique. The identification of national standards and any existing guidelines, including capillary blood gas sample training to health professionals, will also be discussed. In order to gain an understanding of the national approach to blood gas sampling a specifically designed questionnaire was distributed to fellow respiratory colleagues at an annual national conference. These findings shall be presented as a review of practice capillary blood gas protocols and future implementations discussed.

The burden of respiratory disease and in particular chronic obstructive pulmonary disease (COPD) is demonstrated by its accountability for around 23,000 deaths in England (DoH 2012) and a financial strain amounting to £492 million per annum (Britton, 2003).

Improving survival in COPD can be achieved through the administration of long term oxygen therapy (LTOT) as a result of correcting hypoxaemia (NOTT, 1980; MRC, 1980), consequently recent years have seen an increase in oxygen provision. Figures estimate 85,000 patients have oxygen at home at a cost of £110 million per year (NHSPCC, 2011). Impress (2011) proposes that 60 % of this group have COPD, but 30% of patients receive oxygen without proven clinical benefit in contrast to approximately 20% of severe COPD sufferers whom would benefit from LTOT but do not receive it.

The implementation of the home oxygen order form (DoH, 2006) saw an increase in specialist respiratory services who undertook formalised assessment and prescribing of supplemental oxygen when indicated.

The prescribing of oxygen is determined by blood gas analysis, specifically a PaO2 measurement of 7.3 kPa (PaO2 8.0 kPa or below), in the presence of pulmonary hypertension/polycythaemia, when breathing room air. The sample is taken on two occasions, not less than 3 weeks apart, in a clinically stable patient free from exacerbation five weeks prior to assessment. The sample obtained is taken as an arterial, femoral or arterialised ear lobe capillary blood (ELCB) sample (BTS,2006).

The physiology of ELCB gas sampling which deems it a suitable substitute for blood gas analysis has been described by Higgins, in 2009. Capillaries are the connectors between arterioles and venules, the arterial and venous network. The blood obtained by skin puncture is not purely capillary but a mixture of capillary, arteriole and venule blood. Physiologically the arterial blood network commands a higher pressure than the venous network, thus it is taken that the capillary sample can be close to that of arterial. Furthermore, the correlation of capillary and arterial blood is greater when the partial pressure of oxygen (PO2) is lower as a result of lower arterial/venous difference. Higgins (2008) states that increasing the capillary bed blood flow achieves arterialisation of capillary blood and subsequently has the biggest effect in reducing AV differences (at rest) and this is supported by Hughes (1996).

There have been a variety of techniques used that seek to achieve arterialisation. Langlands and sought to arterialise the earlobe utilising heat from a light bulb. Their comparative study, in 1965, assessing ABG and ELCB gas analysis, reported no statistical difference between the PaO2, partial pressure of carbon dioxide (PaCO2) and pH of the two samples. Olvia et al (1973) obtained earlobe samples following manual massage of the earlobe for three minutes but discovered a reduction in PaO2 of the capillary sample when compared to arterial, as a reported consequence of tissue extracts. MacIntrye et al (1965) supported the finding that manual massage of the earlobe alone was not an effective method to achieve adequate capillary blood sampling for blood gas analysis, however massage with a vasoactive cream for three minutes was deemed appropriate in their hypotensive cohort. Godfrey et al (1971) achieved arterialisation by application of a vasoactive cream (thurfyl nicotinate/Trafuril).

Despite the efforts to arterialise the earlobe, Hughes (2009) and Higgins (2008) question the importance of this process given the absence of formal assessment. However, the physiological theory for vasodilatation is that this will assist free-flowing blood enabling anaerobic sampling. Whether to arterialise or not there is firm agreement that manual massage of the earlobe alone is not recommended (Hughes 1996; Olvia 1973; Godfrey et al 1971; Higgins, 2008; Langlands and Wallace, 1965; MacIntrye at al, 1965).

Recent years have seen the publication of newer larger clinical trials which deemed arterialized ELCB gas sampling as simple, less invasive (Fajac et al, 1998) and a satisfactory representation of traditional arterial sample collection so renewing calls for it to be used within clinical practice (Pitkin et al, 1994). Concurrently the wide availability of portable blood gas analyzers to healthcare professionals expanded the geographical range of this intervention to include those in the community.

Analysis of the ELCB gas sample was an area of particular interest and one that has little commonality within published research. A review of clinical trials from 1965 onwards presenting earlobe investigation techniques is shown in Table 1.

Study	Sample Size	Vasodilation	Incision Tool	Sample time
Langlands &Wallace (1965)	16	Heat from a light bulb	Scalpel & bung	Not specified
MacIntryre et al (1968)	14	Cream massage for 3 mins	Not specified	Not specified
Godfrey et al (1971)	8	Cream 10-15 mins	Scalpel & bung	30 secs
Olivia et al (1973)	Not given	Massage 3 mins	Long point lance	Not specified
Spiro et al (1976)	11	Cream 10 mins	Scalpel & bung	Not specified
Pitkin et al (1994)	40	Cream 10 mins	Scalpel	Not specified
Dar et al (1995)	55	Cream 3 mins	Scalpel	Not specified
Dall'Ava-Santucci et al (1996)	81	Cream 5-10 mins	Scalpel	Not specified
Sauty et al (1996)	115	Cream 5-10 mins +/- massage	Scalpel Blade	Not specified
Fajec et al (1998)	70	Cream 5-10 mins	BD Lancet	Not specified
Verges et al (2005)	20	Cream 20 mins	Not specified	Not specified
Wimpress et al (2005)	252	Cream 10 mins	Scalpel blade	Not specified
Eaton et al (2001)	100	Cream 10 mins	Lancet	85% < 60 secs
Honarmand & Safavi (2008)	67	Not specified	Scalpel blade	Not specified
Stott et al (2008)	142	Not specified	Not specified	Not specified

Table 1 Earlobe sample techniques across studies from 1965

In summary 15 relevant studies have been included, all of which have undertaken adult ELCB samples. The majority of the trials were specific to patients with an underlying respiratory disease, however a handful, including Honarmand & Safavi (2008) and Stott et al (2008) were undertaken in an intensive care environment, encompassing a variety of underlying physiological conditions.

The discussion point of interest here was the technique used. 11 out of 14 used a vasodilatation cream, 1 used massage alone, 1 used the heat from a light bulb and 2 did not specify. The anomaly in vasodilatation is only apparent in the early studies and from 1976 is a continuum that remains as previously discussed. It is also clear that the scalpel blade is the most commonly used tool to make the incision and that sample collection time is rarely reported.

Oxygen prescribing has been discussed and is undertaken by specialist assessment services following clinical review, which includes requirement for a blood gas sample which can be either an arterial sample or an arterialized ELCB sample (BTS, 2006). In relation to the chronic management of COPD patients, these roles are largely undertaken by respiratory nurses/physiotherapists both in primary and secondary care settings. The variety of oxygen therapies available all require formal assessment and prescription, the varieties include LTOT to correct chronic hypoxaemia, short burst oxygen therapy for relief of dyspnoea and ambulatory therapy to prevent desaturation of >4% to a value of < 90% when mobilising (BTS, 2006).

Oxygen therapy has proved to be the cornerstone for correcting hypoxaemia during an exacerbation and can been prescribed and delivered to the patient in their home. This temporary medical intervention can only be implemented when deemed safe and clinically appropriate following correct assessment within the framework of a hospital at home/prevention of admission scheme (BTS, 2007). It is clear that the benefits of oxygen therapy cover a spectrum of COPD junctures spanning the trajectory of the disease and demonstrating the need for clinical specialist assessment roles to expand across primary and secondary care health care provisions, including integrated respiratory teams. Furthermore, public policies including the manifestation of the COPD strategy (DoH, 2012, Darzi 2008), the personal approach to care and guidelines surrounding the commissioning and implementation of home oxygen services (NHSPCC, 2011) indicate domiciliary oxygen assessment and follow-up certainly appear to remain within the nursing and allied healthcare professional domain encompassing primary, secondary and integrated healthcare teams.

The BTS, in 2008, recognised that the sample acquisition and process is complex and should only be undertaken by fully trained staff. Clinical experience gained through working within a variety of respiratory healthcare settings over the last ten years suggested that undertaking ELCB gases is often taught by varied peer assessment. This sought to question the training that was currently provided, particularly in light of the ideology that clinical practice should be underpinned by empirical research. The variability of sample techniques (Table 1) questions this phenomenon in this field of practice.

Keen to explore current practice, questionnaires were distributed to 110 respiratory colleagues at an annual respiratory nursing conference, capturing a variety of geographical and healthcare domains. The cohort represented 79 national institutions, including acute trusts, community and some pharmaceutical and university students. Of the distributed questionnaires, 42 responded, representing 31 areas nationally. They were further broken into areas of practice as opposed to individual responses. Questionnaires that had been completed by a group of professionals representing one area were included once only. 3 areas returned 4 questionnaires to say they undertook only ABGs not ELCBs. A further 3 returned questionnaires indicating it was not their area of practice, including a practice nurse, a breathlessness management nurse and a respiratory nurse specialist working in secondary care. This left 22 questionnaires appropriate for analysis (Table 2).

Clinical Area	8 Primary Care, 11 Secondary Care, 1 Community Hospital, 1 Lung Centre, 1 Unknown.
Sample Site	22 = Earlobe
Vasodilatation	16 = Yes, 1 = Yes but stated not recommended. 1 = occasionally. 4 = No - but 'indicated staff should good a give rub' and 'instruct patient to twiddle their ear'
Incision Tool	16 = various lancet devices 3 = Micro lance green/brown needles 3 = Scalpel Blades (secondary care only)
Estimated Sample Time	19 = few seconds to 5 minutes 3 (scalpel blades) = 5-30 seconds
Number of Incisions	19 = 1-3 3 (scalpel blades) = 1 -2

Table 2 Questionaire responses re: current respiratory practice

The findings of the questionnaire highlighted the need for this investigation and demonstrated a wide variation in ELCB technique, a widely used practice that is undertaken nationally by many healthcare professionals across all domains and one that has huge implications for the patient if the prescription of LTOT for a minimum of 15 hours a day is deemed necessary. There was a surprisingly varied approach to the use of both vasodilatation and the number of incisions. The scalpel blade approach reduced the need for multiple incisions and also seemingly resulted in a quicker sample collection time as estimated by the practitioner. Whilst acknowledging an estimated sample time is not a reliable marker of practice, it is particularly insightful as there is a theoretical proposal supporting prompt anaerobic blood sample collection (Hughes, 2009; Cramer, 2006; McIntyre et al, 1965; Langlands & Wallace, 1965; Spiro & Dowdeswell,1976; Wimpress et al, 2001; Honamand & Safavi, 2008).

The number of incisions required to achieve an appropriate blood flow for capillary blood sample analysis was not documented within presented trials, yet experience formed the rationale for including this question within the distributed questionnaires. Findings were that health professionals used a variable number of incisions, indeed more when utilising lancet/needle devices. This data was anecdotal and its plausibility of course questionable, but whilst incision attempts have not been addressed by previous investigations it may prove to be particularly important when examining sample integrity.

The variation in technique led a further inquiry into the content of formal ELCB gas sampling teaching. Two teaching centres were identified, one in central England, who taught the ELBG technique utilising a scalpel blade and bung (EFH, 2011) based upon Cotes et al (2006) guidelines. The second, The Association of Respiratory Technologists and Physiologists (ARTP) who teach to a national audience from a central base. They have recently changed their incision tool from a scalpel blade to a choice of either scalpel blade or lancet as determined by health professional and local practice guidelines (Swindells, 2012). The reason for this change is unclear and no rationale documented, whilst one of the more recent comparative trials Eaton et al (2001) utilised a lancet device for ELCB within which great attention was paid to technique and attempts were made to minimise variables. Their findings reported disappointing correlations in PaO2 between ELCB and ABG, concluding a ELCB approach could not be recommended as an appropriate sample technique upon which to prescribe LTOT.

The majority of the evidence presented in Table 1 demonstrates studies investigating ELCB have obtained sampling utilising a scalpel blade and bung, yet this is in contrast to the current practice undertaken by the majority of healthcare practitioners as captured within the distributed questionnaire (Table 2). Local discussions within the author's place of work, which incorporated Pathology, whose procedures and processes are placed to manage inherent risks CPA (2012), raised health and safety concerns for the use of a scalpel blade for both user and patient, particularly in relation to its application within community settings and repeated sampling (6 monthly for LTOT users, BTS (2006)) therefore it is not currently considered a suitable option for local practice. These concerns are supported by Bernhadt (1995) who, while a supporter of ELCB analysis, proposed skin puncture (finger and earlobe) by lancets as the most appropriate option and that incision with a scalpel blade is unnecessary and dangerous.

The enquiry as to recommended practice remains unclear. The search for a nationally agreed standard for taking arterialized ELCB samples yielded no results as supported by ARTP (2012). Furthermore, guidance as to which is the most appropriate technique to adopt is not directly answered by the providers of portable analyzers. Verbal recommendations from Alere on the 2nd July 2012 and Una Health on the 9th May 2012 are to refer to local policy. Referral to local policy is a common instruction (Warmsley, 2011; SFH, 2010) however an insight into practice as captured within the questionnaires has demonstrated a variable approach in local technique. Therefore it was perceived prudent to review local practice as documented in written local policies/ standard operating procedures (SOP) in order to validate or discount the results previously identified.

A small random sample of local policies/SOPs nationwide were sought and reviewed. Ten areas were sampled again spanning primary and secondary care including two integrated respiratory teams.

Clinical Area	8 Primary Care, 11 Secondary Care, 1 Community Hospital, 1 Lung Centre, 1 Unknown.
Sample Site	22 = Earlobe
Vasodilatation	16 = Yes, 1 = Yes but stated not recommended. 1 = occasionally. 4 = No - but 'indicated staff should good a give rub' and 'instruct patient to twiddle their ear'
Incision Tool	16 = various lancet devices 3 = Micro lance green/brown needles 3 = Scalpel Blades (secondary care only)
Estimated Sample Time	19 = few seconds to 5 minutes 3 (scalpel blades) = 5-30 seconds
Number of Incisions	19 = 1-3 3 (scalpel blades) = 1 -2

Table 3 Local practice/SOPs

The investigations into the practice of ELCB through questionnaires and local policies as presented demonstrated clinical practice concerns. This is particularly disappointing given unequivocal figures that predict an aging population living with non-communicable diseases, including COPD (WHO, 2012) with an associated predicted increased need for oxygen therapy, strengthening the need for a robust, reproducible approach for its assessment. ELCBs have been proposed as being an option to fulfil the demand for easy reliable blood gas analysis (Godfrey et al,1971;Spiro & Dowdeswell, 1976; Pitkin et al 1994; Dar et al, 1995) and patient satisfaction reports a preference for this approach over ABGs (Eaton et al, 2001; Dar et al, 1995).

Professional conduct codes (NMC, 2012) and national quality standards (NICE, 2012) instil the foundations that healthcare practice are essentially underpinned by empirical research, however in the realm of ELCBs this appears to be counter to current practice if the variation in reported technique has physiological implications to blood gas analysis.

The evidence underpinning the theory of ELCB sampling was re-examined to understand whether a variable approach to sample collection impacted on the results as a whole. This was particularly important given the little attention that appears to have been previously given to the repeatability and reliability of the technique. A meta-analysis (Zavorsky et al, 2007) incorporating many of the studies presented in Table 1, sought to clarify the physiological accuracy of ABG verses ELCB. Although both earlobe and finger tip sample sites are included and robustly reviewed, there is no discussion surrounding technique. The end points measured to explore the validity between ELCB and ABG included PaO2, PaCO2 and pH. Zavorsky et al (2007) concluded finger tip and earlobe capillary samples provide a good correlation for pH and PaCO2. Finger tip sampling produced unreliable measurements in PaO2 and should never be used and whilst it concluded that arterialised ELCB samples may be an appropriate replacement for arterial blood gas analysis, adoption of this approach is not recommended when precision is required, an outcome that possibly has been alluded to within early studies. Langlands and Wallace (1965) reported ELCBs were useful in the domain of 'survey work', thus the study data was re-examined to understand the recommendation given. Interestingly, findings demonstrated ELCB gas samples often under calculated PaO2 when compared with arterial sample and the standard deviation was 4.1 mmHg (0.54 kPa), which can be considered substantial in terms of oxygen prescribing. It is unclear whether the investigators acknowledged this difference hence the recommendation made, in 1965, of whether there was a lesser need for blood gas precision in the absence of long term oxygen therapy.

The early studies Godfrey et al (1971) and Spiro and Dowdeswell (1976) reported good PaO2 correlation been ABG and ELCB however their limitations, which include sample size, underlying disease and cardiac output must be acknowledged. Larger, newer studies dispute the reliability of ELCB when compared to ABG (Fajec et al, 1998; Sauty et a, 1996; Eaton et al, 2001; Stott et al,2008; Honarmand & Safavi, 2008) and several theories have been proposed for this; Fajec et al (1998) proposes under-calculation is not a physiological difference but exists as a result of statistical presentation, specifically when simple regression analysis rather than Bland and Altman (1986) is adopted; a theory not supported by Sauty et al (1996) or Honarmand and Safavi, 2008. Wimpress et al (2005) agree an underestimation of PaO2 exists but report repeated sampling improves agreement. The practical implication of repeating samples would be unfeasible, for reasons including patient experience, time resources and financial constraints.

The purpose of this discussion was to investigate and present local and national approaches to an unstandardised clinical procedure. It is interesting to postulate that the recurrent theme of under calculation of PaO2 is evident irrespective of lancet or scalpel blade sample technique as supported by trials utilising both approaches (Eaton et al, 2001; Honarmand & Safavi, 2008). However the knowledge of PaO2 under-calculation of between 0.5 to 1.0 kPa, is recognised by both Dall' Ava-Santucci et al (1996) and the British Thoracic Society (BTS, 2008). This questions the BTS recommendations that support the ELCB approach in oxygen assessment and prescription, particularly for LTOT assessment where precision is required (BTS, 2006).

A key issue is that the questionnaire did not seek to identify the purpose of ELCB gas analysis which may not have been utilised for the purpose of LTOT assessment and subsequent prescriptions. It would have been extremely insightful to have gained an overview of the processes and pathways that were in place to support ELCB, following the collection of clinical information and including follow-up procedures. This was somewhat achieved by the review of local practice guidelines which gave greater insight into the application of ELCB gases in practice. For example, one integrated team undertake a ELCB in the community if SpO2 is ≤92% when the patient is breathing room air, in the presence of lung disease (NICE, 2010); if PaO2 is <8 kPa, the patient is referred to secondary care for an ABG. Another SOP suggests that if a sample is disproportionate to SpO2 or has proven difficult to bleed then an ABG will be required. Another practice SOP samples only for SBOT and ambulatory oxygen therapies. Upon reflection, additional enquiry into the purpose and scope of oxygen assessment within the distributed questionnaires would have added greater depth and insight to the current practice of local and national oxygen assessment practice. Certainly some health professionals are using ABGs both in the community and secondary care centres. Whilst this is a valid reliable approach ELCB evidence has consistently reported good correlation for PaCO2 and pH regardless of the technique adopted, as has been demonstrated in both earlobe and finger tip samples. This suggests this may be an area for further development within respiratory medicine, particularly with respect to identification and management of chronic and acute type-2 respiratory failure.

ELCB is a wide and topical area of interest within respiratory medicine. Limitations of this discussion worthy of further investigation include further knowledge of national practice through examination of SOPs and understanding the financial differences as models of care vary. There would also be benefit in understanding the physiological processes that impact blood gas analysis including cardiac output and appreciating oxygen dissociation curve changes during an exacerbation which may differ between the two sample approaches.

It would appear that a wealth of research has persistently identified that ELCB analysis under calculates PaO2 perhaps indicating that further research investigating correlation is not required. However, studies identifying appropriate lancet devices which improve PaCO2 and pH correlation would be favourable against further scalpel blade research and could alleviate health and safety concerns amongst professionals. The need to establish a safe guideline that appropriately measures PaO2 is imperative for patient safety, and also needed to tackle our oxygen epidemic that is a growing financial concern. Streamlining service delivery nationally that may or may not incorporate ELCB would also be particularly advantageous, assisting the direction of specialist oxygen services.

It is imperative that a national standardised guideline for ELCB technique is formed, even in the light of findings that technique appeared to have little effect on sample outcomes when compared to arterial samples. A national standardised guideline would ensure and reinforce the core principles that vasodilatation would at the very least deliver evidence-based practice in the realm of ELCB.

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Highlights of the International Paediatric Sleep Association (IPSA) Congress 2012

Dr Hui-Leng Tan, Consultant in Paediatric Respiratory and Sleep Medicine, Royal Brompton Hospital, London

The International Paediatric Sleep Association Congress 2012 took place at the Manchester Central Convention Centre from the 5th -7th of December. I was delighted to be asked to write a short article on the highlights of the conference for INSPIRE, focusing in particular on the respiratory aspects of the conference. There were multiple highlights, so this is a very personal selection.

What will change our practice the most will, no doubt, be the new AASM scoring manual guidelines which were just published recently. This was covered extremely well in the Wednesday workshop 'The Nuts and Bolts of sleep monitoring' and is briefly summarised below:

1. In addition to the previous criteria for the scoring of central apnoeas, an event can now also be scored if there is absent inspiratory effort throughout the duration of the event and it is associated with a decrease in heart rate to less than 50 beats per minute for at least 5 seconds or less than 60 beats per minute for 15 seconds (infants under 1 year of age only). For mixed apnoeas, whilst previously the absence of inspiratory effort needed to occur BEFORE the presence of effort, now, an event can be scored irrespective of which way round it occurs.

2. For hypopnoeas, the peak signal excursion needs to drop by ≥30% (compared to the previous 50%) of pre-event baseline and the guidelines now differentiate between obstructive and central hypopnoeas. Obstructive hypopnoeas should be scored if there is snoring during the event, there is increased inspiratory flattening of the nasal pressure or PAP device flow signal compared to baseline breathing, or associated thoracoabdominal paradox occurs during the event but not during pre-event breathing. Conversely, central hypopnoeas can be scored if none of the above is present.

3. When the 2007 guidelines came out, there was a lot of discussion, as one could score a paediatric RERA (respiratory effort related arousal), WITHOUT the event causing an arousal, whereas you did need an arousal in adults. The latest edition now specifically says a RERA does need to lead to arousal from sleep.

4. In periodic breathing, central apnoeas that occur within a run of periodic breathing should be scored as individual apnoeas as well.

On Thursday, one of the symposiums was on the 'Controversies in OSA diagnosis and management: A proposal for a consensus'. Oscar Sans Capdevila presented the Spanish guidelines for OSA diagnosis and treatment. Several other algorithms were presented by other presenters at the symposium. What struck me was the lack of consensus between centres and countries. In Europe, the majority of sleep studies are cardiorespiratory polygraphies, whereas in North America, full PSGs are considered the gold standard. Some physicians use an AHI cut off of 2, some use 3 or 5. Some centres use pulse oximetry as an initial screen for OSA etc. Should the UK come up with a national consensus?

The important questions we need to ask ourselves, which David Gozal mentioned in his talk, are: What constitutes disease? i.e. what AHI cut off should we be using?

One possibility is to use >3SD beyond the mean or >95th centile. However, not every child fulfilling these criteria will demonstrate evidence of end organ morbidity. Do we treat them? Conversely, some children have an AHI<1, but snore frequently, and may have neurocognitive consequences or signs of systemic inflammation. What he proposed was a system, similar to conditions such as rheumatic fever, which adopts a combination approach that includes symptoms, sleep study results, and measurable outcomes, such as biomarkers, functional measures which in the future may include urinary proteomics, neurotransmitters and even genomics.

On Friday, the symposium on 'Promoting healthy sleep in children with cerebral palsy' was particularly interesting. It brought together the experience of therapists, paediatricians and researchers from 3 continents

with a special interest in this area. The complexity stems from the fact that numerous factors need to be considered in these children including: epilepsy, positioning requirements, feeding regimes, pain management, continence problems, sleep disordered breathing, behavioural insomnia, parasomnias and periodic limb movement disorders. With careful and structured assessment, sleep problems in these children are amenable to treatment.

There was an excellent keynote lecture on sleep memory and emotion by Matthew Walker. Sleep loss has a detrimental effect on the ability of the human brain to encode new fact-based memories. He discussed data which showed the benefit of a nap in preparing key brain regions for restoring the capacity for new learning. Stage 2 sleep during the nap correlated with change in learning ability, in other words, the more Stage 2 sleep the subjects had in their nap, the greater their improvement in learning ability.

In terms of emotion, Sleep resets the optimal next day reactivity and functional connectivity of limbic and prefrontal brain networks. These connections are lost with sleep deprivation, with demonstrable increased amygdala reactivity on functional MRI. It is REM sleep which recalibrates the sensitivity of the brain to unique and specific types of emotions.

Interesting posters presented include:

Long term improvements in sleep disordered breathing in school-aged children are associated with neurocognition but not behaviour. A group in Melbourne showed that a decrease in OAHI predicted increase in performance IQ and reading ability. However, behavioural assessment did not improve and all OSA children had higher problem behaviour scores than controls, suggesting early behavioural patterns developed in association with OSA may become engrained by school age, which has implications for the timing of OSA treatment.

Children with OSA have impaired exercise capacity which is independent of obesity. Obese children are exercise-limited due to physical deconditioning, but those with OSA are further compromised as they have an impaired cardiac response, with lower cardiac output and oxygen consumption at peak exercise capacity.

There was fascinating work on cerebral haemodynamics in Bolivian children living at high altitude.

The group in Manchester described their experiences in the long term ventilation of children with metabolic conditions and children with neuromuscular diseases.

Clearly, one of the major social highlights was the Gala dinner which was at Old Trafford Football Stadium. Guests had the opportunity to tour the Manchester United museum, before being treated to a 3 course dinner, with entertainment which included Prof P. Gringras playing the electric guitar.

This has been a brief overview. I thought it was generally an exceedingly well organized and informative conference and are sure everyone is looking forward to the next IPSA meeting which will be in Brazil in 2 years time.

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ARTP Educational Short Courses 2013

ARTP Blood Gas Practical Sampling Course

12th April 2013

Location: ARTP c/o Executive Business Support, City Wharf, Davidson Road, Lichfield, Staffordshire, WS14 9DZ

Target Audience: Qualified healthcare professionals wishing to become practically competent in blood gas sampling.

Aims of the Course: To provide healthcare professionals with the underpinning knowledge and practical skills to develop competence in arterial and arterialised capillary blood gas sampling.

Cost: This one day course costs £150 for ARTP members and £200 for non-member

For more information or to register onto this course please see the ARTP website:
http://www.artp.org.uk/en/courses/blood-gas-sampling/practical-blood-gas.cfm

ARTP Lung Function Reporting Course

13th & 14th May 2013
Day 1- Pathophysiology, Day 2 - Clinical Reporting

Location: The Beeches Conference Centre, Birmingham

Target Audience: Advanced level respiratory physiologists involved in the clinical interpretation of pulmonary function tests, Consultant Physicians and Specialist Registrars.

Aims of the Course: Understand the role of clinical assessment in the diagnosis of disease. Understand the changes in pulmonary function parameters that occur as a result of a variety of disease/disorders. To learn how to write a clinical report. To be able to critically analyse test results and to learn how to interpret lung function results and relate these findings to disease processes and or clinical diagnosis

Cost: The full two day course costs **only** £185 for an ARTP member or £255 for a non-member. Attendees can also register for either day, Day 1- Pathophysiology or Day 2 - Clinical Reporting, for £100 per day as an ARTP member or £150 per day as a non-member

For more information or to register onto this course please see the ARTP website:
http://www.artp.org.uk/en/courses/lft-reporting.cfm

More ARTP courses - Registration opening soon*

ARTP Bronchial Challenge Testing - 27th June
ARTP Cardio Pulmonary Exercise Testing - 14th - 16th October
ARTP Blood Gas Practical Sampling course - 18th October
ARTP Non-Invasive Ventilation - 11th & 12th November

*Please note all courses are subject to minimum numbers and dates subject to change.

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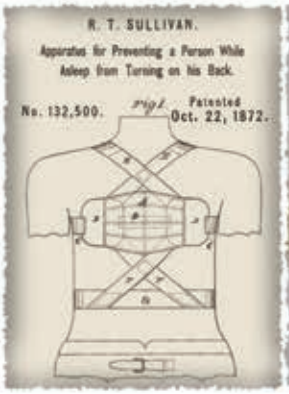

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By Nigel Clayton

Global Lung Initiative

I was fortunate to attend the ERS annual congress in September and met with most of our suppliers. A much talked about topic was the introduction of the new Global Lungs Initiative (GLI) reference equations for spirometry values. These are the first global multi-ethnic reference equations for spirometry that span all-ages. Briefly, data from 74,187 healthy non-smokers (57.1% females) aged 3-95 years were used to derive multi-ethnic reference equations using modern statistical methods, including development of age dependent lower limits of normal.

Since the GLI are not traditional equations, they require the manufacturers to implement them directly into their software. Most of the manufacturers are working on this, however I note that several will be charging for the upgrade on existing equipment, including Medisoft, nSpire Health, MedGraphics and Cosmed. For NDD users, they have stated that there is no charge for the upgrade and the new software is already available for download from their website.

CareFusion state that the changes are already available on Sentry Suite and that for JLAB, Vmax®and Micro Medical the implementation will be completed as soon as possible. Carefusion also state that there will be no charge for the predicted equations. I await this with bated breath, particularly those of us using Vmax software. Let's hope they are true to their word

If you cannot wait for the development of the new software you can download the easy to use free desktop programs at: www.lungfunction.org.

ERS Product of Outstanding Interest (POINT) Award

A new award was made at the last ERS congress aimed at encouraging new innovation and applications into solving the challenges of modern respiratory healthcare. Earlier in the year the 11 Assemblies of the ERS were asked to nominate devices or equipment that embodied innovation, either having the potential for or already demonstrating significant improvement in patient care. Each product was scored and a selection committee identified four outstanding products based on comparative scoring by an impartial selection group.

The six highest-scoring devices were then compared by the judging panel of four (three Assembly Heads and the Advising Editor of the ERS Buyers' Guide) and the manufacturers of the four top-scoring devices were invited to attend the POINT session at the ERS Annual Congress.

The session was well attended by many of the ERS exhibitors, keen to experience how this new award would be made. Each company was allowed ten minutes to present their product to the audience and three judges.

The first two nominated devices were in the diagnostic category.

PneumaScan™

The PneumaScan™ (PneumaCare Limited, Cambridge, UK) uses three-dimensional

(3D) imaging technology similar to that found in the X Box gaming consol. It also looks very similar to WALL-E the little robot. The manufacturers call this ''structured light plethysmography'' to measure breathing and even spirometry parameters remotely from the patient. A chequered light pattern is projected onto the patient's chest and cameras then record breathing and measure dimensions to produce images and measures of ventilation.

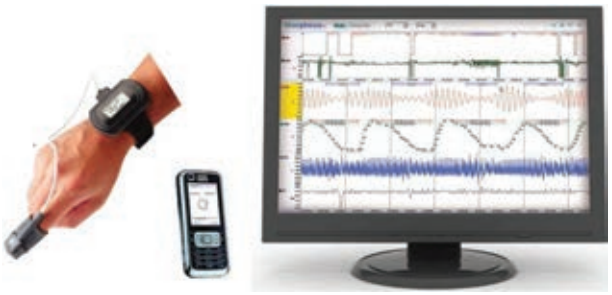
The system can also review the left and right side contributions or the upper chest and lower abdominal function as they relate to the recorded respirations. The manufacturers claim the accuracy is such that that it complies with ATS/ERS spirometry standards.

The exact clinical niche for the PneumaScan™ has yet to be fully established, but its very existence has prompted some novel research and clinical applications, most logically, in the operating theatre, ITU, sleep investigations, or for bed-bound patients

PneumaScan™ in operation

Morpheus®Ox

Like standard oximetry devices, Morpheus®Ox (WideMed, Herzliya, Israel) uses photo-plethysmography (PPG) to measure blood oxygen saturation, then uses a clever algorithm to produce an accurate and reliable sleep study diagnosis, including sleep/wake, apnoea–hypopnoea index and Cheyne–Stokes respiration. WideMed has also developed a unique mobile telephone application capable of recording and transmitting the data collected during the test. Morpheus®Ox is simple for the patient to use; its wristwatch size enables it to perform a sleep test in the comfort of the patient's own bedroom, and it is therefore comfortable and less intrusive than multichannel or polysomnography systems.



Morpheus®Ox

The second two devices to be nominated were in the treatment category

Puritan Bennett™ 520 /560 ventilators
The Puritan Bennett™ 520 and 560 ventilators (Covidien plc, Dublin, Ireland) are a new compact, lightweight ventilator with long-lasting internal lithium-ion batteries with real time battery indicator and external power options. The ventilators have multiple alarms and data management capabilities delivered via a USB memory device that enables the easy transfer of patient information to the clinician's computer. A neat feature of these ventilators is that the ventilator settings and alarm settings are linked to reduce the risk of clinically inappropriate settings. Oxygen enrichment is available using a low-pressure oxygen source by a specific measurement kit to monitor inspired oxygen levels, making them an ideal half-way house between a home and intensive care device.

Puritan Bennett™ 560 ventilator

VENTIlogic LS
The VENTIlogic LS (WeinmannMedical Technology, Germany) is also a new non-invasive ventilator designed specifically for use in COPD patients. Algorithms were developed that may help to avoid additional hyperinflation. The specific algorithm, AirTrap Control, automatically regulates frequency and expiratory time in order to avoid short expiratory times. There is also a trigger lockout that avoids false triggering and trigger artefacts when trigger sensitivity is high. Finally, a temporarily increased expiratory pressure is produced to prevent early collapse of the airways, which represents the most important mechanism that contributes to hyperinflation.

Versatility of the VENTIlogic LS ventilator

Once the presentations had been made, the tension mounted as the judges (our own Brendan Cooper, Paolo Pelosi (Italy) and James Paton (Glasgow)) went into deep discussion. They were obviously having some difficulty in deciding the outright winner. After more tension, the panel sat back to announce that two of the products had achieved the same score! The award was therefore shared between PneumaCare Ltd for the PneumaScan™ and WideMed for the Morpheus®Ox.
The ARTP offers it congratulations to both companies. If you would like to nominate a product for the 2013 awards, this can be done at: www.ersbuyersguide.org/point

Manufacturers Survey

Many thanks to all those who completed the manufacturers survey. The number crunching has been completed and the awards will be made at the ARTP conference in Hinckley on 8th February.

Complaints

Don't forget, if you have any problems regarding equipment malfunction, quality control / calibration, service response times, software issues etc. please feel free to voice your opinions off the forum by contacting the Manufacturers Liaison Committee direct at Watchdog@artp.org.uk. We will then be able to collate this information, including verification of accuracy, before commencing on an appropriate course of action.

Finally, to all the manufacturers who may be reading this article, please remember to keep us posted with details of any new products you are about to release on the market. Details should be sent to nigel.clayton@uhsm.nhs.uk.

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Abstracts for ARTP Conference 2013

Whether you are a student, you have recently completed your degree, or an experienced researcher, the ARTP Annual Conference is an excellent setting to present your findings

‘Research is about going up all the alleys to see if they are blind’ Marston Bates, 1950

An abstract is a means of communicating either a work in progress, or completed work. Whether you create the abstract to confirm a suspicion, describe a novel piece of research, show the result of an audit, or demonstrate a better way of working (with measurables), the ARTP membership need to hear about it. You are expected to present it at our forthcoming conference in a friendly, supportive and educational atmosphere.

To help with the cost of attending the conference, ARTP members can apply for a conference grant, up to the value of £500. For more information about these grants, for the terms and conditions and to download the application form, please visit the ARTP website at www.artp.org.uk, and navigate to:

ARTP>About>Conference Grants

ARTP 2013 Conference Abstracts

The ARTP would like to thank all those that took the time to submit an abstract at the ARTP 2013 conference. There were a large number of excellent posters demonstrating the depth of research being done in respiratory and sleep across the UK.

Please find below the winners of the best abstracts from the 2013 ARTP Conference

Category A — Winner - Rhea Fielding

This category is for students and those who have not previously presented at an ARTP conference.

Category B — Winner - Claire Pringle

This category is for the more experienced researcher You may be asked to perform either a poster presentation as above, or an oral presentation.

Congratulations to the winners of the best abstracts and many thanks to everyone that presented a poster or an oral presentation.

ARTP 2013 conference talks, photos and information can be found on the ARTP website (members section) http://www.artp.org.uk/en/members-area/resources/conferences/2013-hinckley-content/index.cfm

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