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ARTP

Association for Respiratory Technology & Physiology

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Inspire

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FIRST WORD

VOLUME 22, ISSUE 1. APRIL 2021

Welcome to the April 2021 issue of Inspire, which now displays an International Standard Serial Number (ISSN 2634-954X) on the cover. I don't think this is related to the fact that 'LFTs' are regularly mentioned in the news (as 'Lateral Flow Tests').

Not so many weeks ago I was wondering about content for this issue, specifically where it would come from as the (virtual) annual conference was rescheduled until July (abstracts by 17th May) and as departments struggled back into a return to normal scenario. Even the manufacturers news appeared to be sparse. Potentially the situation will improve and I am pleased to say that contributors (both regular and new) 'stepped up' so my thanks to them. I am also pleased to welcome Dr Vicky MacBean and Christopher Warren as much needed Deputy Editors. Although arriving late in the production of this issue my hope is they will help to provide fresh ideas for *Inspire* as this is my eighth year as Editor! You can also help with this by emailing me at Inspire@artp.org.uk if you have written an article or if you have ideas for features. I also note that ARTP have committee vacancies.

To this issue: the ARTP Lifetime Achievement Special Award for 2021 goes to Sheila Edwards and this was presented at the recent BTS meeting. Congratulations to Sheila and congratulations also to Keith Butterfield and to Heather Ambler, each of whom are retiring with fulsome ARTP best wishes.

We have an original research article investigating whether there is a role for Primary care-based respiratory and sleep physiologists, which could probably be revisited in the COVID-19 era.

On to the regulars: 'On the Blower' contains the latest product information from three manufacturers who contributed this time. 'How it Works' tackles plethysmography, which will be split over two issues. I know that computers make things simpler (and more accurate) but there was something tactile about aligning the paper, switching an X-Y recorder inputs to display box or mouth pressure (or flow and volume), not forgetting to turn the time base off for the latter. 'Top Forum' is perhaps more useful this issue if, like me, you delayed switching from Yahoo to Google Groups and missed something as a result. Details of how do this begin the article. Sometime regular 'From the Museum' features the Vitalor, with a colour which is fated to be in this issue. Finally a regular feature, which is also original research, is provided from ARTP Research & Innovation via 'Fresh Air'.

We start the issue with a reflective 'Word from the Chair'. My thanks again to all contributors and to the Editorial team. I look forward to the virtual conference and hope to provide content from that in the next issue.

Aidan Laverty

A WORD FROM THE CHAIR

Julie Lloyd

ARTP Honorary Chair

Hello and welcome to the 'Spring' edition of **Inspire**. Hopefully, you will have been enjoying the unseasonably good weather we have had so far in April and maybe even meeting people you haven't seen for many months for a well-deserved, COVID safe catch up! I've been using the weather to explore some of the local canals, which are much more beautiful than I ever imagined. This picture was taken near a village called Fradley and somehow feels as if it's from another era.

However, back to the job in hand! This quarter's version of **Inspire** is a real bumper issue, with hopefully something to interest everyone. Kevin Hogben, who is known for his encyclopaedic knowledge of the history of lung function measurement, has produced a fascinating article tracing the history of body plethysmography. I note from the article that this is Part 1, so it looks like we have a further instalment to look forward to in the future. Given the current work on Diagnostic Hubs, we also have some real food for thought in the study by Charlie Earle from Swansea University examining whether

primary care-based respiratory and sleep physiologists is a role that should be developed. I am aware that there are small numbers of our members that already provide this role, but maybe something we will all be doing more in the future? There is an excellent article from 'On the Blower' highlighting the potential effects of food and drink on exhaled nitric oxide values – rather than 'you are what you eat', more 'you excrete what you eat'!

In this edition, we also bid goodbye to some members who have made an enormous contribution to respiratory and sleep science and ARTP; our ARTP Special Award Winner and former BTS Chief Executive Sheila Edwards, ARTP Webmaster and Head of Service at Dorset Hospital, Keith Butterfield, and Heather Ambler, Clinical Services Manager (Respiratory Physiology Services) for NHS Greater Glasgow and Clyde.

Spring is often seen as a time for reflection and for new beginnings after the dark days of winter; for many of us, this winter has given us some of the darkest days we have ever experienced. Over the last few months, large numbers of us will have been redeployed to roles that we never imagined we would be called to do and to provide care to some of the sickest patients in the hospital. I doubt any of us can say that this experience has not changed us in some way. However, like all of you, I am hopeful that the worst times of COVID are behind us and we can now begin the work of recommencing our services and working our way through the many patients that require our care and expertise again. This will not be without its challenges, as we move away from how we used to work and explore new ideas and new ways of working. Over the last few months, I have seen how adaptable and how innovative respiratory and sleep scientists can be and I have never been more proud to be the Chair of this organisation. What lies ahead is not yet certain, but in the words of the Bengali poet Arundhati Roy:

> *"Another world is not only possible, she is on her way.*
>
> *On a quiet day, I can hear her breathing."*

How very apt for those of us in respiratory and sleep.

ARTP Lifetime Achievement Special Award Winner 2021

Sheila Edwards

During the recent British Thoracic Society Winter Meeting, ARTP were delighted to award Sheila Edwards, BTS Chief Executive, an ARTP Lifetime achievement special award to acknowledge her huge contribution to the respiratory field

Sheila was appointed as the first BTS Chief Executive in 1998, following a review of the BTS structure. Since her appointment, she has demonstrated a commitment to inclusivity and team working across all levels. She has welcomed all those practicing in respiratory healthcare (scientists, physiotherapists, nurses, etc.) from both primary and secondary care and enabled them to find their place within BTS.

Sheila has always been a great friend to and supporter of ARTP. She constantly tried to build bridges to establish the ARTP-BTS Liaison Group, which subsequently became the ARTP & BTS joint strategy board. She has enabled respiratory and sleep scientists to get more involved with BTS by seconding them to various committees including BTS Education Committee (designing the Summer BTS Meeting), Standards Working Groups or other BTS Advisory Groups. She saw the need to involve the entire clinical team and not just one clinical team or group.

Her ability to manage difficult meetings, intransigent people (….including a certain past Chair and President of ARTP!!) and the ebb and flow of professionals' politics is legendary. She has more recently striven to get the ARTP & BTS joint strategy board strengthened and been helpful and diplomatic in ensuring spirometry training and respiratory physiology teaching for young doctors is established for better care of patients.

Sheila and Dr Martin Allen were a great double act at BTS for supporting ARTP in so many ways. On a personal level, Sheila has been supportive and diplomatic when the going has been tough and helped me navigate ARTP through sometimes tricky waters. I will miss her support and her genuine care for those who work with her.

Professor Brendan Cooper, President of the Academy of Healthcare Science, was asked for his recollections of Sheila and noted *'Sheila has always had a lovely warm and welcoming persona, which regularly spilled over into BTS work. She was largely responsible for the 'British Tea Stand' first at ATS then ERS congresses, so that delegates "away from home" could meet up and share information and invites to various conference events – and have a brew! Whenever I was at an overseas conference, there was always time for a catch-up chat with Sheila, who showed a genuine interest in how things were going. I've always known she was a keen football fan, and she always made sure there were TV screens at any BTS when a World Cup or Big Match was being played. Because of her familiar, gentle Northeast accent, I'd always assumed she was a Sunderland fan. I only found out in a recent email exchange, that in fact she's a Chelsea fan (….duh, why else would you work in London!). I think she's forgiven me!*

BTS will have a challenge to replace Sheila on her retirement, but knowing her, she will have set out the pathway for a seamless transition for the next CEO to take over the helm and steer BTS and respiratory medicine as a whole, through the turbulent waters of healthcare change ahead. It's been an enormous pleasure and privilege to have worked with Sheila over more years than we both care to mention. Have a great retirement and look back on a good job, brilliantly done. As a previous Chair and President of ARTP, thank you for supporting us over all those years'

ON THE BLOWER

Matt Rutter
Alan Moore
Prof. Brendan Cooper

This edition of 'On the blower' has an interesting article from Circassia about the effect of nitrate-rich foods and FeNO testing. The latest product updates from Intermedical, and Vitalograph.

Click on the manufacturer logo to access their website

Article:

CIRCASSIA

How certain foods affect FeNO testing results

FeNO (fractional exhaled nitric oxide) testing can help clinicians to support asthma diagnosis. It is important to be aware that several factors may influence a patient's FeNO levels, including age, sex, weight, and height.[1]

Nitrate-rich foods increase FeNO levels

It is important to be aware of any factors that may influence a patient's FeNO levels. For best results, patients should be advised to avoid certain types of food a few hours before a FeNO test.

Studies have shown that nitrate-rich foods, especially leafy vegetables such as lettuce, spinach and kale, but also beetroot, can increase FeNO.[2,3]

Caffeine, alcohol, and tobacco may decrease FeNO levels

Other types of food can have the opposite effect. In a recent study, caffeine was shown to decrease FeNO levels significantly.[4] However, it is good to know that other studies have reported different results and concluded that caffeine does not need to be considered.[5,6]

Whereas coffee potentially affects FeNO levels in the short term, other food and lifestyle habits can have a lasting effect.[7] A study by Afshar et al. pointed out that excessive alcohol consumption causes a reduction in FeNO levels. [7]

Tobacco has also been found to influence FeNO levels both in the short and the long term.[8,9,10] In a study by Kougias et al. researchers analysed the effect of smoking one cigarette immediately before measuring FeNO, and saw a significant decrease in FeNO levels.[9] Malinovschi et al. looked at the long-term effects of tobacco and concluded that both current and ex-smokers have lower FeNO levels.[10]

In conclusion it can be said that certain types of food may affect a patient's FeNO levels. It is recommended that clinicians communicate this clearly to their patients.

For more information about FeNO testing please visit https://www.niox.com/en-gb/

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Product Updates and News:

intermedical

The **Spirobank Smart** is still proving to be an extremely popular way to monitor vulnerable patients effectively and safely at home. The Spirobank Smart is a hand-held spirometer that works with an App on the patient's Smartphone. The test can be performed in real time and sent directly to the clinician. The App shows the Flow Volume graphs as well as the actual values, % predicted and LLN of all the key parameters and the PDF report produced is based on the ATS/ERS recommendations. The Spirobank can also integrate into a number of monitoring portals such as **PatientMPower** and the **Project Breathe** and **Breath RM** portals. Integration into the NHS Health Hub is also under development.

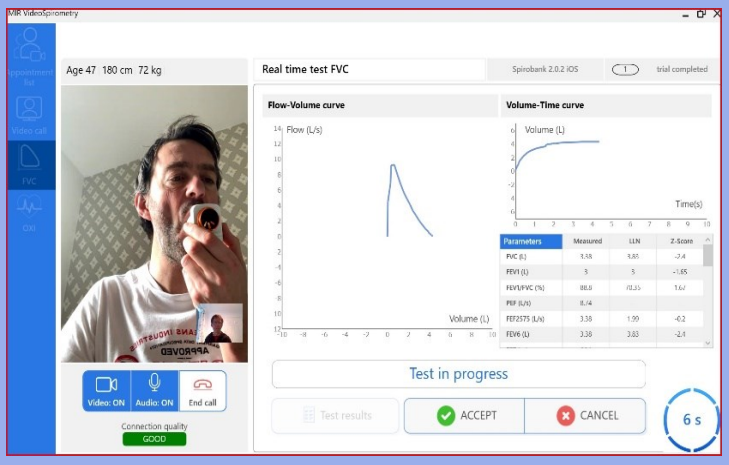
We are also pleased to announce that our new **Video Spirometry Windows application** is now available connecting your Windows PC to your patient's smartphone. This offers the following:

◊ Live video call with patient from the clinician's PC to patient's smartphone via **MIR Spirobank** app.

◊ See flow volume and volume time curves in real time as the test is done.

◊ Option to delete the last blow.

◊ Save report on clinician's PC, no need for patient to email it.



A detailed demonstration can be performed via Teams so please contact us to arrange a date.

Other news and we are seeing a big increase in interest for our networked spirometry solutions that can be integrated with hospital EMR and are license free. This includes our EasyOn PC, EasyOne Air and portable full PFT system (EasyOne Pro/ProLab) for use in Community/outreach lung function testing.

Waiting time between patients can be cut to 15 minutes with the **Rensair air purifier**, that traps and kills viruses. Dentistry is a high AGP procedure and the latest dental guidance recommends a 15 minute wait where there are 10 or more air changes per hour.

The Rensair purifies air with HEPA-13 filtration and kills 99.97% of bacteria and viruses (including Coronaviruses) using a patented, UVC ozone-free light technology. No installation is necessary, it just plugs in and switches on. It is supplied on castor wheels and easy to move between rooms. Efficacy is confirmed by independent lab tests and it is already in use in several NHS trusts.

A full presentation along with calculations specific to any given clinic room is available from Intermedical on request.

The new version of the **Resmon Pro oscillometry/FOT device** uses the same proven algorithms as the previous device and has the additional advantages of a full colour touch screen and improved connectivity. Tests involve tidal breathing only and do not require forced manoeuvres. FOT is more sensitive to peripheral airway changes than spirometry.

The **Bedfont NObreath** is proving to be a big success in both Primary and Secondary care, facilitating cost-effective and accurate FeNO testing.

Contact us for our latest offers.

And finally, Intermedical are pleased to have partnered with Finnish company **Ventica** to extend the use of their technology in testing children aged 1-5 as other lung function tests are difficult in this age group. The device measures tidal breathing patterns overnight by impedance pneumography and analyses variability. Reduced variability is associated with persistent wheeze and obstruction. A number of published papers demonstrate its efficacy and we are in the process of facilitating additional UK based studies.

Vitalograph®

A Global Leader in Respiratory Diagnostics

2021 continues to be a time like no other, but with the arrival of a vaccine and hopes for a clearer path to a brighter future, we all have high hopes for this year. As always, we at Vitalograph commend both members of the ARTP and the wider NHS for all their hard work during very difficult times.

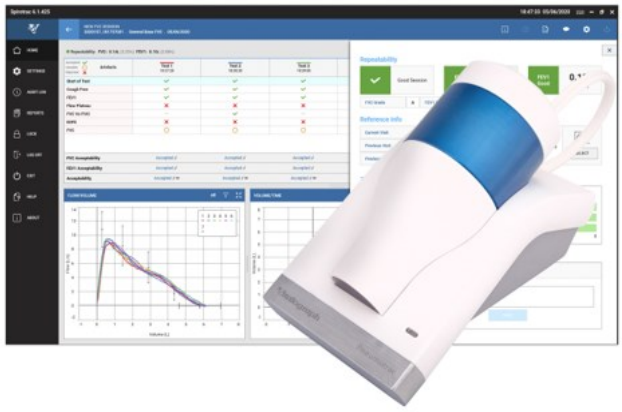
PRODUCT UPDATES

SPIROMETRY

We are proud to announce the launch of the **Pneumotrac** PC spirometer, **Spirotrac 6** software and **Alpha** desktop spirometer. These valued products have been updated to be compliant with the ATS/ERS Standardization of Spirometry 2019 Update and the ISO 26782 standards.

Benefit from:

- Redesigned user interfaces
- Accuracy within ±2.5%
- Built-in new ATS/ERS grading system
- Built-in standardised operator comments
- Free network interface software
- Free online device training



BACTERIAL-VIRAL FILTERS

When testing patients' lung function, customers can be assured that the Vitalograph BVF (Bacterial Viral Filters for Respiratory Function Testing) meet the high standards set out by the ARTP and ERS with independently validated efficiency even at high expiratory flow (600-700 L/min).

Bacterial Filter Efficiency (MRSA, TBC, etc.)	> 99.99996%
Viral Filter Efficiency (Influenza, HN1, SARS-CoV-2/-1, etc.	> 99.999711%

For further information including our Certificate of Cross Infection Efficiency and Cross Contamination Report: https://vitalograph.com/news/1118/bacterial-viral-filters-bvfs-reduce-contamination-risk-to-equipment-others-when-performing-spirometry-during-the-covid-19-pandemic

Vitalograph®

A Global Leader in Respiratory Diagnostics

FeNO

Vitalograph has added the Bosch Vivatmo FeNO devices to our range. Featuring the Vivatmo pro with base station and Vivatmo me. These feature the same unique sensor technology which requires neither calibration nor replacement.

Bosch Vivatmo *pro*

Bosch Vivatmo *me*

Benefit from:

- Cordless
- Compact and mobile design
- Maintenance-free technology
- Sensors accurate enough to find '5 brown blades of grass on a green football field'

SPIROTRAC V

We recently sent out a message via the ARTP forum regarding a potential issue with Vitalograph Spirotrac 5.0 Software (SPV) where, depending on the Operating System (OS), OS version and language, the incentives will not run, nor the application start up. This was traced to the Adobe Flash Player plugin used to run the incentives. Adobe had written code in some flash players upgrades to prevent it from running media. In addition, Microsoft include an optional feature to uninstall Adobe Flash Player in some OS upgrades. The first problem prevents the incentives from running and the second prevents SPV from starting.

The solution to the problem is to install an upgraded version of SPV. Vitalograph are offering a free upgrade to the latest version of Spirotrac 5, with many additional features. There is no loss of data and the process is relatively straightforward. A dedicated web page is available across all our websites with application download information and installation instructions:
https://vitalograph.co.uk/spirotracvdownloadregistration

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How it Works

By Kevin Hogben

Body Plethysmography

Part One

The development of Body Plethysmography is largely attributed to Arthur B Dubois MD (pronounced 'DuBoyce'), who once wrote:

"The Development of the Body Plethysmograph and its applications: A body plethysmograph is a box about the size of a telephone booth used to measure small changes of gas volumes in the lungs of a person seated inside the chamber. Using this instrument German Physiologists were able to measure the approximate volume of gas in the lungs (functional residual capacity) as early as 1880. Clinical use of this method in the 1950s awaited the development of modern strain gauges and flowmeters. At present, the method is also used to measure Airways resistance (alveolar pressure divided by airflow at any instant).

In addition, small gas volumes can be analysed in terms of instantaneous exchange of gases (O_2,CO_2 N_2O_2 or CO) between the alveoli and the blood entering the lung capillaries. From this we can deduce the pulsatile nature of pulmonary capillary blood flow and blood volume, and how this changes under physiological conditions.

Clinical use of the body plethysmograph is mainly for the measurement of functional residual capacity and residual volume, as a substitute for the helium dilution closed circuit method in assessment on pulmonary function. The plethysmographic method is somewhat quicker, and it includes all the gas in the thorax (thoracic gas volume). Clinicians also use the plethysmograph to measure airways resistance in patients with asthma or bronchitis, to evaluate the middle sized airways, as a supplement to the expiratory volume or flow-volume curves that reflect obstruction or collapse in the bronchioles. Perhaps the main use of the "box" studies is determining mechanics of airway constriction or dilation in humans, without forced expiration which would sometimes change airway calibre. Normal airway resistance is about 1.0 cmH_2O per litre per second of airflow, with a range of 0.6 to 2.4. The clinical range is 0.3 (in dilated bronchi). A change of 11 cmH_2O per litre per second (in constricted bronchi). A change of 10% can be detected between two successive sets of measurements (a set is five readings in a five minute period). Thus, the effectiveness of the bronchodilators can be evaluated rapidly and objectively in individuals using this method. Body Plethysmographs are used as a supplementary method in those pulmonary function Laboratories which require highly specialized equipment, or in research laboratories where lung mechanics and alveolar gas exchange are of particular interest."

* This article is the author's personal view and not all devices are covered.

Please email the editor at inspire@artp.org.uk if you would like to write a history of your favourite(s).

A NEW METHOD FOR MEASURING AIRWAY RESISTANCE IN MAN USING A BODY PLETHYSMOGRAPH: VALUES IN NORMAL SUBJECTS AND IN PATIENTS WITH RESPIRATORY DISEASE'

By ARTHUR B. DuBOIS, STELLA Y. BOTELHO, AND JULIUS H. COMROE, Jr.

(From the Department of Physiology and Pharmacology, Graduate School of Medicine, University of Pennsylvania, Philadelphia, Pa.)

(Submitted for publication October 17, 1955; accepted December 5, 1955)

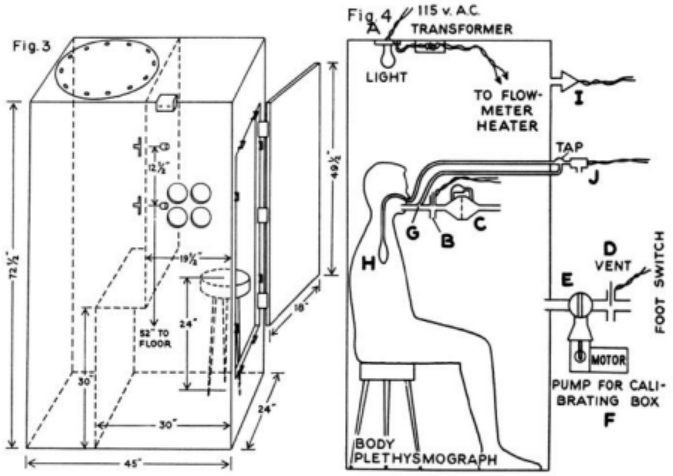
Design of a body plethysmograph for studying cardiopulmonary physiology'

JULIUS H. COMROE, JR.,[2] STELLA Y. BOTELHO AND ARTHUR B. DuBOIS

Department of Physiology and Pharmacology, Graduate School of Medicine, University of Pennsylvania, Philadelphia, Pennsylvania

This overview and the 1955 and 1959 papers by Comroe, Botelho and DuBois set the pace and even gave the design; to minimise the volume the box "wrapped" around the subject and was sealed with a fierce looking door mechanism. The subject had little chance to move or escape! The paper printed a disclaimer in the opening paragraph:

FIG. 3. Dimensions of body plethysmograph and compensating chamber.
FIG. 4. Schema showing measuring devices and accessories. *F* is a 'Silent Diaphragm Air Compressor,' type D, Paasche Airbrush Co., Chicago, Ill., modified by removing one valve and blocking the other with adhesive tape. A 1-in. diameter hole and tube were placed in top of air dome. Speed of the 115-v., d.c. motor was controlled by a rheostat of 100 or 150 ohms. *Valve D* is 115 v., d.c., Cat. #803014, Automatic Switch Co., Orange, N.J. *Interrupter B* is Ledex Rotary Solenoid, Model 5ER 45 35 x 3 x 8 x 9, supplied by G. H. Leland, Inc., 123 Webster St., Dayton 2, Ohio, mounted on the shutter as designed by Mead and Whittenberger, *J. Appl. Physiol.* 6: 408, 1954.



"The General Principles of the body Plethysmograph for the measurement of thoracic gas volume, volume of gas trapped in the lungs or pleural cavity, airway resistance, pulmonary nonelastic tissue resistance, pulmonary capillary blood flow and abdominal gas volume have been published elsewhere. However precise dimensions of the Plethysmograph. The electronical circuits and labor-saving direct reading scales for the cathode ray tube oscilloscopes have not been described in sufficient detail for investigators who wish to duplicate the apparatus. They are presented here because of numerous requests for this information. We wish to emphasise that this original design may well be modified and improved for special uses; several possible changes in design and equipment are mentioned here."

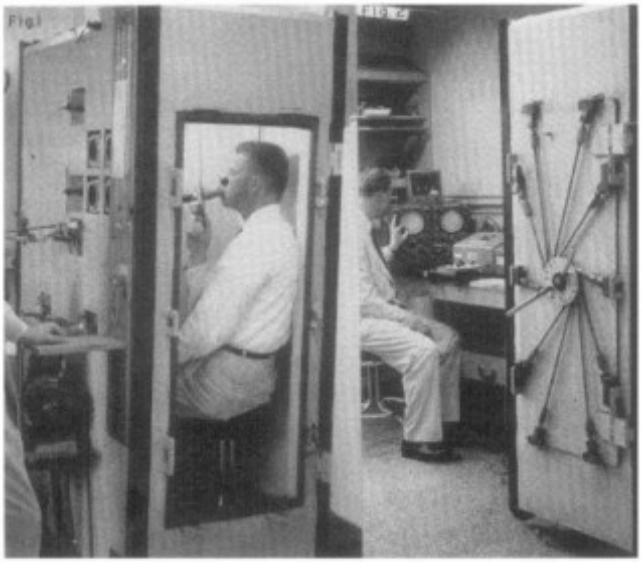


FIG. 1. Body plethysmograph, subject seated inside, door open.
FIG. 2. Body plethysmograph and recording apparatus, door closed.

In the image it is just possible to make out the Cathode Ray Oscilloscope (CRO) used to capture the trace of Mouth vs box for TGV and Flow vs Box for Airways resistance, the oscilloscope was used in "persistence" mode, so the trace remained complete on the screen for a short period of time, otherwise the "eye" would have to memorise a trace described by a dot on the screen. A MAJOR improvement was the polaroid camera, this was fitted on a hinge allowing it to be swung in front of the Cathode Ray Oscilloscope and then the screen captured as a photo to allow analysis later.

Traces were quite indistinct

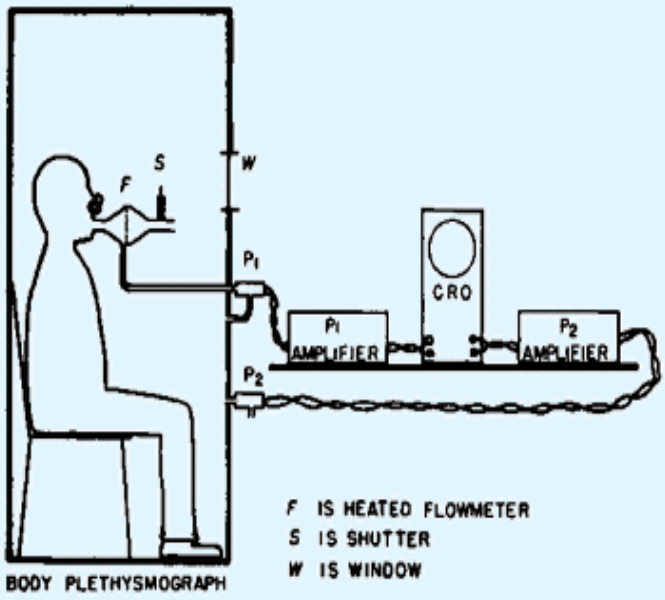


FIG. 1. APPARATUS FOR MEASUREMENT OF AIRWAY RESISTANCE

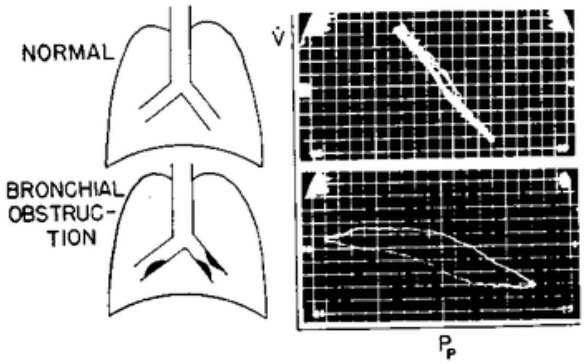


FIG. 2. PHOTOGRAPH OF CATHODE RAY SCREEN (SHUTTER OPEN)

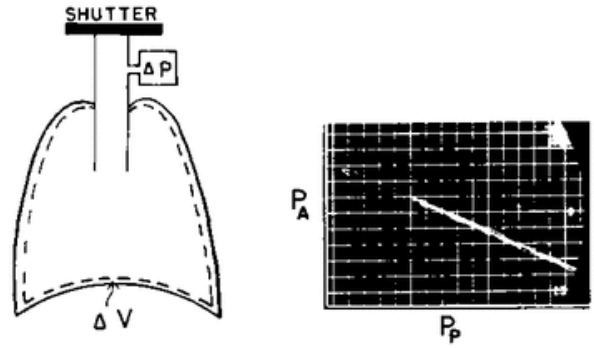


FIG. 3. PHOTOGRAPH OF CATHODE RAY SCREEN (SHUTTER CLOSED)

The slope was often determined by a scale fitted to the round window of the oscilloscope to quickly determine the slope

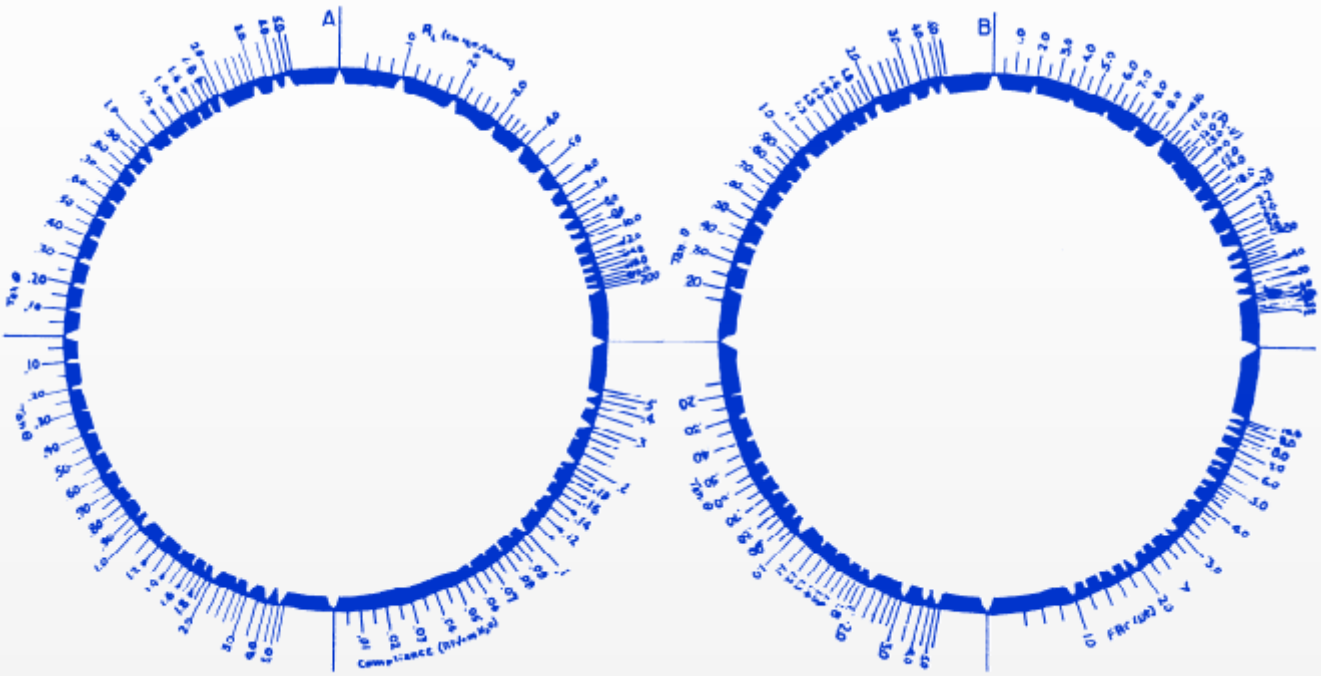


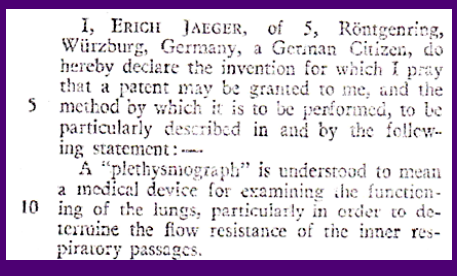
FIG. 7 A, B. Direct reading scales for attachment to CRO face. Scale for CRO #1 on left; for CRO #2 on right.

This was the technology until the X-Y Plotter became available. This made dramatic improvements with the real physical trace on a paper copy that was large enough to read, the angles of the slopes were still determined by hand with the skill of the eye of the Physiologist to place the line of best fit to the data, to account for any drift or shift due to the performance of the subject.

On some systems it was even possible to record the volume vs time tidal breathing and then the shutter closure offset to the tidal breathing and finally the Vital Capacity all on one sheet of paper, very much the presentation adopted in the modern computerised system.

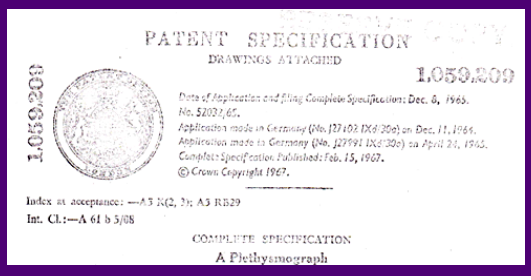
These advances were significant in moving forward the Body Plethysmograph as the "gold Standard" for Thoracic Gas Volume and Airways resistance.

The original European Patent for the Body Plethysmograph was filed in 1965 and accepted 1967. This patent was owned by Erich Jaeger. As with all patents this limited the interest of other companies without licence by the patent owner.



I, ERICH JAEGER, of 5, Röntgenring, Würzburg, Germany, a German Citizen, do hereby declare the invention for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

A "plethysmograph" is understood to mean a medical device for examining the functioning of the lungs, particularly in order to determine the flow resistance of the inner respiratory passages.



PATENT SPECIFICATION

DRAWINGS ATTACHED

1,059,209

1,059,209

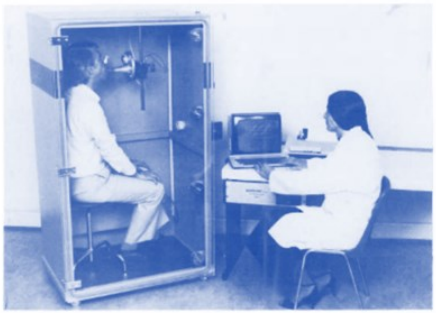
Date of Application and filing Complete Specification: Dec. 6, 1965.
No. 52037/65.
Application made in Germany (No. J27402 IX/d/30e) on Dec. 11, 1964.
Application made in Germany (No. J27991 IX/d/30e) on April 24, 1965.
Complete Specification Published: Feb. 15, 1967.
© Crown Copyright 1967.

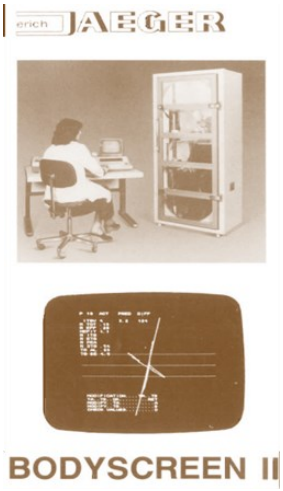
Index at acceptance:—A3 R(2, 3); A3 RB29
Int. Cl.:—A 61 b 5/08

COMPLETE SPECIFICATION

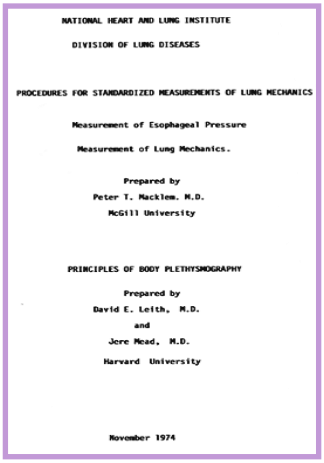
A Plethysmograph

One such company that was popular in addition to the Jaeger unit was that of two Swiss Doctors Fenyves and Gut, they had started to advertise their range in the ARTP Breath magazine.





Body Plethysmographs were becoming mainstream devices, including a Scottish entry from Mercury Instruments. There are several constructions for the Body Plethysmograph, which is well described in a presentation in 1974 to the National Heart and Lung Institute, By David Lieth and Jere Mead.



NATIONAL HEART AND LUNG INSTITUTE

DIVISION OF LUNG DISEASES

PROCEDURES FOR STANDARDIZED MEASUREMENTS OF LUNG MECHANICS

Measurement of Esophageal Pressure

Measurement of Lung Mechanics.

Prepared by
Peter T. Macklem, M.D.
McGill University

PRINCIPLES OF BODY PLETHYSMOGRAPHY

Prepared by
David E. Leith, M.D.
and
Jere Mead, M.D.
Harvard University

November 1974

Part Two of How it Works—Body Plethysmography, will follow in the August issue of Inspire.

Primary care-based respiratory and sleep physiologists: a role that should be developed? A mixed methods study.

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Correspondence: c.l.earle@swansea.ac.uk

Background

The majority of the workload for a respiratory (**R**) and sleep (**S**) physiologist is running outpatient clinics in a secondary-care environment, however, with new developments in both technology/equipment and its mobility, there is less of a need for these clinics to be hospital-based. Changing the location and structure of clinics could potentially reduce known pressures on the national health service (NHS) and help to manage the spread of infection.

With the current coronavirus (COVID-19) pandemic infecting over 11,500 people in Wales, and causing over 3,000 deaths[1], healthcare managers are considering alternative ways to deliver services to patients, whilst ensuring both staff and patient safety. Reducing unnecessary footfall within the hospital, and offering teleconsultation where possible, is already being encouraged across UK outpatient departments as a method of reducing infection risk[2]. Since the creation of the NHS in 1948, there have been 17 policies with the initiative of moving care closer to home[3]; however, many outpatient appointments are still based in a hospital setting.

Considering the pressures on the NHS[4], new advancements in portable technology for diagnostic equipment and a present emphasis on restructuring outpatient services[4], little has been done to evaluate the way **R** and **S** services in Wales are provided.

This project expands on the '***healthier wales***' initiative already being implemented by NHS Wales involving primary care '*clusters*'[5], which were introduced by the Welsh Government in 2014[6]. These clusters are designed to centralise local services across a geographical area and to better coordinate care[5;7]. Local general practices hold specialised clinics, increasing accessibility to the service, especially in more rural areas of Wales. Increased accessibility will influence the number of missed appointments, thus saving money[8].

Community health services have the potential to improve multidisciplinary, collaborative working; between GP's, community teams and secondary care staff[9]. This was highlighted as a problem of primary care 'clusters' by Stanciu, et al [6].

Clarke, Bourn, Skoufalos, Beck and Castillo[10] identified that in the US, the most frequent users of emergency departments were those with chronic conditions, such as; asthma, stroke and coronary artery disease. The same population group also require high quantities of outpatient appointments[10], therefore, it is sensible to focus healthcare redesign around providing better management of these patient groups.

Clarke et al[10] considered a mobile integrated healthcare approach as a potential future healthcare framework; incorporating multidisciplinary professionals. Although not specifically mentioned as 'mobile' Charles, Wenzel, Kershaw, Ham and Walsh[11] also considered integrated care modules as a potential future healthcare model in the UK.

Hernández, et al.[12] introduced a community-based integrated care package for patients with COPD in Spain, and found that it: enhanced self-management, reduced anxiety/depression, improved quality of life and reduced acute emergency department visits and mortality. Interestingly, the number of hospital admissions did not decrease, and after six years, there were no differences between those who had received community integrated care, and those who had not. Hernández, et al.[12], referred to research conducted by Casas et al.[13], where a similar study was conducted (in Spain and Belgium) but using hospital-staff to run the integrated care, as opposed to using community-staff, as used in the Hernández study. Casas et al only followed up on the patients for 12 months, rather than six years however found that, after one year, integrated care resulted in reduced hospitalisations, and a reduction of re-admissions, with no difference in mortality. Hernández also documented a reduction in emergency department visits and mortality after 12 months, from their study.

Niv et al.[14], combined hospital and community services to develop an integrated care model for gastroenterology patients in Israel. The process opened up direct communication between GPs in primary care and specialists in gastroenterology and resulted in a reduction of waiting times from three months, to three weeks. Niv concluded that an integrated approach like this was not only cost-effective but improved patient care.

Mitchell, et al.[15], completed a systematic review of 10 papers on the effectiveness of integrated health care models (primary to secondary care). Significant improvements in disease control and severity were well documented. No papers published negative effects of implementing integrated care although there were cost increases. This differs from other literature stating that integrated care has the potential for cost savings[14;16;17].

Evidence already exists that patient-centred, multi-disciplinary approaches are effective, with the potential to improve health outcomes and patient experiences[16;18;19]. This presents an ideal opportunity to begin to reconsider the way in which **R** and **S** services are designed; to maximise patient benefit, optimise cost efficiency and improve patient attendance and compliance.

Methods

This is a mixed method study design; questionnaires and qualitative interviews were carried out between January and March 2020. Qualitative data collection was used for general practitioners (GPs), to enable a quick and easy response mechanism; with the aim to increase completion.

There were two strands* of participants enrolled:

* a third strand (of service users/patients) was planned for this study but was not completed due to COVID-19 restrictions.

Strand one:

An online questionnaire was emailed to all general practice managers in Wales asking them to forward it to GPs in their surgery who: 1) have an interest in **R** and/or **S**, or 2) who run **R** and/or **S** clinics within the practice.

Practice managers were sent a reminder email three weeks later, and all responses were collected within six weeks. The questionnaire enabled a large geographical location to be covered quickly, and efficiently (time and cost). One limitation with the questionnaire was a lack of current knowledge on physiologists, and their role in the NHS.

Strand two:

A structured interview was conducted with one HoD from four of the seven health boards around Wales (Swansea Bay University Health Board (SBUHB), Cardiff and Vale University Health Board (CVUHB), Hywel Dda University Health Board (HDUHB) and Aneurin Bevan University Health Board (ABUHB)). Interviews were conducted within the hospital. Hospitals were chosen based on their geographical location and the size of the service (trying to cover the whole of Wales, in the largest centres). Interviews in Cwm Taf University Health Board (CTUHB) and Betsi Cadwaladr University Health Board (BCUHB) were unable to be completed due to COVID-19 restrictions. An interview was not conducted in Powys as there was no outpatient **R** or **S** physiologist service at the time. Interviews lasted approximately 20 minutes and were audio recorded, then analysed for concurrent themes. Interviews were completed in the workplace of the interviewee.

There was no specified sequence to the methods, other than staff availability.

Analysis of the GP questionnaire consisted of descriptive statistics. Statistical analysis was undertaken in Apple 'Numbers' software. Prior to analysis, descriptive checks of the data were undertaken to ascertain the extent of missing data. Analysis of the HoD interviews consists of inductive theme analysis. This was carried out in NVivo12 with the codebooks and node reports shared between both researchers.

The GP questionnaire was proof-read and piloted by an academic researcher and a GP.

Two HoDs (one academic and one clinical) proof-read and gave feedback on the interview questions.

The HoD interviews were carried out by one researcher (with a specific **R** and **S** physiologist background) and were

analysed independently by two researchers (including one with significant qualitative analysis experience). Nodes were compared and then combined prior to further analysis.

Due to COVID-19 it was not possible to collect any service user perceptions or interview heads of departments from BCUHB and CTUHB. This is especially important as one GP in BCUHB documented significant impact on services due to location and accessibility.

The pandemic is also likely to have limited the number of GP questionnaire responses received.

Results

Strand One- Online GP Questionnaire

In excess of 250 general practices across Wales were emailed the online questionnaire.

A total of 51 responses were received, however, only 21 eligible persons completed the questionnaire (one was not a GP, 29 did not proceed further than the consent form).

Responses were received across Wales as illustrated in Figure 1.

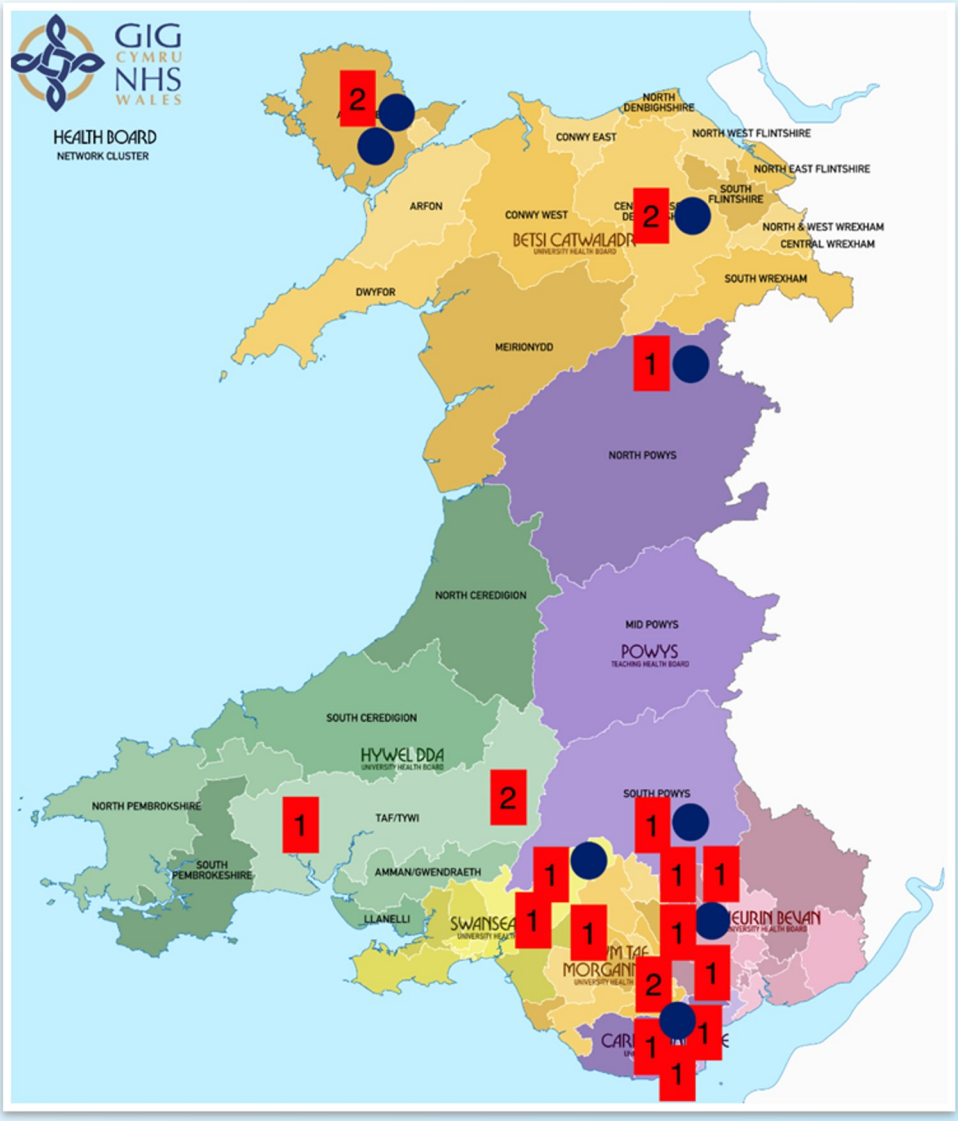


Figure 1: Shows the location of GP cluster responses. The red squares show the approximate locations and number of GPs who completed the questionnaire. The blue dots show the approximate locations of GPs who raised accessibility as a consideration when making a referral to a secondary care **R** or **S** service.

A total of 9 responders (43%) stated that they have a specialist interest in **R** or **S**. There were no responders from SBUHB with a specialist interest in **R** or **S**.

A total of 20 (95%) GPs stated that they referred patients to secondary care for both **R** and **S** services. 1 (5%) from HDUHB does not make referrals in either area, but stated they thought there was room for change/development in the **S** service pathway.

90% of GPs primarily consider the 'appropriateness to the patient' before referring them to secondary care **R** or **S** services. At least 1 GP in 5 out of 7 health boards in Wales, raised accessibility as a consideration when making **R** and **S** referrals (ABUHB, BCUHB, Powys THB, SBUHB & CBUHB).

The main reason for non-referral to a secondary care **R** or **S** service was the '*inappropriateness to the patient*' (43%). One GP in the BCUHB raised accessibility as a reason for non-referrals.

71% of responders think there is a need for change/development in the current pathways for both **R** and **S** services. Interestingly, the same responders thought a change was needed in both **R** and **S** services.

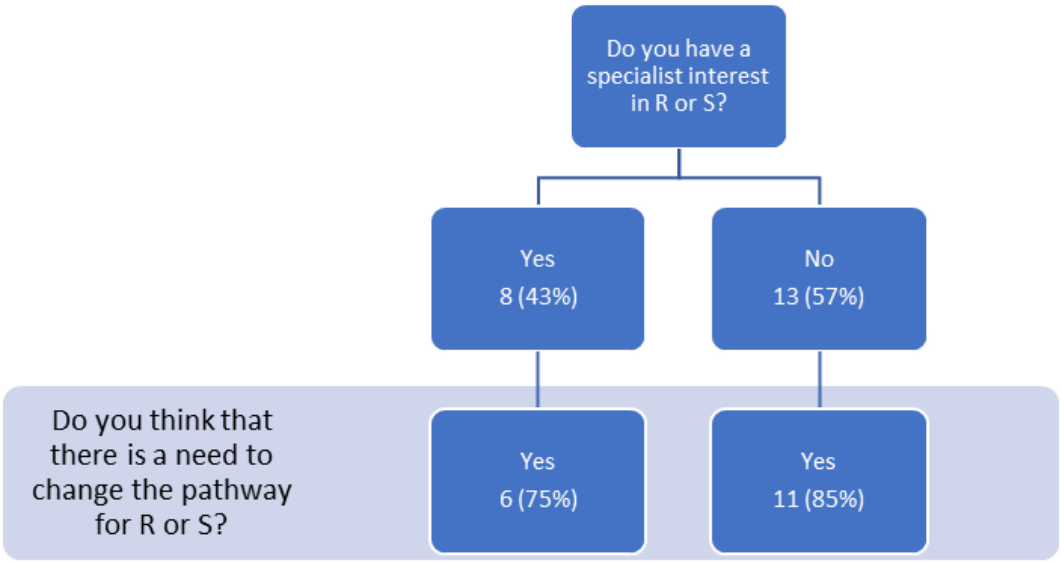
The three most common reasons to change/develop the **R** service were (in order of occurrence):

1. Reducing waiting times
2. Make more appropriate referrals
3. Redistribution of workload

The three most common reasons to change/develop the **S** service were (in order of occurrence):

1. Reducing waiting times
2. Improve the patient experience
3. Increase access to the service

Of the 21 responders, 8 (43%) stated having a specialist interest in **R** or **S**; with 13 (57%) having no specific interest in either area. Interestingly, both groups (those with a specialist interest, and those without) think there is a need to change the pathways (illustrated in **Flow chart 1**, below).



Flow chart 1 highlights that it is not only GP's with additional/specialist interest who feel there is room for improvement in **R** and **S** service pathways.

60% of responders think it would be beneficial to have **R** physiologist run clinics in their GP cluster. The most common rationales for this were (in order of occurrence):

1) To complement and support the current GP service
2) Increase access to the service and reduce waiting times

GPs were much more divided when asked if they think it would be beneficial to have **R** physiologist run clinics in their general practice; no = 50%, yes = 30%, don't know = 20%. The most common rationales for this were (in order of occurrence):

1) Small patient numbers for a practice-based service (cluster-based service more efficient)
2) Lack of space

65% of GPs think it would be beneficial to have a **S** physiologist run clinics in their GP cluster. The most common rationales for this were (in order of occurrence):

1) Improve access to tests (for patients and staff)
2) Uncertainties regarding demand for service

Again, GPs were much more divided when asked if they think it would be beneficial to have **S** physiologist run clinics in their general practice; no = 55%, yes = 25%, don't know = 20%. The most common rationales for this were (in order of occurrence):

1) Not enough demand/small referral numbers (cluster-based service more efficient)
2) Lack of space

Table 1 lists the barriers to implementing a **R** or **S** physiologist service in a GP practice. Room space and the cost of hiring a physiologist were selected by at least 70% of participants. Additional barriers included:

Admin support

Clinical responsibility

Room/space

Funding from health boards

Table 1. Showing the main barriers to R and S service implementation in a GP practice (n=20) (2020)

	What, if any, would be the main barriers to having a R physiologist service in your practice?	**What, if any, would be the main barriers to having a S physiologist service in your practice?**
Options	***Number of selections (maximum=20) (%)***	
Room space	15 (75)	15 (75)
Cost of hiring a physiologist	14 (70)	15 (75)
Clinical oversight	9 (45)	10 (50)
Limited parking	7 (35)	7 (35)
Administrative burden	6 (30)	6 (30)
Organisation of clinics	3 (15)	5 (25)
Changing of current patient pathways	3 (15)	3 (15)
Implementing change	2 (10)	1 (5)
There would be no barriers	1 (5)	0 (0)
Other	0 (0)	0 (0)

Strand Two- Head of Department Interviews

Interviews were conducted in four health boards across Wales; SBUHB, CVUHB, HDUHB and ABUHB.

The main themes and total coverage of these topics across all interviews are written in **Table 2**.

Table 2. Showing the how frequently topics were discussed in HoD interviews (n=4) (2020)	
Theme	**Number of Occurrences**
Professional issues	86
Staffing (roles, numbers and grade)	66
Issues and challenges with community R/S services	65
Positive attitudes towards community R/S services	52
Practical issues	50
Waiting list	38
Professionals views on patient preference	25
Clinical responsibility and safety	24
Workload	20
Storage of data	13
Raising awareness of physiologists	12

Three out of the four health boards (ABUHB, HDUHB and SBUHB) discussed 'professional issues' most throughout their interviews (32%, 33%, 37% respectively). Professional issues included key topics such as; patient referrals (how would they be received and by whom), patient pathways (how would the clinics work) and standardisation of care (ensuring patients receive equitable care in both primary and secondary centres).

LUHB discussed staffing the most throughout the interview (63%). Staffing issues included key topics such as; suitable banding of staff for the required task and the number of staff members.

Conclusions

Both primary and secondary care centres are open-minded to the development of a primary care-based physiologist role. There seems to be roughly equal demand for both **R** and **S** service developments between the two groups, however, there is some confusion amongst GPs as to the physiologist role. This should be researched further before the implementation of any service.

The main barriers to implementing physiologist led services (**R** and **S**) are:

- lack of space (within primary care)
- ensuring rigorous clinical pathways
- ensuring suitable and appropriately qualified staffing
- uncertainty as to the knock-on effects for secondary care services.

Between GP's and HoDs, there were some common attitudes supporting the establishment of the primary care-based physiologist role. These were:

- the overall clinical responsibility must not fall with the physiologist
- the physiologist must be suitably qualified and experienced to work autonomously
- the clinics should be set up within a GP cluster (rather than at practice level)
- the physiologist must be employed within the secondary care team (rather than employed by the GP cluster).

Whilst there is very little pre-published literature on this topic in UK, this study has identified differences across Wales in patient referrals, due to geographical access to secondary care. Some patients are not being referred to secondary care due to accessibility. Careful implementation of cluster-based physiologist services has the potential to resolve these issues and continue working towards the '*moving care closer to home*' initiative.

It should be considered that the data within this study was collected pre COVID-19 and so opinions, waiting-lists and strategic direction may have changed.

Acknowledgements

Thank you to Alys Einion-Waller and Ioan Humphreys for being my supervisors for this project, and to all those who kindly proof -read aspects of this study.

Ethical Approval

Ethical approval was granted for this study by Research Ethics Committee 5, Wales.

Funding Source

Funding for this project was obtained from the 'Research Capacity Building Collaboration Wales' (RCBC), which itself is funded by Health and Care Research Wales.

Conflict of Interest

There are no conflicts of interest to declare.

Data Availability

The data underlying this article cannot be shared publicly due to for the privacy of individuals that participated in the study. The data will be shared on reasonable request to the corresponding author.

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FRESH AIR

*Welcome back to **Fresh Air**. It has been a challenging time for most non-COVID respiratory research and, hence, difficult to find authors to contribute to this article. In light of this, I have revisited a study I conducted a little while before our services shut down. It investigates the efficacy of the Epworth Sleepiness Scale in identifying perceived sleepiness in a cohort of patients with suspected sleep apnoea - I hope it provides some useful insight.*

"Sleepiness" and the Epworth Scale

Introduction

Excessive daytime sleepiness (EDS) is a relatively common problem[1-2] that can impact on an individual's quality of life[3-4], affect their personal and public safety[5-6], and may be indicative of underlying medical conditions[7]. Within the speciality of sleep physiology, the most common condition associated with EDS is obstructive sleep apnoea/hypopnoea syndrome (OSAHS). Indeed, EDS is one of the three cardinal features of OSAHS, alongside loud snoring and witnessed apnoeas. Importantly, the Driver and Vehicle Licensing Agency (DVLA) states that any condition that causes excessive daytime sleepiness must be reported[8] as up to 20% of road traffic accidents may be attributed to drivers with EDS[9]. Worryingly, a poll in 2005 revealed that 60 percent of adult drivers in the USA had driven whilst drowsy and almost one third had fallen asleep at the wheel[10]. Therefore, accurately identifying and quantifying daytime sleepiness is vital but it can be challenging in some patients.

There are a number of available clinical tools for assessing sleepiness, which include both objective measures and subjective questionnaires. The most common objective measures include the Multiple Sleep Latency Test (MSLT)[11] and the Maintenance of Wakefulness Test (MWT)[12], although driving simulators and other cognitive/mnemonic function tests are also available. The MSLT is considered by many to be the gold standard assessment of sleepiness, although it is most commonly used in the assessment of neurological conditions such as narcolepsy[13] as well as idiopathic hypersomnolence[14], with OSAHS being previously excluded with a diagnostic study (e.g. polysomnography). A MSLT assesses how quickly a patient falls asleep when instructed to whilst lying quietly in a bed. It is performed in a sleep laboratory, with a daylong schedule that usually comprises 5 tests (although some centres may do 4) each separated by a two hour break. A mean sleep latency of less than 8 minutes is diagnostic of excessive sleepiness[15]. In contrast, the MWT determines a patient's ability to stay awake. The same 5 test protocol is used but the patient is instructed to stay awake for 20 or 40 minutes under similar soporific conditions. Normative values for the MWT seem less well defined, although a value of less than 20 minutes is likely to be abnormal.

The most common subjective measure of sleepiness is the Epworth Sleepiness Scale (ESS)[16]. Others include the Stanford Sleepiness Scale, the Karolinska Sleepiness Scale, and the Sleep-Wake Activity Inventory, which may be useful monitoring tools although evidence suggests they are not as useful for assessing overall sleepiness[17]. The ESS comprises 8 everyday situations for which the patient scores their chance of dozing, where 0 = no chance, 1 = slight chance, 2 = moderate chance, and 3 = high chance. A total score of 11 or more out of 24 is classified as EDS. The ESS is a quick and simple tool that has previously been shown to perform well with respect to test-retest reliability, internal consistency and validity in comparison to objective assessments[18] and it has been used as a research tool in thousands of studies. Nevertheless, it is not without its limitations and may underestimate sleepiness in some patients[19].

The current study was designed to assess the predictive power of the ESS with respect to patient-reported "sleepiness" (based on a simple descriptive scale) and the impact of EDS on their quality of life.

Methods

304 patients referred to the Lung Function & Sleep Department at the Queen Elizabeth Hospital Birmingham for routine domiciliary overnight oximetry screening for OSAHS were included in the study. Patients were given an ESS to complete. In addition, we devised a simple "sleepiness" score (QEHSS) comprising a linear scale ranging from 0-4, with 0 denoting "not sleepy", 1 "slightly sleepy", 2 "fairly sleepy", 3 "very sleepy" and 4 "extremely sleepy". Clinically significant sleepiness on the QEHSS was denoted by a score of 2 or more. The questionnaire also contained a yes/no option for the patient to report if any daytime sleepiness was impacting negatively on their quality of life. This three-part "extended" ESS questionnaire is included in Appendix 1.

Patients were categorised based on their QEHSS and the median and distribution of ESS was assessed in each group. Nominal data were compared using a Chi Squared Test and continuous data were compared using a Kruskal-Wallis Test. Test characteristics were also assessed using the QEHSS as the reference standard with a score of $\geq$ 2 as the threshold for EDS. The proportion of patients in each group who reported an impact of sleepiness on their quality of life was also calculated.

Results

The patient population included 304 patients (185 males: 119 females, median age 52 (range 16-84), median BMI 33.3 (IQR 29.0 - 39.0), median oxygen desaturation index (ODI) 6.9 (IQR 3.6 – 19.3), median arousal rate 27.8 (IQR 18.0 – 45.0). Data for each QEHSS group is summarised in **Table 1**.

	QEHSS 0 not sleepy	QEHSS 1 slightly sleepy	QEHSS 2 fairly sleepy	QEHSS 3 very sleepy	QEHSS 4 extremely sleepy	p-value
N=	26	73	93	88	24	--
Sex	20M : 6F	57M : 16F	58M : 35F	40M : 48F	12M : 12F	< 0.0001
Age (years)	51 (24 – 82)	55 (17 – 81)	52 (16 – 84)	50 (17 – 80)	52 (20 – 72)	ns
BMI (kg/m^2)	30.9 (28.2 – 35.1)	31.3 (27.6 – 36.1)	33.0 (29.0 – 37.2)	36.8 (31.2 – 42.5)	35.9 (29.3 – 43.8)	0.003
ODI	5.9 (2.9 – 13.9)	5.9 (3.5 – 21.0)	7.2 (4.0 – 19.3)	7.3 (3.8 – 20.2)	10.7 (3.5 – 17.0)	ns
Arousal Rate	24.7 (13.0 – 31.6)	30.6 (17.6 – 47.3)	30.6 (19.8 – 45.3)	27.5 (17.7 – 46.0)	27.9 (18.8 – 37.7)	ns
ESS	2 (0 – 13)	8 (1 – 17)	10 (0 – 22)	14 (0 – 24)	15.5 (0 – 23)	< 0.0001
Impact QoL	4Y : 22N (Y = 15%)	26Y : 37N (Y = 36%)	69Y : 24N (Y = 74%)	79Y : 9N (Y = 90%)	24Y : 0N (Y = 100%)	< 0.0001

Table 1: A summary of demographic and diagnostic data for patients categorised by their QEHSS. Age and ESS are presented as Median (Range). BMI, ODI and Arousal Rate are presented as Median (IQR). There were no significant differences in age, ODI or arousal rate between groups. There was a smaller proportion of females in QEHSS groups 0 and 1 compared to groups 2 – 4. The ESS showed a clear, significant trend to increase on average from QEHSS groups 0 – 4 as did the proportion of patients who felt sleepiness was impacting on their quality of life (QoL).

88% patients with a positive ESS also reported significant sleepiness with the QEHSS and 86% reported a negative impact on quality of life overall. 46% patients with a negative ESS still reported significant sleepiness with the QEHSS and 54% reported an impact on quality of life. A notable proportion of patients (38%) with a both a negative ESS and a negative QEHSS still reported that sleepiness was impacting negatively on their quality of life. These data are summarised graphically in **Figure 1**.

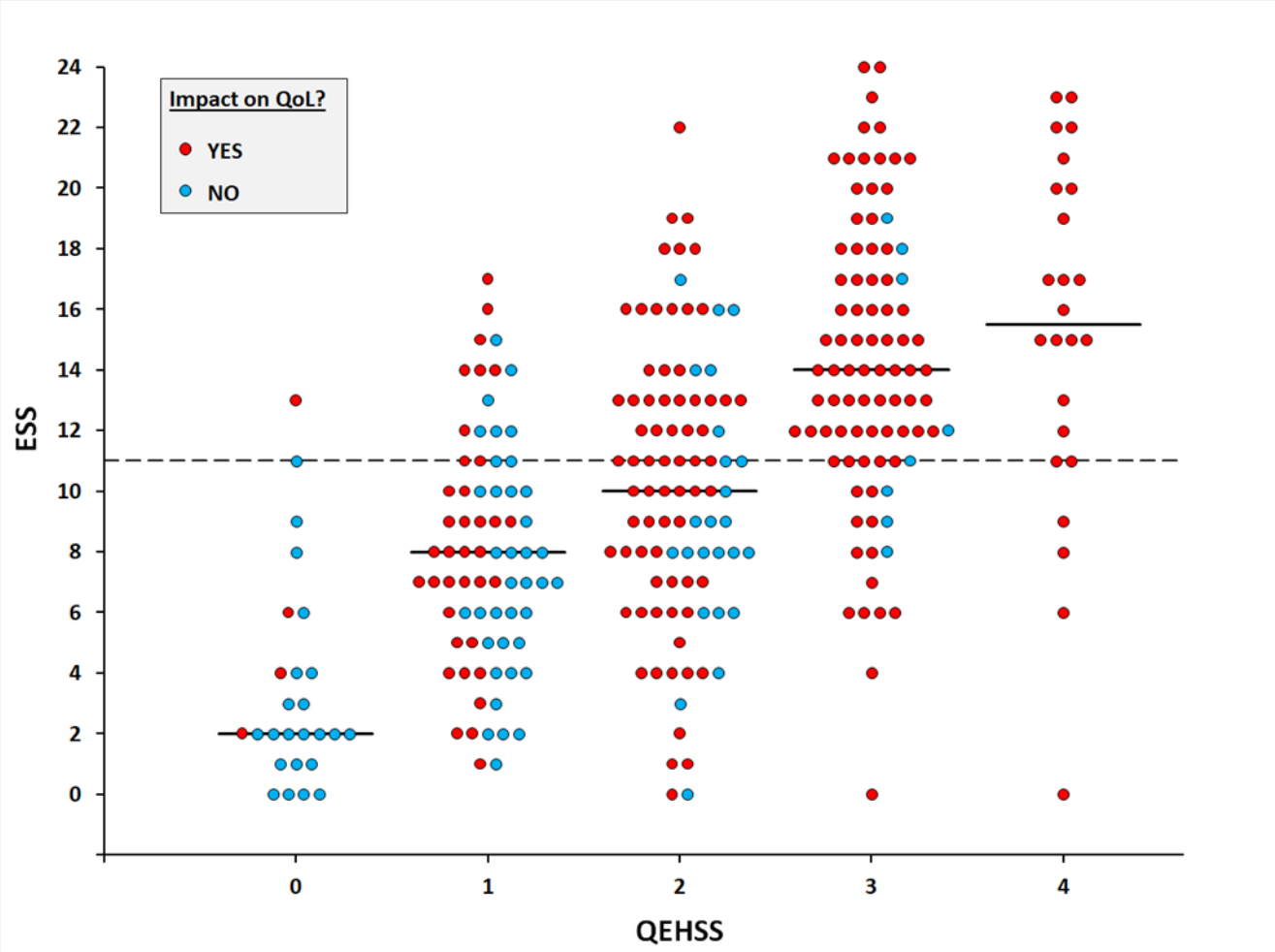

Figure 1: ESS versus QEHSS in 304 patients with a provisional diagnosis of OSA. The threshold for clinically significant sleepiness by the ESS of 11 is indicated by the black dotted line. The graph also shows which patients felt any sleepiness did (red circles) and did not (blue circles) impact negatively on their quality of life (QoL).

The ESS had a good positive prediction rate (87.7%) but a poor negative prediction rate (53.7%) at identifying clinically significant sleepiness (defined by a QEHSS ≥ 2). By the same criteria, the ESS had a good specificity (80.8%) but a poorer sensitivity (66.3%).

Discussion

This study was designed to compare the efficacy of the ESS in identifying subjective sleepiness in patients with suspected OSAHS. Sleepiness was defined by a simple five-point descriptive scale (QEHSS) and the impact on quality of life was also recorded.

The results show that, on average, the ESS relates well to perceived sleepiness, with the median ESS increasing in successive QEHSS group. A positive ESS (> 11) is a good predictor of perceived sleepiness, which seems logical as patients are unlikely to fall asleep during the day if they do not feel sleepy. However, almost half of the patients with a negative ESS (< 11) reported feeling fairly sleepy or worse (QEHSS ≥ 2). This suggests that many patients experience clinically significant sleepiness despite a low chance of falling asleep in everyday situations, which could be important when considering safety (particularly with respect to driving). Moreover, around half of patients with a negative ESS reported an impact of sleepiness on their quality of life, even when only slightly sleepy with a QEHSS of 1. The fact that 3 patients with a negative ESS and no reported sleepiness (QEHSS of 0) also reported an impact on their quality of life suggests that there may be a proportion of false positives, perhaps due to a misunderstanding of the question. The QEHSS did not correlate with measures of sleep disordered breathing (ODI or arousal rate) but this is perhaps not surprising as it has previously been shown that the ESS does not correlate with AHI[20].

One major limitation is that, like the ESS, our QEHSS is a subjective assessment of sleepiness. An objective assessment of sleepiness such as the MSLT may have provided a more robust reference standard, although this test is very time-consuming and not available within our sleep service. One recent study by Crabtree and colleagues[21] compared the ESS to the MSLT in children with craniopharyngioma and found a good specificity (91.7%) but a poor sensitivity (33.3%) using the traditional ESS cut-off score. An ESS cut-off score of 6 improved the sensitivity but at the expense of the specificity. Although this study was in a different patient group with a modified ESS, the results support our findings.

In summary, the ESS is a subjective assessment of the likelihood of falling asleep during routine daily activities. It is a strong predictor of perceived sleepiness when it yields a positive result but a negative ESS does not exclude clinically significant sleepiness. It is worth considering recording perceived sleepiness alongside the ESS (and perhaps the impact of this on the patient's quality of life) as it may aid in the interpretation of diagnostic sleep investigations and decisions relating to driving safety.

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Appendix 1: MODIFIED QEH EPWORTH SLEEPINESS SCALE

NAME:…… **DATE:** ……/……/……

1. How likely are you to doze off or fall asleep in the situations described in the box below in contrast to feeling just tired? Please **CIRCLE the most appropriate number** for each situation below;

SITUATION	CHANCE OF DOZING			
	None	Slight	Moderate	High
Sitting and reading	0	1	2	3
Watching TV	0	1	2	3
Sitting inactive in a public place (e.g. theatre or a meeting)	0	1	2	3
As a passenger in a car for an hour without a break	0	1	2	3
Lying down to rest in the afternoon when circumstances permit	0	1	2	3
Sitting and talking to someone	0	1	2	3
Sitting quietly after a lunch without alcohol	0	1	2	3
In a car, while stopped for a few minutes in the traffic	0	1	2	3

2. Although you may not fall asleep in the situations described above, how sleepy do you feel during the day? Please **CIRCLE the most appropriate number.**

Not at all	Slightly Sleepy	Fairly Sleepy	Very Sleepy	Extremely Sleepy
0	1	2	3	4

3. Does sleepiness affect your Quality of Life (please tick)? **Yes** ☐ **No** ☐

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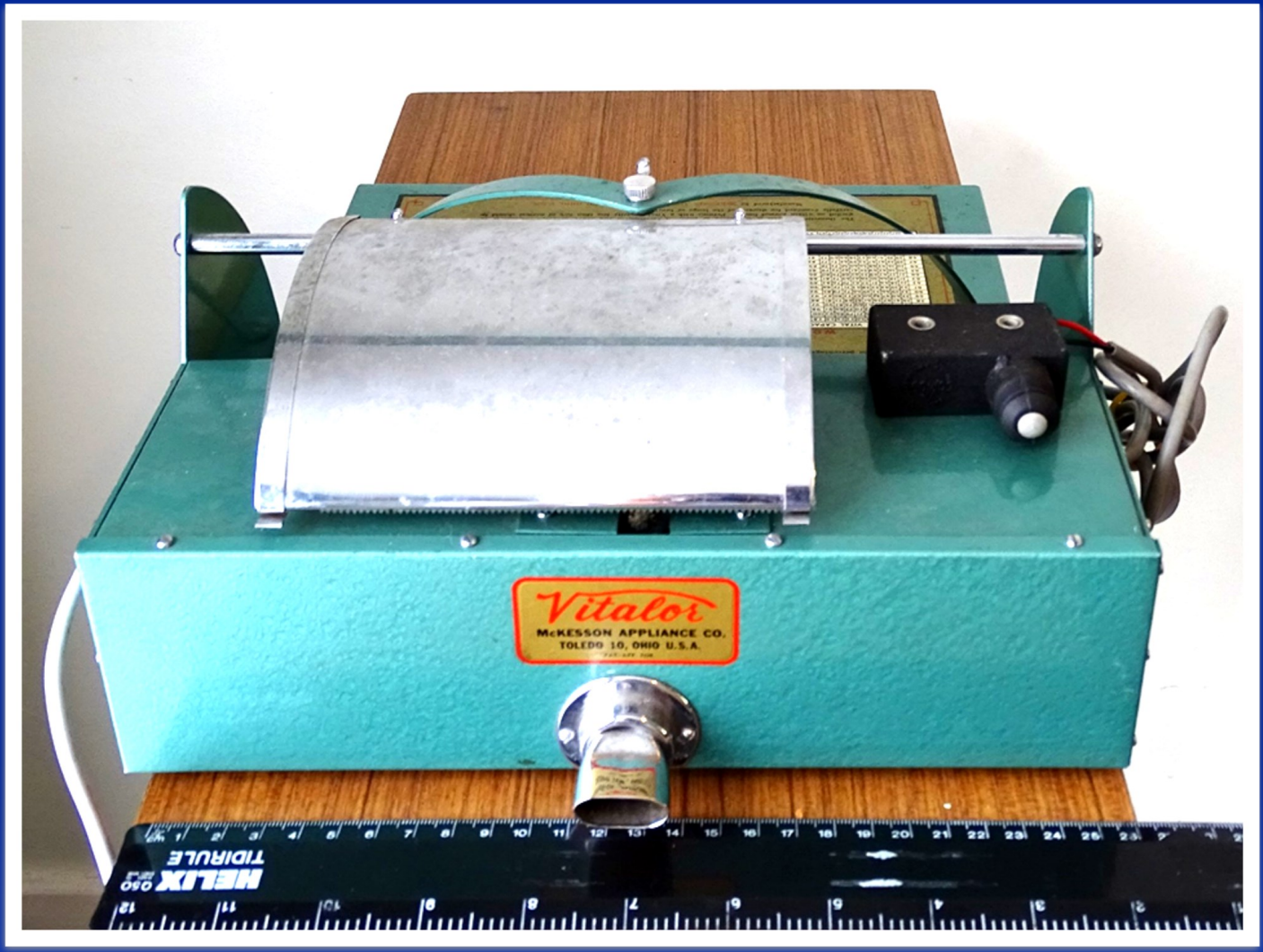
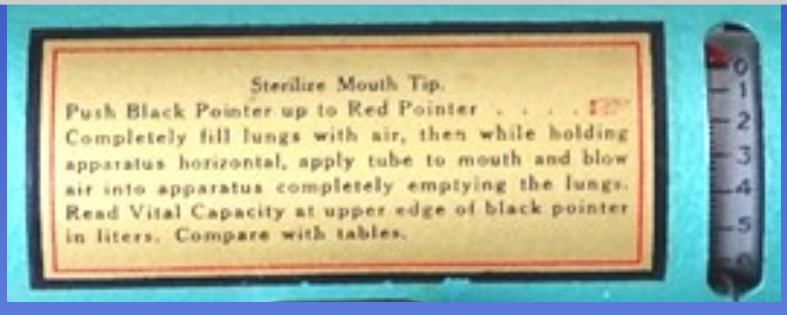
FROM THE MUSEUM

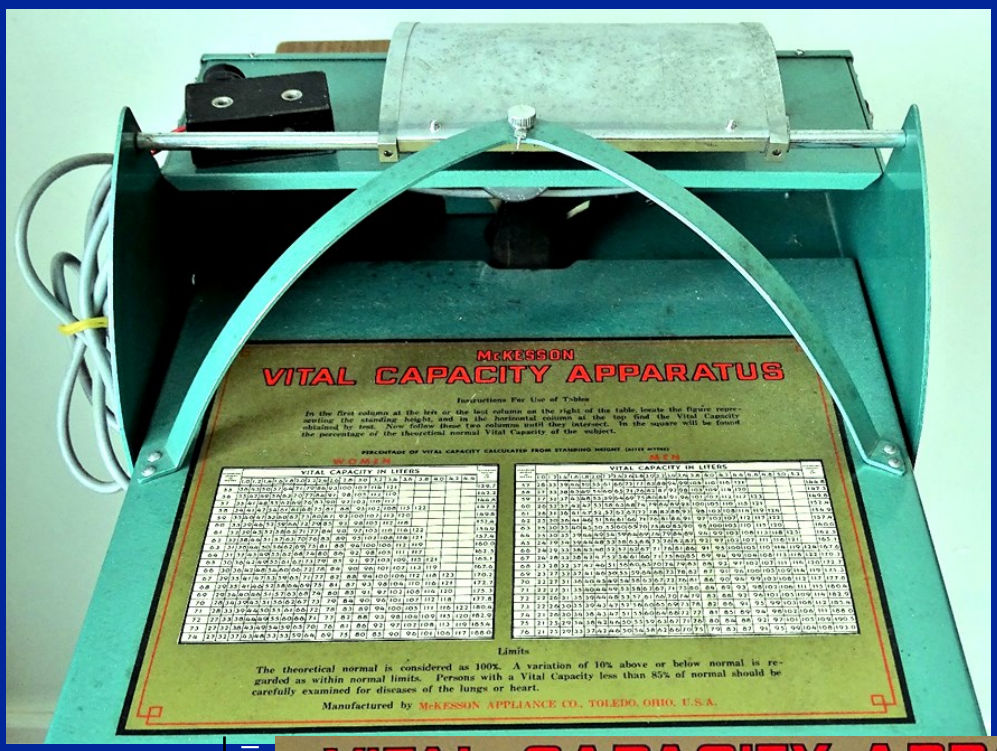
The McKesson Vitalor



From the 1950s, used to record the Timed Vital Capacity.

A chart is placed in the recording tray and the white button held manually to activate the motor controlling the horizontal movement of the chart (2 $cm.s^{-1}$). Note the thick rubber bellows and the narrow orifice offering a high resistance and back pressure (up to 37 cm H_20 in one account). The recording scale was crude, indicating up to 6 litres in 200ml increments. The instructions and interpretation of results had no adjustment for age or ethnicity.





REAR VIEW

Images by Dr David Chinn

VITAL CAPACITY APPARATUS

Instructions For Use of Tables

In the first column at the left or the last column on the right of the table, locate the figure representing the standing height, and in the horizontal column at the top find the Vital Capacity obtained by test. Now follow these two columns until they intersect. In the square will be found the percentage of the theoretical normal Vital Capacity of the subject.

PERCENTAGE OF VITAL CAPACITY CALCULATED FROM STANDING HEIGHT (AFTER MYERS)

WOMEN

STANDING HEIGHT IN INCHES	VITAL CAPACITY IN LITERS																STANDING HEIGHT IN Cm.
	1.0	1.2	1.4	1.6	1.8	2.0	2.2	2.4	2.6	2.8	3.0	3.2	3.4	3.6	3.8	4.0	4.2	4.4	
55	36	43	50	57	64	71	79	86	93	100	107	114	121						139.7
56	35	42	49	56	63	70	77	84	91	98	105	112	119						142.2
57	35	41	48	55	62	69	76	83	90	97	103	110	117						144.8
58	34	41	47	54	61	68	75	81	88	95	102	108	115	122					147.3
59	33	40	47	53	60	67	73	80	87	93	100	107	113	120					149.8
60	33	39	46	52	59	66	72	79	85	92	98	105	112	118					152.4
61	32	39	45	52	58	65	71	77	84	90	97	103	110	116	122				154.9
62	32	38	44	51	57	63	70	76	83	89	95	102	108	114	121				157.4
63	31	38	44	50	56	62	69	75	81	88	94	100	106	112	119				160.0
64	31	37	43	49	55	62	68	74	80	86	92	98	105	111	117				162.5
65	30	36	42	49	55	61	67	73	79	85	91	97	103	109	115	121			165.1
66	30	36	42	48	54	60	66	72	78	84	90	96	101	107	113	119			167.6
67	29	35	41	47	53	59	65	71	77	82	88	94	100	106	112	118	123		170.2
68	29	35	41	46	52	58	64	69	75	81	87	93	98	104	110	116	121		172.7
69	29	34	40	46	51	57	63	68	74	80	85	91	97	102	108	114	120		175.3
70	28	34	39	45	51	56	62	67	73	79	84	90	96	101	107	112	118		177.8
71	28	33	39	44	50	55	61	66	72	78	83	89	94	100	105	111	116	122	180.4
72	27	33	38	44	49	55	60	66	71	77	82	88	93	98	104	109	115	120	182.9
73	27	32	38	43	49	54	59	65	70	76	81	86	92	97	102	108	113	119	185.4
74	27	32	37	43	48	53	53	59	64	69	75	80	85	90	96	101	106	117	188.0

MEN

STANDING HEIGHT IN INCHES	VITAL CAPACITY IN LITERS																				STANDING HEIGHT IN Cm.
	1.0	1.2	1.4	1.6	1.8	2.0	2.2	2.4	2.6	2.8	3.0	3.2	3.4	3.6	3.8	4.0	4.2	4.4	4.6	4.8	5.0	5.2	
57	28	33	39	44	50	55	61	66	72	77	83	88	94	99	105	110	116	121					144.8
58	27	33	38	43	49	54	60	65	71	76	82	87	92	98	103	109	114	120					147.3
59	27	32	37	43	48	53	59	64	69	75	80	85	91	96	101	107	112	117	123				149.8
60	26	32	37	42	47	53	58	63	68	74	79	84	89	95	100	105	110	115	121				152.4
61	26	31	36	41	47	52	57	62	67	72	78	83	88	93	98	103	108	114	119	124			154.9
62	25	30	36	41	46	51	56	61	66	71	76	81	86	91	97	102	107	112	117	122			157.4
63	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120			160.0
64	25	30	35	39	44	49	54	59	64	69	74	79	84	89	94	99	103	108	113	118	123		162.5
65	24	29	34	39	44	48	53	58	63	68	73	78	82	87	92	97	102	107	111	116	121		165.1
66	24	29	33	38	43	48	52	57	62	67	71	76	81	86	91	95	100	105	110	114	119	124	167.6
67	24	28	33	38	42	47	52	56	61	66	71	75	80	85	89	94	99	104	108	113	118	122	170.2
68	23	28	32	37	42	46	51	56	60	65	70	74	79	83	88	93	97	102	107	111	116	120	172.7
69	23	27	32	37	41	46	50	55	59	64	68	73	78	82	87	91	96	100	105	109	114	119	175.3
70	22	27	31	36	40	45	49	54	58	63	67	72	76	81	86	90	94	99	103	108	112	117	177.8
71	22	27	31	35	40	44	49	53	58	62	67	71	75	80	84	89	93	98	102	106	111	115	180.4
72	22	26	31	35	39	44	48	53	57	61	66	70	74	79	83	88	92	96	101	105	109	114	182.9
73	22	26	30	35	39	43	47	52	56	60	65	69	73	78	82	86	91	95	99	103	108	112	185.4
74	21	26	30	34	38	43	47	51	55	60	64	68	72	77	81	85	89	94	98	102	106	111	188.0
75	21	25	29	34	38	42	46	50	55	59	63	67	71	76	80	84	88	92	97	101	105	109	190.5
76	21	25	29	33	37	42	46	50	54	58	62	66	70	75	79	83	87	91	95	99	104	108	193.0

Limits

The theoretical normal is considered as 100%. A variation of 10% above or below normal is regarded as within normal limits. Persons with a Vital Capacity less than 85% of normal should be carefully examined for diseases of the lungs or heart.

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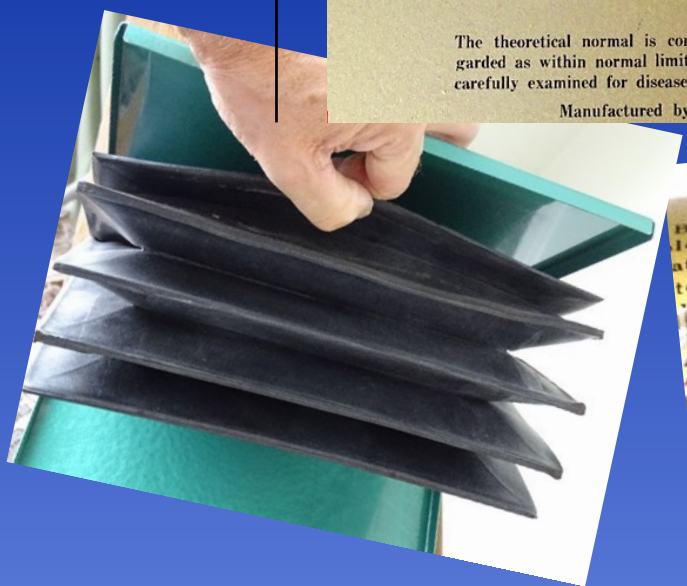

Dr Harry Griffin (PhD)

Lead Respiratory Physiologist

Hampshire Hospitals NHS Foundation Trust

With Yahoo making the decision to close their Group platform, the ARTP Forum migrated across to Google groups on Monday 14th December 2020. There was roughly a month between the closure of Yahoo Groups and the first post appearing on Google Groups. After such a challenging year in Respiratory Physiology it seemed fitting to have some 'fallow time' from the Forum over Christmas from…..well discussing 'fallow time'.

If you wish to continue to send and receive emails from the ARTP Forum then you must complete the online form at the link below to confirm the contact details that you wish to be added. Consent Form Link:
https://forms.gle/9bCAbMKSHE19gZbh7

The new email address for contacting the ARTP Forum is forum@artp.org.uk. Remember to add this email address to your safe senders list to ensure that you will receive emails from the ARTP Forum.

Top Forum

Title: PFT for lung cancer patient

Date: 30/11/2020

Question: Lung function has been requested for a patient on cancer pathway. Patient tested positive for COVID-19 seventeen days ago. ERS states: COVID patients must not be tested for a minimum of thirty days post infection. We swab all patients 3-7 days prior to PFT, wear full PPE and have been waiting the recommended 30 days. An EBUS procedure is going ahead if this patient's recent swab is negative. What are ARTP member's thoughts on performing PFT earlier than 30 days?

Replies: It seems likely that numerous other departments have had to consider this conundrum over the last year and there were several helpful replies. The first reply came from a member of the ARTP COVID-19 working group. They stated that national guidance had changed around infection control since the original lung function guidance was published in May 2020. Furthermore, they felt that with full PPE available there is little risk to the staff, so go ahead and test as it is clinically required with minimal risk to the patient.

Another physiologist agreed that the tests should go ahead as the clinical need is there in a pre-surgery lung cancer patient and the benefit outweighs the risk. However, they reported they would be uncomfortable testing a potentially active COVID-19 patient in the middle of the day and they would suggest the patient be tested at the end of the clinic or on a separate kit.

Furthermore, the physiologist stated they had agreed within their hospital that for most pre-op requests a Spiro will suffice and would perform this on the wards on a swab positive patient.

In response to the first reply from the member of the COVID-19 working group one physiologist asked whether ARTP were going to publish updated recommendations. In particular they were interested if other departments had restarted performing Mannitol challenge tests. One physiologist stated that they had indeed restarted this diagnostic service with appropriate risk assessment and full PPE in place. However, another reply highlighted the potential impact that performing these longer tests would have on the huge backlog of routine PFTs, especially the shorter but more urgent 2WR slots.

Title: Interpreter for lung function tests

Date: 14/01/2021

Question: We have been asked to undertake spirometry and lung function tests for a patient who cannot speak English. How can you get round the problem of having an interpreter in the room?

Replies: One physiologist stated they use an interpreter on the telephone, but it can be difficult getting the instructions across and that they had had more success with Google Translator. Another physiologist suggested utilising modern technology so that the interpreter could attend virtually via MS Teams. Furthermore, another reply described how a dedicated language line via an iPad allows a video link and felt it worked really well with full control over microphone and speaker volume.

One physiologist stated they continued to use face-to-face interpreters as they also found telephone interpretation challenging but stressed the interpreter must also wear the required PPE and stand 2 metres away from the patient. Indeed, one physiologist described how their trust went one step further and had interpreters mask fit tested and trained in use of enhanced FFP3 level PPE.

Title: Oxygen delivery method

Date: 19/02/2021

Question: We currently have a COVID-19 positive patient with learning disabilities on one of our wards who needs O_2. She is saturating between 72-80% on room air. However, she is unable to tolerate any standard delivery methods (e.g. nasal cannula, masks, hoods etc) and even a CPAP tent has been unsuccessful. Any ideas on how we can give her supplemental oxygen?

Replies: Several physiologists were quick to reply with helpful ideas. The first suggested contacting the learning disabilities team? Unfortunately, the physiologist had already received support from both the learning disability team and the patients family without success.

Another physiologist suggested a hyperoxic environment/hyperbaric chamber but if she was for escalation to ITU it might be worth a discussion regarding intubation. However, in reply to this comment we learnt the patient was not for escalation but medics were having a discussion with the family about sub-cutaneous continual sedation.

Further suggestions from a helpful physiologist described the Oxyarm type headset which still needs to be worn on the head but not the face and could be introduced in a new way to provide some comfort. Another consideration is that ITU may have experience with the more invasive trans-tracheal oxygen supplementation, although the physiologist highlighted that this was approaching intubation and sedation.

Title: Cough Peak Flow Measurement and Pulse CO Monitoring

Date: 03/03/2021

Question: Have any services been performing cough peak flow measurements (cPEF) and/or pulse carbon monoxide (pCO) monitoring?

Replies: A senior physiologist stated that their department used a standard PEF meter (Wrights generally) to measure cPEF but that it can be done on some commercially available lung function systems with specific software. cPEF was performed as part of the assessment of patients with MND as a reduced cPEF is indicative of poor secretion clearance.

They also had experience of measuring pCO using an HP 8-wavelength pulse oximeter that gave SpO_2 adjusted for SpCO etc. However, they hadn't used the technology for a long time and attached a picture to illustrate how big and bulky the equipment they used had been.

Another senior physiologist suggested that 7 years ago they had reviewed an updated pCO measuring technology that the first physiologist may have been referring to. They stated "the technology was certainly not what I would describe as robust", "making clinical decisions on the measurements would not have been appropriate" and "I would rather rely on a proper measurement from a blood sample and a proper co-oximeter". However, they did acknowledge there could have been improvements in the technology in the past 7 years.

Title: Healthcare Science Week

Date: 08/03/2021

Question: We have been asked by our Lead Healthcare Scientist to display a poster in our department as part of promoting Healthcare Science week. However, to my horror I noticed that Respiratory Physiology doesn't even feature on it. I would appreciate thoughts on the matter. https://www.nhsemployers.org/case-studies-and-resources/2019/01/promoting-healthcare-science-as-a-career

Reply: Numerous physiologists replied to this post expressing their disappointment. Indeed, one senior physiologist and board member of numerous professional respiratory bodies stated "This is particularly galling in view of the fact that the National School are trying to promote aspects of respiratory in line with the known shortfall in Respiratory Physiology staff".

However, the Forum came together to quickly suggest ideas for minimising the impact of this error and one physiologist commented that the "The [ARTP] workforce committee created some flyers that may be of use". A member of EBS quickly responded by uploading the ARTP flyer onto the resource file on the new ARTP google drive. It can be accessed here: https://drive.google.com/drive/folders/1TAVqxUmq8ogAh236UgVKBv8H5UOg7AFD?usp=sharing

Title: Book recommendations

Date: 27/03/2021

Question: I was wondering if anyone has a book recommendation list that would be helpful for an STP student?

Replies: The first reply stated the ARTP handbooks are available directly from ARTP. They also recommended two other books: Lung Function Tests: Physiological Principles and Clinical Applications by John M. B. Hughes and the latest edition of Lung Function: Physiology, Measurement and Application in Medicine 7th Ed by J Cotes.

The second reply was even more extensive by providing an entire list of books that had been put together for STP students at their Trust (see below). They also highlighted that the ARTP handbooks parts 1 and 2 were expected to have newer editions released soon. Indeed, one of the authors confirmed that the new edition of Part 1 should be available in a few months.

Lung Function	https://www.amazon.co.uk/Lung-Function-John-Cotes/dp/1118597354/ref=sr_1_2?dchild=1&keywords=LUNG+FUNCTION&qid=1613131882&s=books&sr=1-2
Essentials Of Polysomnography	https://www.amazon.co.uk/Essentials-Polysomnography-William-H-Spriggs/dp/128403027X/ref=sr_1_1?dchild=1&keywords=polysomnography&qid=1613131927&s=books&sr=1-1
Applied Respiratory Physiology	https://www.amazon.co.uk/Nunn-Lumbs-Applied-Respiratory-Physiology
A Practical Guide to the Interpretation of Cardiopulmonary Exercise Tests	https://www.amazon.co.uk/Practical-Interpretation-Cardiopulmonary-Exercise-Respiratory/dp/019883439X/ref=sr_1_1?dc
ERS Handbook of Respiratory Medicine (3rd edition)	https://www.ersbookshop.com/ers-handbook-of-respiratory-medicine-3rd-edition-456-p.asp
ERS Handbook of Respiratory Sleep Medicine	https://www.ersbookshop.com/ers-handbook-of-respiratory-sleep-medicine-100-p.asp
ERS Practical Handbook of Noninvasive Ventilation	https://www.ersbookshop.com/ers-practical-handbook-of-noninvasive-ventilation-226-p.asp

Keith Butterfield

ARTP would like to extend our best wishes to Keith Butterfield, who is retiring from Dorset County Hospital on 26th March 2021. Keith has made a huge contribution to respiratory and sleep physiology in his roles in the West Midlands and subsequently at Dorset and he will be greatly missed. During his time at City Hospital, he was instrumental in setting up the first regional audit of diagnostic lung function equipment. This impacted me personally as the equipment in my department performed so disastrously, I was able to obtain funding for replacement!

In his role as ARTP Webmaster, he transformed how ARTP presented itself to the world by introducing and then managing the ARTP website. We have all benefited from his innovative ideas in terms of IT; he will be sorely missed and impossible to replace.

Julie Lloyd, ARTP Chair

Professor Brendan Cooper commented '*Keith was my Vice-Chair from 2005-2010 as we took the ARTP from a small professional body with a little relevance to day to day workforce, to becoming the voice of clinical respiratory physiology in the UK. Keith has always demonstrated great practical aptitudes and either fixed things "on the hoof", or developed long-standing initiatives such as the website to improve the accessibility and usefulness of ARTP to its membership. Who knew he had been a swimming pool technician and policeman in his early career choices? (No, he wasn't in a Police Diving Team!).*

We had some great fun producing bigger and better annual ARTP conferences, and Keith was a great support in getting the ARTP conference "show" on the road. Indeed, many of the formats used today were because Keith worked closely with the fabulous team at EBS to deliver great venues, events and an atmosphere of being their ARTP family.

He spent many long hours writing, developing and planning the website, for which he never probably got the full recognition, because for our younger members it was probably expected. For the older generation, it was an exciting and frontier-busting initiative which put ARTP on the map. Keith was good at the details on strategy documents and he worked a lot on getting the new ARTP structure (including having a President and fixed terms of office for Exec members).

Keith's musical abilities and enthusiasm to play are exceptional, to the point that he and I once even had an impromptu jamming session on guitars at the end of doing some ARTP strategy work at his house! I suspect retirement for Keith will actually mean more a "change of direction" with many new projects, interests and shows to come. Thanks for all you did to support my years on ARTP Executive. Great days.

ARTP Past Chair, Dr. Karl Sylvester took on the role of ARTP Vice–Chair when Keith stepped down and recalled '*Keith was instrumental in getting the first update to the ARTP statement in over 25 years. Our late night Skype sessions were strangely enjoyable. He was always central to producing excellent work on behalf of ARTP, such as the surveys that were conducted over the years. From when I joined ARTP to when I took over from Keith as Vice-Chair he was always at the centre of developments and improvements to the organisation. He always seemed comfortable with quietly getting on with exceptional work for ARTP in the background and never expecting recognition or reward. His calm and laid back attitude was infectious and very welcome. Keith always had a very considered approach and welcomed the thoughts and opinions of his peers when it came to decision making.*

Probably Keith's biggest achievement was winning the ARTP's Got Talent competition where he was up against such fierce competition as Alan and his organ. A night never to be forgotten.

His knowledge and experience will be missed from respiratory and sleep physiology but I'm sure Keith has plenty planned and I'm sure a lot of this includes music.

On behalf of ARTP, I would like to thank Keith for all he has contributed to the professional body over many years and I'm sure that you will join us in wishing Keith well as he starts a new chapter in his interesting life.

Heather Ambler

Retirement of Heather Ambler, CSM (Respiratory physiology services) for NHS Greater Glasgow and Clyde

Julie Lloyd, ARTP Chair

After over 40 years of dedicated NHS service, ARTP has been advised that Heather Ambler, Clinical Services Manager (Respiratory physiology services) for NHS Greater Glasgow and Clyde is taking her well-deserved retirement on 31st March 2021. Heather began her career in the NHS in 1977, in nuclear medicine, before joining respiratory medicine in 1979. She worked her way through all levels of respiratory physiology, contributing to various research projects along the way. Heather was promoted to Physiology manager for West Glasgow in 1999 and led the service until a further promotion in 2014 to her current post as CSM for all respiratory physiology services for NHS Greater Glasgow and Clyde. She has made a huge impact on education and training in Scotland and has overseen a huge number of trainee staff through to practitioner level and beyond via the many different training routes. She was the first in Scotland to undertake training in the STP programme with five individuals now completed and registered Clinical Scientists.

Her team describe how Heather has developed their respiratory physiology service, almost immeasurably, over the years into the biggest service in Scotland, providing the full range of respiratory and sleep investigations. **Her colleague, Aileen Brown, Clinical Physiology Manager at Gartnavel described Heather** as '*always keen to raise the profile of the profession and has represented her team at a local and national level. She has always encouraged all members of her team to join and participate with ARTP and has supported their attendance at ARTP conferences as much as possible. Heather has been an inspiration to many respiratory physiologists in Glasgow and beyond and a lot of us owe our successful careers, at least in part, to her leadership and guidance*'.

ARTP would like to extend our heartfelt thanks and gratitude to Heather for her huge support of the profession at all levels over many years. She will be very much missed by her colleagues and friends and we would like to take this opportunity to wish her a wonderful retirement.

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ERS GROUP 9.01 NEWSLETTER

European Respiratory Society – Introduction: Jellien Makonga-Braaksma

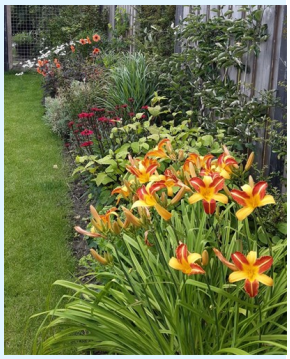
Jellien is the Assembly Secretary elect for ERS Assembly 9: Allied Respiratory Professionals. Her mandate will begin after the Virtual ERS 2021.

Rachel asked me to introduce myself to you all. My name is Jellien Makonga-Braaksma, I've been working as respiratory function technologist since 1993. I've been member of ERS since 2009, always in group 9.1. I was secretary and chair of the group, as many of you know. The last years I was chairing the Spirometry Committee together with Felip Burgos. When the call for candidates came for Assembly Secretary I hesitated a little bit… why? Because I left the lung function department since the first of February of this year.

My hospital, the Meander Medisch Centrum in Amersfoort (the Netherlands) offered me the possibility to study for my Masters' Degree, which I gladly accepted. So I've been studying "Innovation and Technology in Healthcare" for 2 years and received my degree last summer. And then a job was offered…as consultant digital services…

So I discussed the situation with the ERS office and they asked me to apply for the function as the knowledge from my Master would be very useful for the tasks of an Assembly Secretary. What are the tasks of the Assembly Secretary? It's being responsible for all educational activities in the Assembly. So the range and quality of trainings offered to the members at Congress and outside is being monitored. In these days many trainings are offered online, a huge change to ERS. I hope to be of help to make the necessary changes and provide the members of all three groups with the knowledge and skills needed.

Fun facts: And what else do you want to know…..any hobbies? Well yes, I play tennis, I love gardening (I have a vegetable garden) and I like to read a good book! Dear colleagues, I dearly hope that we'll meet again soon and live at Congress or somewhere else!



Thank you for sharing Jellien!

We would love to hear from **ALL** of you to learn more about who **YOU** are. Send us some interesting details about you, where you are based and what you do and let's get to know each other a little better.

European Respiratory Society – Message to members

The ERS International Congress 2021 will be a VIRTUAL event!

Despite hoping for some form of face to face congress this year, the current situation means a pragmatic view about the safety of large scale face to face events had to be made and the decision is to replicate the very successful 2020 virtual congress. Please join us again this year. More information regarding the registration process will be announced in the coming weeks but more information can be found here https://www.ersnet.org/congress-and-events/congress/

Taskforce application:

Our group submitted 2 taskforce application to ERS Office.

1. Developing Global Lung Function Initiative (GLI) reference equations for cardiopulmonary exercise testing
2. ERS technical guideline for blood gas sampling and analysis (TF-2021-15)

Acceptance of the application will be announced in May 2021.

European Respiratory Society – Upcoming webinars

Registration = FREE
CME credit = 1

Lung diseases and self-management—what is missing?

13 April, 2021—18:00-19:00 CET
Chairs: Dr Marco Clari, Ms. Jana De Brandt
Speakers: Dr Carol Kelly, Dr Karen Heslop-Marshall, Mr. Steve Jones

In the last decade, much has been done in the prevention, diagnosis, and treatment of obstructive and restrictive lung diseases. However, prevalence and burden continue increasing and challenging health and social systems. The question that should be studied is: Why is this happening, if we have better guidelines, better pharmacologic options, and more attention has been given by health professionals and society to these issues?
We recognise the continued need for more engaged and active patients in the control of health conditions, requiring better support for the patients to develop self-management skills. Clearly defined content to be integrated into self-management programmes is known, but the actual field intervention faces many challenges.
Allied health professionals have a key role in the integration of pharmacologic and non-pharmacologic treatment in the day-to-day life of the patients. Supporting patient behaviour change is one of the biggest challenges faced by health professionals. Evidence remains lacking in defining recommendations for implementing self-management programs. Therefore, we must summarise the state of the art, clarify concepts, discuss field experiences, with the objective of establishing networks of identified needs for multicentre research in self-management.

Educational aims

- Define the concept of self-care
- Analyse the theoretical background of self-care
- Identify the main challenges to the implementation of self-care/self-management programmes
- Understand features of self-management
- Importance of address physical and psychological elements
- Define the concept of motivational interviewing
- Define the influencing factors and eligible patients
- Defining challenges and potential pitfalls
- Implementation of effective strategies in the motivation of patients

Diseases / methods

- Airway diseases
- Interstitial lung diseases
- Thoracic oncology
- Paediatric respiratory diseases

Target audience

- Respiratory nurses
- Respiratory therapist
- Respiratory physiotherapist
- Physiologist
- Medical technical assistant
- Adult pulmonologist/Clinician
- Clinical researcher
- General practitioner
- Medical student
- Respiratory critical care physician
- Physician in pulmonary training

Clinical practice guidelines for the diagnosis of asthma in children aged 5 to 16 years

22 April, 2021—18:00-19:00 CET
Chair: Professor Alexander Moeller
Speaker: Dr Erol Gaillard

Making a diagnosis of asthma in children can be difficult. As a result, significant over and under-diagnosis of asthma occurs in children. Both are problematic because over-diagnosis results in the inappropriate and unnecessary use of asthma medications associated with potential side effects and increased healthcare costs. Conversely, under-diagnosis results in poor asthma control and reduced quality of life. A European Respiratory Society (ERS) task force developed evidence-based clinical practice guidelines for the diagnosis of asthma in children aged 5 to 16 years.

Educational aims

- To raise awareness of the need for a systematic approach to diagnosing asthma in school-age children
- To become familiar with the asthma diagnostic algorithm developed by the task force and the evidence underpinning the algorithm

Diseases / methods

- Airway diseases
- Paediatric respiratory diseases

Target audience

- Paediatricians
- Primary care physicians
- Paediatric trainees
- Primary care trainees
- Children's nurses and healthcare assistants
- Primary care nurses and healthcare assistants
- Respiratory physiologists

For a more detailed webinar calendar, please check the ERS website.

European Respiratory Society – Getting involved

As always, we would be delighted to hear from you with any thoughts and suggestions you may have for our group. It is great to hear from our Assembly Secretary-elect in this newsletter. We need more volunteers to showcase their departments and the exceptional work they undertake for their patients, so please do send us your contact details and we can get these included in the next newsletter.
As you will see a number of Assemblies have developed webinars and it would be great if we could arrange for some respiratory physiology webinars, for example, test performance, lung function during COVID, changes to practices due to the pandemic, innovative solutions to service delivery, lung function interpretation or any other thoughts people may have. Volunteers to deliver on these and other items would also be very welcome.
Are you missing something in the ERS library of documents or do you have suggestions for future taskforce application? Please don't hesitate to contact us. Karl: karl.sylvester@nhs.net; Rachel: r.ong@amsterdamumc.nl.

Virtual

ANNUAL CONFERENCE

1st-2nd July 2021

ARTP Association for Respiratory Technology & Physiology

ARTP Virtual Annual Conference 2021
Call For Abstracts

DEADLINE for SUBMISSION

11:59pm Monday 17th May 2021

There are seven weeks to go until the deadline to submit your abstract for the ARTP Annual Conference 2021 which will take place virtually on **1st & 2nd July 2021**.

Click here for more information

Click here to download the abstract submission guidelines

Click here to submit your abstract

ARTP Association for Respiratory Technology & Physiology

ARTP committee vacancies – Find out how to become involved

ARTP are recruiting and would love to hear from enthusiastic and motivated members who wish to become an active part of driving committee activity forward, and in turn help ARTP continue to expand their presence within respiratory and sleep physiology.

We are looking to find new members to fulfil the below committee roles:

Primary Care Representative

The ARTP Education Committee have established many courses covering a wide range of topics in the field of Respiratory Medicine and Lung Function testing, and are responsible for delivering the ARTP Professional Qualifications. The Committee would be keen to hear from those within primary care, who wish to play an integral part in the development of future educational opportunities available through ARTP.

Vice Editor of S-NEWS

S-NEWS is ARTP's Sleep E-Magazine. It is published twice yearly and keeps members up to date on both research and innovation in the Sleep Medicine world, as well as giving members a look at different aspects of sleep medicine.

An exciting opportunity has arisen in the role of sub-editor, which will provide support to the editor of the magazine. This role will require resourcing of new articles as well as helping with reviewing and editing.

It will require input mainly through the months of January – March & August – October in order for new issues to be put together. However, some input may be required throughout the year in the process of sourcing articles.

The person fulfilling this role will directly report to the S-NEWS editor, and will also be part of the Sleep Committee.

Requirements for the role:

- Innovative and keen to bring new ideas to the magazine.
- Prompt and punctual with deadlines.
- A good working knowledge of computer operating systems and ability to use Microsoft Word or Apple Pages.
- Working within a Sleep Team, (any level of experience) with a working knowledge of at least some sleep conditions, diagnostics and treatments.
- Ideal role for a Junior Member of the ARTP who wishes to become involved.

If you are interested in applying for any of the above roles, then please complete the expression of interest form by clicking the link below.

Click here to complete the expression of interest form.

The deadline for applications is Friday 30th April 2021.

For further information, please contact the ARTP Administrator at admin@artp.org.uk.