August 2019 VOLUME 20, ISSUE 2

ARTP | Association for Respiratory Technology & Physiology

Inspire

INSIDE THIS ISSUE:

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FIRST WORD

VOLUME 20, ISSUE 2. AUGUST 2019

Summer time and the living is easy? Depends on your air con I suppose. I hope you have been enjoying all of the summer sporting events which seem to be more numerous than ever this year. The new football season looms and I believe there is a Rugby World Cup just around the corner. Thankfully, the **Inspire** team have resumed their preseason training and have rallied to produce this latest issue.

A traditionally slim summer journal this time, but none the worse for that. We have all the regular articles plus the annual '**No prizes**' cryptic crossword—all answers related to lung function and sleep. This has been thoroughly tested on at least two extremely bright physiologists and so is perfect to complete during your well earned summer holiday.

Fresh Air continues to "*highlight the latest trends in research and innovation from both respiratory and sleep sciences*". This time with a clear and concise update on Forced Oscillometry. This is a technique which has been around for some time and the article describes it is easier to use as technology is Improved and normal values are incorporated. From an earlier time, '**From the museum**' reminds us of an age when wires and counterweights were the latest technology. **On the Blower** rounds up the latest summer news from the manufacturers.

Finally, in another attempt to be as up-to-date as possible, we have **Refresher**, highlighting some recent social media messages concerning lung function plus **Top Forum**, in which I have attempted to provide a concise summary of events on the ARTP forum, which has been very busy since the last issue.

The issue ends with information about the forthcoming **ARTP National Strategy Day** and also **ARTP conference 2020**. Take these together with '**A Word from the Chair**' as a reminder that while we may briefly pause for a summer holiday, the ARTP 'season' continues apace!

My thanks go to all the contributors, without whom **Inspire** would be very slim indeed! Thanks also to the Editorial committee for their comments and I would especially like to thank Matt Rutter for his assistance in setting out a clear timetable for article submission.

Aidan Laverty

A WORD FROM THE CHAIR

Julie Lloyd

ARTP Honorary Chair

Hello and welcome to the summer edition of Inspire. Hopefully many of you will either have been or are about to go on a holiday to recharge and refresh for the challenges that lie ahead. The ARTP Board has been busy since the last edition of Inspire and as always, I must extend huge thanks for all the work they do alongside busy work and personal lives that makes ARTP the organisation that it is. We have an excellent portfolio of education courses coming up in the next few months and the work on the new ARTP website is proceeding at pace. The new website will provide us with opportunities to communicate both with our members and with the public and raise awareness of the impact that healthcare scientists have in the diagnosis, care and management of patients with respiratory and sleep disorders.

In this edition of Inspire, there are some fascinating images of a spirometer from the archives. Sadly, this makes me feel very old as I can recall using something very similar when I first began working as a respiratory physiologist. Moving to more current technology, there is an excellent review from Dr Samantha Irving on the utility of the Forced Oscillometry Technique (FOT), which has struggled somewhat to find its place in routine respiratory function testing but may be about to 'come of age'. We also have a 'Best of the Forum' section, where questions or queries that stimulated discussion on the ARTP Forum, along with the responses received are available. This really demonstrates what a valuable resource the ARTP Forum is to all our members to obtain friendly advice or pick up on the experience of their colleagues when trying to develop or deliver services.

Planning for a number of exciting ARTP upcoming events is well underway, with the National Strategy Day scheduled for Friday 6th September at the Hilton Birmingham Metropole. This event is free to attend for all Heads of Departments or their nominated deputies and we have planned an exciting and interactive program discussing current and key issues facing respiratory and sleep services across the UK. We have managed to secure a discounted rate for those heads of department who wish to travel down the night before, with details available on the website.

The program for ARTP Annual Conference in Birmingham is now complete, with almost all of the speakers confirmed and excellent uptake from our manufacturer colleagues. We have received several nominations for ARTP Special Awards and we look forward to announcing the recipients at Conference. For those of you preparing your abstract or case studies, please be mindful that the submission date is Friday 27th September as there will be no extension of the deadline this year. The deadline is just in time for those of you travelling to the ERS Congress in Madrid to get your abstract in before you board your flight! ERS Congress is an excellent opportunity to see cutting edge research presented, network with respiratory colleagues from all over the world and if you're very lucky, sample some local culture. ARTP has awarded a number of travel grants to support ARTP members to attend ERS, so if you have an abstract you want to submit and fancy seeing the sights of Vienna in 2020, please consider applying for an ARTP travel grant to attend.

For those of you that do travel to Vienna next year, it may come as a surprise that unlike the UK, not everywhere is ‘smoke free’ and in some smaller bars and restaurants there are no ‘smoke free’ areas at all.

Sign to indicate the location has both smoking and non-smoking areas in Vienna

The UK has been at the forefront of reducing the harm from cigarette smoking and we now have one of the lowest smoking rates in Europe with fewer than 1 in 6 adults smoking. The consultation document ‘Advancing our health: prevention in the 2020s’ published 22nd July 2019 by the Department of Health and Social Care announces a smoke-free 2030 ambition by working with the health and care system, to put prevention at the centre of their decision-making. This ambitious plan is an important step in the fight against the harm caused by smoking that we all see in our practices every day and should lead to significant improvements in the lung health of people in the UK.

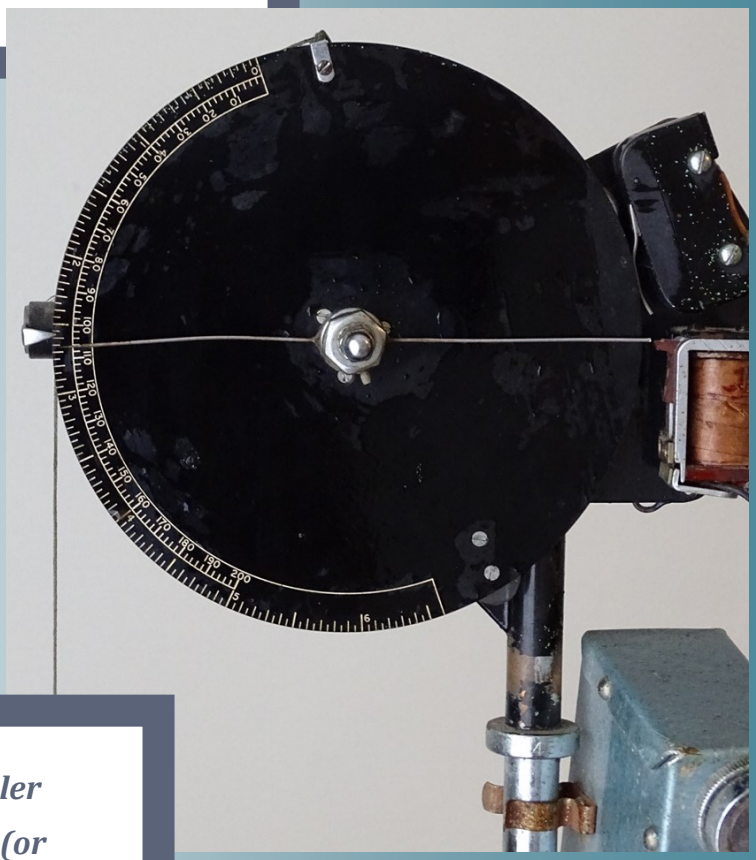
I’ll keep this ‘Word from the Chair’ brief as I’m sure that the sunshine beckons outside... or another patient for those of you reading this at work. As always, I’d really love to hear your feedback and suggestions for what you would like from your ARTP. I look forward to seeing many of you at the National Strategy Day of the Conference and I really hope you enjoy this edition of Inspire.

FROM THE MUSEUM

Image by Dr David Chinn

Gaensler spirometer (Poulton & Son, Barry), 1960s.

This device was obtained from the MRC unit at Llandough Hospital, Wales after its closure in the 1980s. For demonstration purposes the timing device is shown attached to the upright where the counter balance weight would have been in place.



Recording dial, Gaensler Spirometer. The FEV1 (or FEV0.75) was recorded using the stylus. The FVC was recorded using the outer indicator.

Matt Rutter

Alan Moore

Prof. Brendan Cooper

ON THE BLOWER

This edition of 'On the blower' has an overview of the benefits of FeNO from Circassia, plus the latest product updates from Intermedical, Remserve , Stowood and Vyaire.

Manufacturers Survey

It's nearly that time again to open up the latest manufacturers survey and take a look back at the last year. Full details will be coming shortly from ARTP. The manufacturers are an essential part of the NHS and excellent service deserves to be rewarded. If you have any issues please contact your account manager, if you have unresolved issues please contact watchdog@artp.org.uk. MR

FeNO overview by Circassia

Circassia

FeNO aids the accurate diagnosis and improves symptom management through medicine optimisation for asthma patients

Diagnosing and managing asthma is still a challenge today

Asthma is a heterogeneous clinical disorder with varying presentations. Objective tests currently in use such as spirometry and peak flow, focus solely on lung function, but cannot assess the degree of airway inflammation. Knowledge of airway inflammation facilitates and aids asthma diagnosis and management through medicine optimisation, which can lead to clinical benefits including fewer exacerbations.

Why use FeNO monitoring for accurate asthma diagnosis?

Eosinophilic inflammation is a major underlying cause of asthma whereby nitric oxide is produced by epithelial cells as part of the inflammatory response. Fractional exhaled nitric oxide (FeNO) is a biomarker of this airway inflammation and monitoring FeNO is becoming an increasingly common, quick and highly accurate way of diagnosing asthma. It gives an immediate result compared to blood or sputum eosinophils. It's quick, easy and non-invasive for both adults and children from the age of five years.

Medicine optimisation in asthma

FeNO monitoring can also be used for patients who already have an asthma diagnosis - through tracking airway inflammation over time and ensuring their medication is working properly. It complements existing asthma monitoring tools for a complete picture to diagnose, treat and manage asthma.

FeNO monitoring:

* Aids the diagnosis of asthma and identifies patients with Th2 inflammatory phenotype
* Is a predictor of response to Inhaled Corticosteroids (ICS) and optimises ICS dose
* Uncovers non adherence to ICS
* Reduces exacerbations in patients at risk of future events
* Helps to identify patients for treatment with a biologic

Benefits for the patients

By seeing a FeNO reading themselves on a screen, patients automatically have greater knowledge around their condition, a faster diagnosis and potential clinical benefits. Preventative measures can also be taken if a reading is higher than usual, providing an early warning system for exacerbations, giving patients a tailored treatment plan, and the assurance that their asthma is being controlled using the latest technologies.

Cost effective asthma diagnosis and management

FeNO monitoring reduces healthcare costs through medicine optimisation and improving clinical management and easily integrates into primary care workflows.

FeNO monitoring and the technology behind it is a means of supporting highly accurate asthma diagnosis and treatment. Already in place in many hospitals and endorsed by a number of CCGs across the UK, it is also likely to be used in increasing numbers of GP surgeries over the coming years.

ON THE BLOWER

Product Updates and News

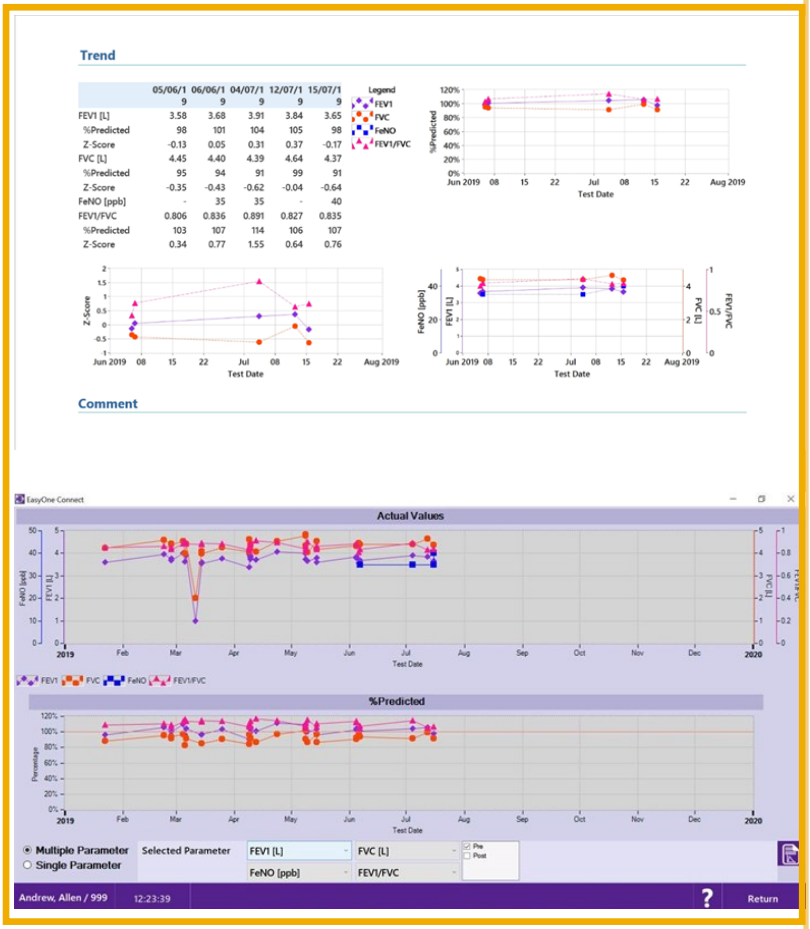
intermedical

The Bedfont® NObreath® is a simple to use, battery-powered handheld monitor that measures Fractional exhaled Nitric Oxide (FeNO) in the breath. The device has been designed for use in almost any clinical setting and can be used to test children as well as adults.

With the Bedfont® NObreath® FeNO monitor, your departments budget can stretch even further by costing at just £3.50 per patient and not per test. NObreath® uses single patient mouthpieces that can be used multiple times without expending mouthpieces unnecessarily in order to achieve a good quality test.

Click here to view our savings calculator: http://www.nobreath.co.uk/nobreathv2/secondarycare/

Ndd's EasyOne Connect software has a trend facility which allows the user to trend the usual lung function parameters. It also has the additional benefit of allowing the user to manually insert additional test parameters including FeNO which means that the FeNO reading can be seen on the same report as the spirometry parameters. You can also trend both the FEV_1 and FeNO reading at the same time and on the same report.



As always, Ndd EasyOne Connect software is completely free of charge and has free updates for life.

RemServe is very excited to announce that we are now offering the O2 Pro Pulse Oximeter Ring to the UK market.

One device fits most patients, fits neatly and easily over the fingers, comfortable and less obtrusive for the patient, removes the need for poorly fitting soft tip and clip sensors reducing light and artefact.

Records several nights downloadable data and can be used in conjunction with smartphone apps, helpful for spot testing and walk tests. The Ring Sensor can be set to vibrate with different level of intensity and threshold, useful for mild obstructive disorders.

Simply place the Ring Sensor over the chosen finger to turn on, remove to turn off, connect to a phone to sync data and view real-time oximetry. The data can be extracted from the device on to a PC as a PDF report or as a CSV if you require the data for further analysis.

Key Features:

Continuously monitor and record Blood Oxygen, Heart Rate and Motion

Smart Vibration triggered by low oxygen

Works with CPAP or Oxygenator

Comfortable and soft

IOS & Android App & PC Software

If you would like to request further information on the O2 Pro Pulse Ring, please get in contact with the team at **RemServe Medical**.

E-Mail: info@remservemedical.com

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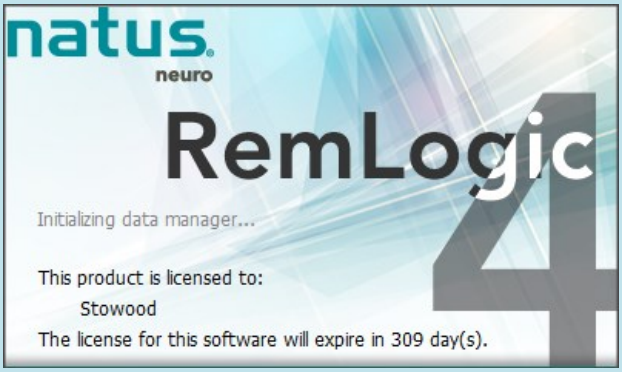
Stowood

Stowood
Innovating sleep diagnostics since 1992



As part of their continual research and development, Embla have released RemLogic 4 and RemLogic-E 4 and are now working on the next version. This software is compatible with Windows 10, and has new features for making analysis easier and faster. For the Embletta MPR PG and Embletta Gold, the upgrade is free to Remlogic-E 4. For users of Embla PSG such as the S4500, N7000, the upgrade is available. New Embla systems such as the brand new SDx and NDx will come with Remlogic 4

The ARTP members may be interested to know that the replacement to the overnight Konica Minolta Pulsox 300i is the Viatom Checkme O2, compatible with Stowood's Visi -Download. The product is becoming well accepted within the NHS for overnight oximetry testing for OSA screening. Our internal tests have indicated only a very small difference between the Konica and the Checkme O2 - means of less than 2 dips/hour for ODI at 4%, less than 2 dips/hour for ODI at 3%, less than 2% SpO2 saturation and less than 2 bpm pulse rate.

There is a lot of excitement in the air at Vyaire!

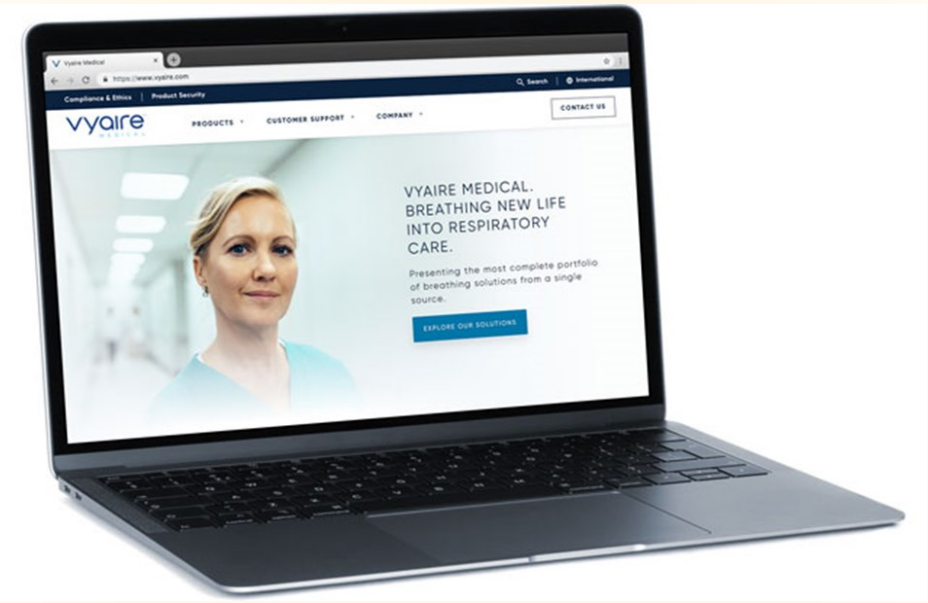
- vyaire.com
- Customer Experience Centre
- Vyntus® ONE

vyaire.com

We invite you to visit our new website: **www.vyaire.com.**

Today's vyaire.com is a reflection of our customer-first strategy, and with this in mind we have built our new site with the following features:

- Navigation on the site by clinical speciality, rather than just by brand
- Customising and grouping products and information for easy sharing
- Searching the knowledge portal to solve specific challenges



This is our first step to improving our online presence so please take a look and let us know what you think!

Customer Experience Centre

Our Customer Experience Centre is coming soon! Located at our Basingstoke, Hampshire headquarters, the center will house all of our Vyaire products in an easy to access location. The site is available for anything from training to customer evaluations. We look forward to welcoming you soon! Vyaire Medical is also supporting the upcoming ARTP CPET course.

ON THE BLOWER

Vyntus® ONE

Nothing is more critical to human life than air. When the ability to breathe is compromised, quality of life suffers. This is what drives Vyaire Medical, to create respiratory diagnostic equipment, that strives for higher levels of accuracy and patient friendliness than ever before.

With that, Vyaire Medical is pleased to announce the latest member of our Vyntus® family. The **Vyntus® ONE**. Vyaire Medical has designed Vyntus® ONE to be effortless for clinicians and people-friendly for patients. Vyntus ONE is incredibly capable with a modular design that possesses an impressive array of features. It is designed to make your tests more accurate, less intrusive and less stressful for patients.

Powered by SentrySuite® software, the reliable Vyntus ONE offers you the following applications:

Standard measurements for Pulmonary Function Testing (using our Ultrasonic Flow Sensor and Flow Path Valve eDemand)

Standard measurements for Cardiopulmonary Exercise Function Testing (using Digital Volume Transducer for the CPET measurements)

Many optional measurements and features to accommodate the wide range of patients and tests carried out in your busy lab today

SpiroConnect

PC Based Spirometry System

SpiroConnect is the latest PC based spirometer, designed by the inventor of the original turbine spirometer and creator of the MicroLab, MicroLoop and SpiroUSB spirometers.

With its patented vertical turbine, SpiroConnect is a new and improved turbine spirometer that is more sensitive to the low flow rates seen in many patients including those with COPD.

SpiroConnect is compatible with Numed's I³ integration software, which automatically retrieves a patient's details from the EMIS, TPP SystmOne or Vision GP clinical systems and files a PDF report and up to 40 coded results to their medical record upon test completion.

For more information about SpiroConnect, please visit numed.co.uk/spiroconnect or telephone 0114 243 3896

numed healthcare | Dedication Innovation Trust

RXiBreeze – a portable home use CPAP solution

Until now PORTABLE CPAP devices have purportedly been a poor imitation of the home CPAP product. Not intuitive, varying degrees of difficulty with set up, settings and use, noisy with higher noise levels stability and delivery fluctuations. But now the RXiBreeze is the new benchmark in portability with all the functionality of the major home CPAP device currently on offer. The difference? Is in the detachable main console for travel, no need to buy a secondary expensive unit.

Features:

- 13+ hr Battery, Main Console Clicks on Top into Position
- HME filters to Enhance Humidification During Travel
- Bluetooth Wireless iPOM SpO2 Watch for Monitoring*
- Smart Phone Connectivity
- iMatrix Software

* Sold separately

Home or Away:

With excellent build qualities that exceeds that of its closest rivals, the new RXiBreeze has been designed using the highest industrial grade hardware platform and implementing ResVent's high performance blower, coupled with touch screen sensitivity that is equal to the latest smart phones and a comprehensive data management system, the RXiBreeze opens up CPAP devices not only to a new level but a new era.

Advantages:

- Full system CPAP/APAP
- Docking Station with Humidifier
- Wi-Fi & Bluetooth connect
- Intuitive Touch Screen Technology
- Standard 15mm/19mm or Heated Tubing*

* Sold separately

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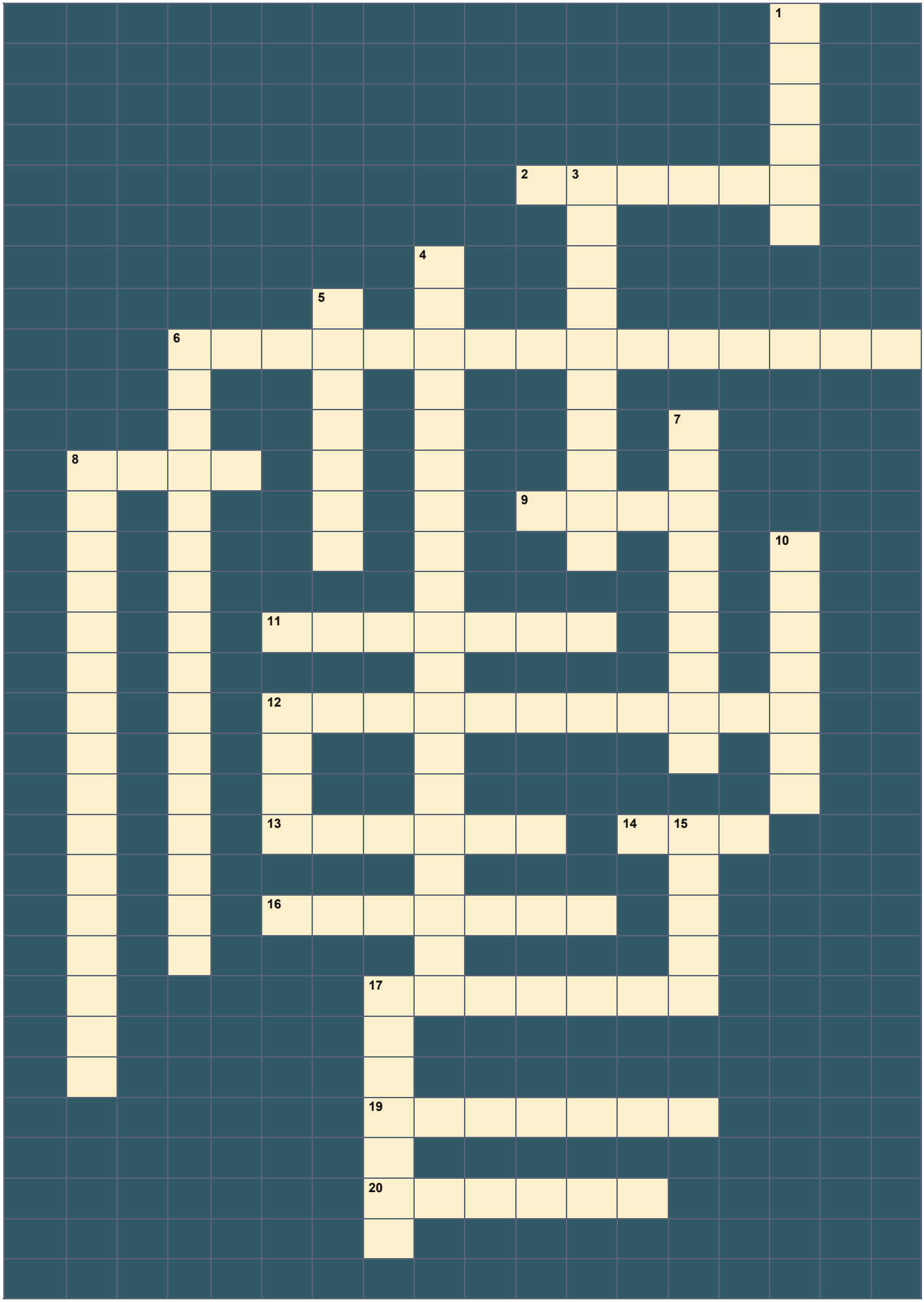

CLUES

Across

2. Short Czech in pain regrouped to aid interpretation? (1, 5)

6. Sounds like multiple pretty boys are meditating over RPG, yah? Sleep recording (15)

8. Hide the device for nose or face (4)

9. Reorganised part to make a great organisation! (4)

11. Sounds like turn is boring for sleep feature (7)

12. Knots amulet transformed to help asthma control (11)

13. Special Japanese Maple to help with medication? (6)

14. Freedom of transport initially provides test technique (3)

16. Walk boldly, alternatively for high-pitched breathing (7)

17. Still batting at church tower but lead others to breathe regardless (7)

19. See 12 down

20. Previous icy rain but breathe out now (6)

Down

1. This Gen-X brief year old is essential to breathe (6)

3. Imports rye muddles in LFT (10)

4. Brit shorn with concoction for a tight squeeze? (19)

5. Much ado over almost poisonous creates lack of vital gas (7)

6. This derived sleep parameter may create the ultimate spinster (5, 7, 4)

7. Sleep pattern creates GP harmony (9)

8. Religious service with disorganised em, retrospect detects gas. (4, 12)

10. Disorganised grizzly perhaps plus article inspires (7)

12. Pammi spends for colloquial muscle strength measurement (4, 3, 4)

15. It's the skin of a bullock in a compound ain't it mate? (5)

17. Hernial transplant provides respiratory relief (7)

All answers related to lung function

ARTP Association for Respiratory Technology & Physiology

Answers will be published in the December issue

Dr. James Stockley— Editor

Fresh air

Forced Oscillometry – An Update on Clinical Utility

Dr. Samantha Irving. Royal Brompton and Harefield NHS Foundation
For ARTP Research Committee

Oscillometry techniques are often taught during training in respiratory physiology, but in practice in many centres these measurements rarely form part of standard clinical protocols. However, with advances in technology in recent years these measures are becoming more practical during a standard respiratory clinic, and the availability of normative values has aided clinical interpretation[1–3]. This is particularly true of the forced oscillometry technique (FOT), which is more comfortable and better tolerated by patients (especially children) than impulse oscillometry (IOS)[4].

More detail on the mechanistic concepts behind FOT can be found here[4, 5]. In brief, total respiratory impedance (Z_{rs}) is the sum of all forces opposing the oscillations delivered into the respiratory system and is calculated from the pressure and flow at a given frequency. Z_{rs} can be subdivided into its two components, resistance (R_{rs}) and reactance (X_{rs}).

Increased airways resistance can result from any pathology that decreases airway calibre (e.g. asthma, chronic obstructive pulmonary disease (COPD), upper airway obstruction). The most common application of the oscillometry techniques is to calculate the resistance of the small airways, a notoriously difficult area to measure with non-invasive techniques. At 5 Hz, the soundwaves generated by an oscillometer are able to penetrate the entire airway. Therefore, resistance at 5Hz (R_5) reflects resistance of the whole airway, including the periphery. At 20 Hz, however, the waves can only penetrate the central airways so R_{20} only reflects resistance of the large airways and the cavities within the oro-pharyngo-larynx (**Figure 1**).

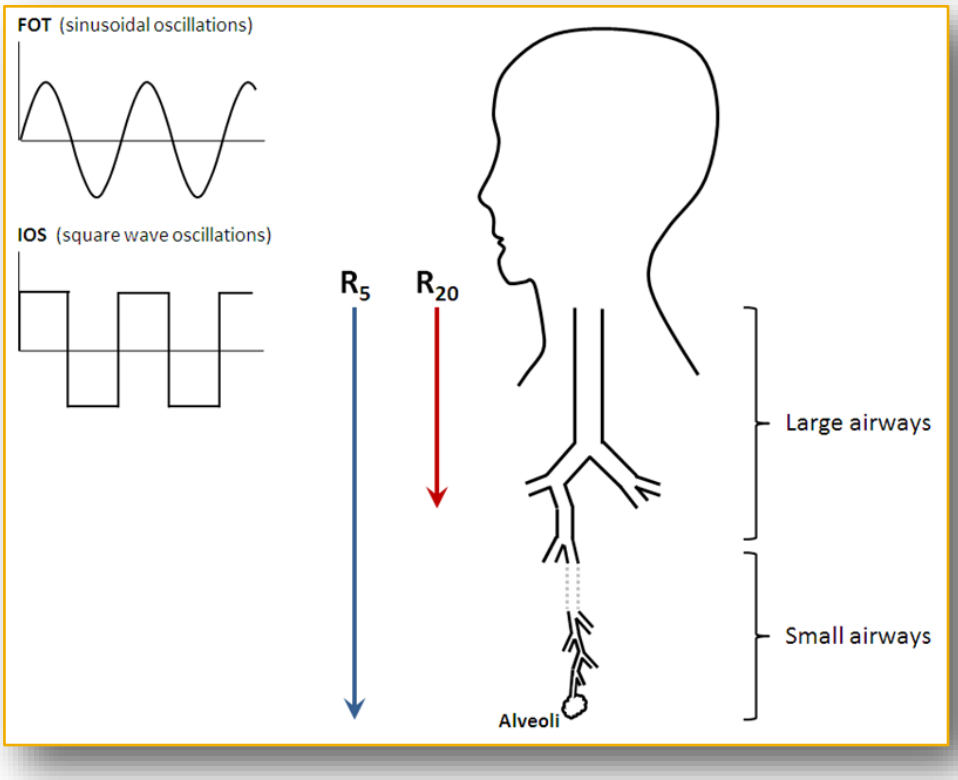

Figure 1: A diagram demonstrating the differential penetrative capacity of high frequency (20Hz) versus low frequency (5Hz) oscillations. FOT delivers the oscillations in a sinusoidal wave, whereas IOS delivers square wave "pulses".

Peripheral airways resistance is calculated by subtracting R_{20} from R_5 (R_5-R_{20}). In healthy individuals, this value is generally small but, in peripheral airways obstruction, R_5 alone is generally raised, leading to an increase in R_5-R_{20}. In contrast, both R_{20} and R_5 are increased in upper airway obstruction.

Reactance is the imaginary component of Z_{rs}, relating to two different properties of the lung; (i) The inertia (*I*) of the moving air column and (ii) the elastic properties, or "capacitance" (*C*) of the lung tissue. Capacitance can be thought of as the "rebound" of the airways in response to the oscillations and it is a measure of the ability of the lung to store energy. This occurs primarily in the periphery where cartilaginous support is lost and lung tissue expands far more easily. At low frequencies, *C* dominates and measures of X_{rs} primarily reflect the peripheral airways, at higher frequency, *I* dominates and X_{rs} reflects the inertia of the air column of the large airways. Therefore, *C* (often described on reports as "low frequency reactance") may also be an important tool in measuring the physiology of the lung periphery. The relationship between the different oscillometry parameters are further explained graphically in **Figure 2**.

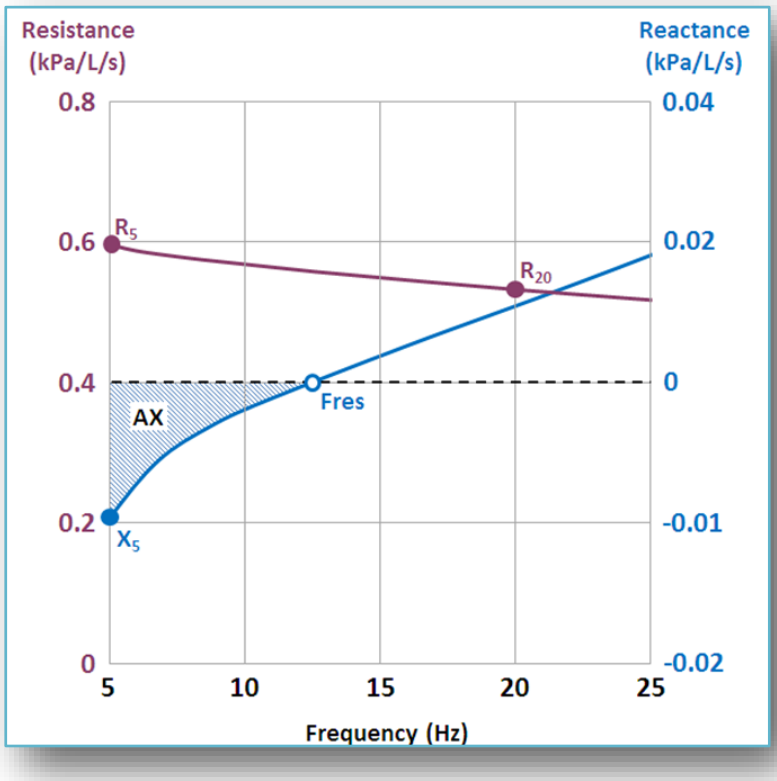

Figure 2: A stylised representation of an oscillometry curve. The resistance (Rrs) is shown by the purple line, with R5 (whole airway) and R20 (large airway) highlighted. Reactance (Xrs) in blue shows the capacitance (C, below zero) portion of the reactance and inertia (I, above zero) portion. The frequency (Hz) at which reactance equals zero is referred to as the "resonant frequency" (Fres). This is used to calculate the shaded reactance area (AX), also called the "Goldman Triangle", which is often used as a measure of compliance and patency of the small airways.

Oscillometry techniques have been widely researched but several pieces of research have been important in promoting its clinical utility and driving a change in practice. Firstly, FOT may have uses in patients where spirometry is either inappropriate or unachievable. Young children often lack the necessary coordination to perform forced vital capacity manoeuvres but may be able to perform FOT, which only requires tidal breathing[6, 7]. This is also true in the case of patients with learning disabilities or dementia. In some asthmatic patients with highly reactive airways, repeated forced manoeuvres may result in bronchoconstriction, so FOT may be a safer alternative in these patients when unstable.

Furthermore, one of the key drivers of this method in paediatric practice is the use of FOT in assessing bronchodilator reversibility (BDR) in children too young to reliably perform spirometry. BDR is an important part of the diagnosis of asthma and wheeze and assessing/grading its severity and in younger children can be very difficult. However, studies have shown that FOT measures improve following bronchodilator in young children with wheeze, suggesting that it is a valuable tool in assessing the severity of airways disease, at least in this patient group[6, 8].

In addition to its use in BDR, variability in Rrs may be related to asthma severity[9]. In children with asthma, high variability over a 5 day period was associated with both worse asthma control and severity. Single occasion measurements were not discriminative between asthmatic and healthy control children but variability was worse in children classified by their physician as having persistent and uncontrolled asthma. There is further evidence that day-to-day changes in FOT may be predictive of exacerbations and therefore more useful in at-home monitoring for patients with asthma than spirometry or peak flow[10]. Presently, however, the cost of FOT equipment would make this unlikely for adoption in clinical practice.

R5, the whole airway measure of resistance, has been shown to be predictive of an improvement in FEV_1 following asthma treatment with combined inhaled corticosteroids and long-acting β2-agonist in a cohort of adult asthma patients[11]. However, it is unclear how steroid-naïve these patients were at the time of treatment, which may affect the wider application of these results.

In adults with asthma, small airway measurements are of increasing interest. Small airways are currently poorly targeted by inhaled therapies due to deposition of particles in the conducting airways, making this phenotype poorly respondent to conventional therapies[12, 13]. In these patients, spirometry may be normal or near normal, so FOT (as a more sensitive measure of peripheral airway physiology) may be more useful[3]. FOT has also demonstrated a greater sensitivity to the subtle changes in the small airways during bronchial challenge testing, which has provided further support for its clinical usefulness in asthma[14].

Potential application of FOT in chronic suppurative lung disease (CSLD) is less well established, largely as patients with extensive pathology can be monitored successfully with existing tests. However, recent preliminary

work investigating autogenic drainage in cystic fibrosis showed an improvement of FOT indices relating to the large airways but not the small airways[15]. As well as providing a proof of concept for FOT use in these patients, this is also mechanistically interesting as it allows for a more detailed physiological understanding of autogenic drainage.

In COPD, there is also a revived interest in the measurement of small airway disease[16], where FOT has been shown to provide useful, complimentary information to spirometry. For instance, during exacerbations of COPD, FOT has been shown to be an effective way of measuring expiratory flow limitation (EFL), which can be quantified from within-breath changes in reactance (ΔXrs)[17, 18]. Patients with higher variation showed higher dyspnoea scores and reduced performance in 6 minute walk test (6MWT) than those with variation below the upper limit of normal. In another study, EFL measured by FOT was shown to be an important feature of COPD exacerbation[19]. Additional FOT parameters may also be useful in detecting very early smoking-induced changes within the small airways[20, 21] and monitoring COPD progression[22].

In addition to published articles, there is also a wealth of promising research that has been recently presented at many prominent respiratory conferences. Although these are predominantly pilot studies, measures of FOT have been used to detect subtle airway changes in healthy subjects in response to various exogenous insults including extreme long-distance running[23], e-cigarette vaping[24] and exposure to environmental factors[25, 26]. Additionally, the feasibility of FOT as an outcome measure in large studies was successfully demonstrated[27] and other studies reinforced its use in COPD monitoring[28, 29], BDR[30] and asthma control and severity assessments[31–34].

It is worth noting that there are some important limitations in the use of FOT[4, 5]. Firstly, although deceptively simple to measure, care must be taken with patient positioning (some manufacturers recommend tilting the chin upwards to minimise positional influences on upper airway resistance), hand support of the cheeks (to avoid expansion of the buccal cavity), and seal on the mouthpiece. This is particularly challenging for patients in whom the test might be most valuable i.e. young children and other patients not able to comply with forced manoeuvres. Care in the set-up of the equipment and necessary staffing must be taken in these patient groups. Several groups in which manufacturers recommend the test, including chronic suppurative lung disease and in critical care/ITU are not yet supported by sufficiently powered studies in the literature[5, 6]. In some patient groups, sufficiently large studies to conclusively prove clinically important changes in BDR or following other interventions remain absent.

In summary, FOT is a quick, non-volitional assessment of airflow mechanics that has the potential to differentiate between small and large airway physiology. Despite this, it has yet to be widely adopted as a clinical tool in the decades since its invention. However, recent advances in technology and the ongoing development of more robust reference ranges appear to have increased its clinical reliability and versatility. Currently, FOT can serve as a useful adjunct to traditional tests (such as spirometry) for a variety of assessments in many patient groups or an appropriate alternative in patients unable to perform spirometry.

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Refresher

Recent tweets & articles that have inspired

ARTP @ARTP_NewsJul 4
ERS statement on respiratory muscle testing at rest and during exercise | European Respiratory Society. **https://erj.ersjournals.com/content/53/6/1801214**

BMJ @bmj_companyJun 19
Good heart and lung (cardiorespiratory) fitness in middle age is associated with a lower long term risk of chronic lung disease (COPD), suggests Danish research published in @ThoraxBMJ today **http://ow.ly/d55N50uEe5F**

CHEST @accpchestJul 10
Researchers train algorithm to help identify tuberculosis on chest x-rays.
https://t.co/aXel7vgFjA

CHEST @accpchestJul 7
Lung cancer radiotherapy may be tied to higher cardiac mortality.
https://t.co/Bf86XolQDf

RespFutures Trainees @RespTraineesMay 27
RespFutures Trainees Retweeted Steve Johnson
Do all your local pharmacies recycle? Why not check & make sure all your patients know where they can take their old devices. #RespIsBest #NHS #sustainability #climateemergency

James Hull @Breathe_to_winMay 22
James Hull Retweeted European Lung Foundation
Great resource - with links to every airline's in-flight oxygen policy / requirements. **https://www.europeanlung.org/en/lung-disease-and-information/air-travel/**

PCRS @PCRSUKJul 10
If you are confused by conflicting guidance on the role of FeNO testing in the diagnosis of asthma, take a look at the new PCRS consensus statement which gives pragmatic advice on when FeNO testing in primary care should be considered. **http://bit.ly/2YKq7OP** @stonny999 @ARNS_UK

Diving into cold water can be deadly—here's how to survive it.
https://theconversation.com/diving-into-cold-water-can-be-deadly-heres-how-to-survive-it-119341

Viruses—not bacteria—cause most childhood pneumonia
https://www.sciencemag.org/news/2019/06/viruses-not-bacteria-cause-most-childhood-pneumonia

Air pollution speeds up aging of the lungs and increases chronic lung disease risk

https://www.ersnet.org/the-society/news/air-pollution-speeds-up-aging-of-the-lungs-and-increases-chronic-lung-disease-risk

High COPD risk occupations identified in large study

https://www.ersnet.org/the-society/news/high-copd-risk-occupations-identified-in-large-study

Should pulmonary rehabilitation be a standard of care in lung cancer?

https://thorax.bmj.com/content/early/2019/05/15/thoraxjnl-2019-213157

Massive haemoptysis and ventilatory failure in pregnancy

https://thorax.bmj.com/content/early/2019/05/31/thoraxjnl-2019-213292

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https://reference.medscape.com/viewarticle/912157?src=soc_tw_190622_mscpedt_reference_mdscp_Guidelines&faf=1

The association of nocturnal hypoxia and an echocardiographic measure of pulmonary hypertension in children with sickle cell disease.

https://www.nature.com/articles/s41390-018-0125-6

Toxic air will shorten children's lives by 20 months, study reveals

https://www.theguardian.com/environment/2019/apr/03/toxic-air-will-shorten-childrens-lives-by-20-months-study-reveals

Refresher

Share your tweets with Suhilla Hashimi, Inspire Deputy Editor at Suhilla.Hashimi@gstt.nhs.uk

Aidan Laverty
on behalf of
Harry Griffin

Top Forum

Staff competency 17th April 2019

The question: how to ensure consistency of quality of measurement across staff?

What systems (if any) different laboratories have in place to ensure the continuing quality of measurements performed by different members of staff over time?

Initiate a peer review system to ensure high quality of testing and adherence to guidelines. Each staff member is assigned a minimum of 10 results from the last month.

We have peer review of every set of results which are then verified by a senior member of staff. Every year there is a staff QC programme where a senior member of staff watches every member of staff from the referral, pre-test questions, patient test, to the report. This allows for any deviances from practice to be picked up and any across the board lack of knowledge or gaps to be addressed.

As part of IQIPS we have an extensive system of assessing staff competencies on an annual basis which is mainly self-certification as well as 6 monthly peer – reviews for all levels of staff. This may mean re-assessment for tests that they haven't kept up competence. All new staff are signed off for competency with our tests and related systems. We keep a spreadsheet which is an overview of "who is competent at what" which helps workforce planning and advertising posts because we have a list of functions for particular roles/jobs within the department. Whilst we interview and employ well qualified/experienced staff, we sign them off to be safe and aware of our processes, so that patients are protected at all times.

This is an integral part of IQIPS. We also use annual self-assessment which is linked to appraisal. We then undertake peer review of other investigations and this is linked to an individual's job plan of which investigations are relevant to their role and therefore require repeat competency assessments. This is for all investigations and therapies undertaken/applied within the department.

RV for gas trapping – 22nd May 2019

The question: Does anyone only use the RV to determine the presence of gas trapping?

I have always used RV/TLC to determine gas trapping with a ratio of above 0.45 being significant, we use plethysmography to measure lung volumes in patients with airflow limitation. In relation to that would you think it is acceptable to indicate the severity of hyperinflation using the TLC by SR's?

The RV%TLC is the marker of gas trapping. The FRC%TLC is a market of hyperinflation.

I would use ›1.64 SR's (above the 95th centile of the reference range) as being significant as in lung function our normal range falls between -1.64 to + 1.64 (5th-95th centiles). Some people will use ›120% predicted if they don't use SR's but we know there are issues with this.

Be careful with just using TLC alone for hyperinflation - they may just have big lungs. As already mentioned, look at the FRC/TLC ratio and the FRC. You can also use the RV to see if there is evidence of hyperinflation if it is › 1.64 SR's but again, also look at the RV/TLC% to confirm this as they may just have big lungs so a slightly bigger RV and TLC therefore a normal ratio. By looking at only one number, you will never get all the information you need to correctly interpret.

I have not used the FRC/TLC ratio but we will incorporate it into our reporting now.

Would you suggest going by the SR on the FRC/ TLC to determine a raised parameter?

For some weird reason no reference values actually exist for FRC%TLC. The simplest thing to do is to divide the predicted FRC by the predicted TLC and then take the ULN for both of these and create the ULN for FRC%TLC.

So for a male, aged 62 and 1.70m

TLC Pred = 6.50 and ULN = 7.65

FRC Pred = 3.44 and ULN = 4.43

FRC%TLC = 52.9 and ULN = 57.9

It's crude, but it's the best we have.

Another nice check/indicator of gas-trapping of course is the VA/TLC ratio. This tells you more about gas mixing of course, but also acts as a technical quality check – was a full inspiration made, etc.

I agree with others, you need several values (RV, FRC, TLC) and also you have to understand the technique used to measure the values.

All of this information will no doubt soon be used to enable "machine learning" of lung function testing so pattern recognition/agreement approaches perfection – far better than humans! (See recent ERJ paper?) Think of life without hours of reporting..... more time to speak to patients, time to quality check staff and develop their skills. This will be true for sleep physiology too, where machine learning will replace analysis of PSG and polygraphy and be more accurate and faster. This is why we are healthcare scientists delivering care and science in health but we are not technicians.

Design guidance for CPET laboratory 4th June 2019

Question: Can anyone point me in the directions of a resource, guidelines or just any advice about the design of a purpose built CPET room?

I'm involved in the design of a new CPET facility for my department. Should I be asking for anything more than just insisting it is air conditioned?

In 2006, ARTP published a Working Group Report on Department Size and facilities.

See link: http://www.artp.org.uk/en/professional/artp-standards/index.cfm/Dept-Size-Report

Whilst this hasn't been updated, I would suggest most of the guidance is still relevant today. It's useful ammunition when persuading managers about what you need to deliver a safe, comfortable and adequate service.

We have a state of the art Exercise Testing facility that we were able to design from scratch as part of the PFI build. It means we have treadmill, cycle ergometer, CPET equipment and the facility to do ISWT all in the same room, together with the Resus/Crash Cart. We are lucky to have windows on the ground floor that doesn't have direct sunlight very often, so temperature stability is fairly good. Always think of the rare contingency of a collapsed patient and having space for the crash team to get around them in an emergency (rare, but it can happen).

We also wrote a paper for ERS around buying capital equipment which gives you pointer on "doing the deal" ; J K Lloyd & B G Cooper Replacing your lung function equipment: what you need to know? ERS Buyer's Guide, ERJ, 63-72, (2013).

It would be good to have enough space between the bike and walls etc in case of faint/ collapse. A couch/ bed would be useful. A sink or area for cleaning equipment. Access to an emergency alarm button. Room for a crash mat and crash trolley would be good too.

The room should allow for the equipment to be placed in the room so that movement around the patient is possible with space in case of collapse and over-estimate your power outlet requirements!

Allow space for sink and couch and crash trolley.

Think about, exactly, where you want your sockets and network points in relation to your equipment position. They won't change it later for you. Also consider where any piped oxygen might be positioned if that is being installed too.

Top Forum

Spirometry post-liver transplant 1st May 2019

Question: Does anybody have any experience with performing spirometry post liver transplant? My thought was 4-6 weeks post-surgery but I may be asked to do it sooner.

Can he cough? Has he been given any practical restrictions? If no restrictions, by now, it should be possible to get some results, but it may take a few attempts to get consistent, reliable best values over a few sessions perhaps. As ever, the benefits of performing spirometry must out-weigh the risks. Would oscillometry answer the question if detecting asthma? It's non-volitional and would require

He's a CF patient so they are looking to compare to his previous spirometry - otherwise something oscillometry would be ideal. We don't routinely perform it in CF's so wouldn't be able to provide comparisons. I've not actually seen him yet so I will enquire to see if he had any other restrictions placed on him and assess him when he attends to see if he is able to perform spiro.

The most relevant factor in terms of obtaining good numbers is how well healed he is at present.. Given the major surgery and the extent of the incisions, he will, no doubt, be pretty tender and that means poor numbers usually. Are poor numbers of any more value than waiting until he is well healed? My view is better to wait and get the best he is able to deliver.

Thanks - my thoughts also. If numbers are submaximal we won't know if it's due to disease or due to the surgery.

I agree that full lung function may not be possible or meaningful currently as the patient heals from major surgery. But if they have an exacerbation of their lung condition in the meantime (say next few months) you'd need some handle on the airways, for example. Hence trying a "passive" technique (e.g. oscillometry) to monitor respiratory therapy or deterioration would be useful.

Serial lung function is something ARTP should perhaps develop some guidelines on. Examples could include;

- Patients with chronic airways diseases should have initially something other than spirometry to monitor the airways with "passive" techniques in case they are unable to perform forceful manouevres because of surgery (as in this case) or severe deterioration. Can compare with the baseline going forward.
- Patients receiving serial gas transfer testing (IPF, BMT, Lung Tx, etc.) should get POCT Hb measurement at each test visit to give more reliable data.
- Neuromuscular patients should have Sit/supine spirometry, MIP/MEP and SNIP at first visit and then follow up with SNIP alone (I'd personally add SLP to that but not yet widely used!)
- In certain patient groups a baseline CPET should be used to determine a fixed submaximal workload (e.g. 75% VO2 Max) to follow up over time rather than repeated CPETs

I'm sure there are many examples of good practice in serial lung function measurement. Perhaps a chapter in the next ARTP Lung Function handbook or revamped ARTP guidelines?

Physiology-led sleep clinics 12th April 2019

Question: How feasible is it to run physiologist-led sleep clinics?

I would like to introduce Physiologist-led sleep clinics and are trying to develop a competency framework for the training required to run a clinic in place of the consultant. Currently all patients see a consultant as part of the pathway and we would like to move away from this as the routine and leave it for the exceptions. Patients are diagnosed using a level 3 sleep study. So far we have planned to observe a number of consultant sleep clinics and include those of ENT and Maxfax colleagues; we have also developed a template for the clinic history to ensure that similar information is asked of the patient and these clinics would only be undertaken by senior members of staff who have undertaken additional sleep training. We are also considering the clinical governance implications although the plan at the moment is that these clinics would run alongside a consultant running a clinic so we wouldn't be without access to guidance. Specific questions: What grade of staff undertake these clinics?What additional sleep specific training did you require? Do you have any additional insurance for working independently?

Re: What grade of staff undertake these clinics? (Downloads, equipment issues, etc.) Band 4 or 5 (supervised by Band 6 or above).

Re: Diagnosing, issuing/altering treatment – to be signed off by Band 7 who has regulation or above. (Think about how you would defend your position in a legal claim or patient complaint).

Re: What additional sleep specific training did you require? You should have spent some time reporting PSG (as a guide, follow STP training curriculum) in a busy UK sleep centre. Attendance at an ERS or ESRS sleep course (e.g. on-line module) would be advantageous, but at least ARTP Advanced Sleep course. Going forward, these roles would only be for staff holding STP equivalence or qualified STP.

Re: Do you have any additional insurance for working independently? No, your hospital indemnity will cover this, unless you are a clinical scientist regulated by HCPC - as should have independent liability insurance anyway.

See STP curriculum for sleep aspects in competency document.

Churg-Strauss syndrome 3rd June 2019

Question: Could anyone advise me as to how Churg-Strauss syndrome might manifest in lung function and of what value the results might be in managing the patient ?

I know it is a form of vasculitis and that it occurs in patients with a history of asthma. So I guess there may be airway obstruction evident and possibly a reduced TlCO?

I have just searched our database, as Churg-Strauss happens to be one of our clinical details. Take home message: Airflow obstruction, variable reversibility. Lung volumes tend to show a high end of normal RV, TLC within the normal range. Transfer factor seems to be very variable, and depends on whether patient is a smoker or ex-smoker. Response to steroids is very variable, but lung function seems to be a good way to monitor steroid response.

ARTP 2020 CONFERENCE - CALL FOR ABSTRACTS

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1. Abstracts at Scientific Meetings

An abstract, which may be an Oral (Spoken Poster) or Poster Communication is a means of communicating work in progress or completed work and may include interesting case studies, research or audits.

Abstracts should be submitted in one of three categories –

A. RESPIRATORY
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C. QUALITY IMPROVEMENT AND PATIENT SAFETY

The decision as to whether a presentation is to be a poster or oral communication will be solely that of the ARTP Research Abstract committee.

The abstract committee will -

* Review all abstracts submitted using an anonymised version.
* Require that an abstract that does not conform to these guidelines be amended before acceptance in order to maintain the high quality and scientific worth of abstracts published in *Inspire*.

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The ARTP Innovation has changed. This is now known as the ARTP Quality Improvement and Patient Safety (QIPS) award. The format of this award will be similar to the current awards that are presented to the best Respiratory and Sleep Abstracts.

We are kindly inviting Hospital Departments and Services to submit QIPS abstracts to the ARTP Annual Conference 2020 in order to raise awareness and to promote QIPS within Healthcare Science.

QIPS strategies may include but are not limited to the following areas of clinical practice with the key theme of Inspiring Quality, Safety and Productivity into Healthcare Science:

* Implementation of new medical device (s) and/or technology (ies)
* Service redevelopment to include patient pathways, increasing outpatient capacity, public patient involvement, community respiratory/sleep services, cost saving techniques)
* Strategies/Initiatives to improve patient outcomes
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QIPS abstracts should be submitted and presented in the same way as Research abstracts. A panel of judges will mark each QIPS Abstract during the conference programme and the one that receives the highest score will be presented the ARTP QIPS Award during the Gala Dinner.

In addition the QIPS abstracts will be published in the ARTP Inspire Journal.

2.Submission of Abstracts

* Abstracts must be submitted using the online facility via the ARTP website and must be received by 11:59pm on Friday 27th September 2019.
* The abstract body should be no longer than 2,000 characters plus one figure/table (not included in the word count).
* Authors will be notified by Wednesday 16th October 2019 as to whether their submitted abstract has been accepted for presentation.

I do hope that you will consider submitting and sharing your research and innovation and look forward to seeing you all at the ARTP Conference 2020.

James Stockley
ARTP Research and Innovation Chair
For further information:

Please visit the ARTP website at www.artp.org.uk, or Contact ARTP Administration by email at conference@artp.org.uk, or Telephone 01543 442141

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