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ARTP | Association for Respiratory Technology & Physiology

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ARTP Association for Respiratory Technology & Physiology

FIRST WORD

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Well, summer has arrived (forget about the weather) but there is no sign of the workload easing here and I expect it is the same for all of you. I am sure you are looking forward to a break and I wish you a relaxing time. With this in mind, we see the return of a crossword puzzle, with all answers related to lung function to ensure you don't forget your chosen career whilst lazing by the pool. Prizes? No budget I am sure but let me know how easy it was. Talking of a rest, how does 49 years serving the NHS sound? The author of this article has done just that and recalls the founding of ARTP. For an alternative view, we are introduced to the 'Life of Breath' organisation, who explore breathing and breathlessness from creative as well as scientific aspects. Articles on their website/blog, include one on the impact of the smoking ban, ten years on, which I have reformatted here, with permission. Karl has neatly linked the breathlessness theme to the British Lung Foundation campaign for Lung Health in his 'Word from the Chair' plus he has news of a new ARTP Innovation award launching at the January 2018 conference. The issue also features an excellent article on CPET which won an ARTP Education Bursary for the author to attend a conference. See here for what is available to ARTP members. Over my years in the profession I have shared offices with many Respiratory Fellows and I would say that one of the tasks that, shall we say, irritates them is completing a Home Oxygen prescription via a 'HOOF' form. I decided to get details of the latest changes from the horse's mouth (sorry). You would not expect 'On the Blower' to be quite as action-packed as in the post-conference issue but Matt has defied this to provide the latest product news and updates.

Finally, at the time of going to press, we end with the sad news of the death of Professor Philip Quanjer, the giant of lung function reference values. Karl has added to the tribute paid by Professor Cooper, amongst others, on the ARTP forum and ARTP are extremely grateful that Professor Janet Stocks and Irene Steenbruggen have written a fitting tribute in time for this issue.

As usual, I hope you enjoy this issue and please feel free to email me at inspire@artp.org.uk with any suggestions for the future. I would like to thank all contributors and also the Editorial team for their customary help and advice.

Aidan Laverty

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A WORD FROM THE CHAIR

Dr. Karl Sylvester

ARTP Honorary Chair

It is with great sadness that I start my 'Word' with a tribute to **Prof Philip Quanjer.** There are others that knew him far better, so I respectfully leave it to Professor Janet Stocks and Irene Steenbruggen, who have provided a fitting obituary in the following pages. His contribution to the world of lung function has been immense. We all know of the European Community for Steel and Coal reference ranges, authored by Prof Quanjer, which we used to assess normality in the adult population for many decades. Recognising the limitations in these equations, Prof Quanjer was integral to the development of the Global Lung Function Initiative Taskforce at the European Respiratory Society and in 2012 published the multi-ethnic reference ranges for those 3-95 years old, which has greatly improved our accuracy in assessing normality in lung function. Prof Quanjer was a co-founder of the European Respiratory Society, the ERJ and a recipient of the prestigious ERS Sadoul Lecture Award. His contribution to the world of respiratory medicine and lung function will be greatly missed.

We have articles in this edition on breathlessness and the smoking ban. As we know, breathlessness is a common symptom amongst the population and a primary cause for initial presentation with a healthcare professional. Causes can be multi-factorial but lung disease is one that provides a massive burden. It is the 3rd biggest killer in the UK, affects the lives of over 12 million people and costs the NHS billions each year. The British Lung Foundation are currently running a campaign asking the government to set up a UK wide task force for lung health to reduce the inequality of healthcare provision and support given to patients with lung disease. I would urge you to support this campaign any way you feel able. This can be via social media or by sending a letter to your local MP. The BLF have done all the hard work for you by drafting an email and their website will automatically send this to your local MP for you. So all you have to do is type in your postcode and hit send. It's that

easy. So please do what you can for our patients burdened with their lung disease. You can find details of how to get involved here https://www.blf.org.uk/take-action/campaign/battle-for-breath.

Proof of how successful a national government-led campaign can be and the impact it can have is demonstrated in the smoking ban. It's approximately ten years since this was brought in and like the article suggests, it's hard to think back on what public places were like before the ban. As a lifelong non-smoker I do recall coming back from pubs and clubs, waking up the next morning and the room reeking of cigarette smoke just from the clothes I had been wearing the night before. There was always the thought of what that continuous inhalation of passive smoke from the dense fog within such a confined space would be doing to my lungs. I guess only time will tell. The article produces some very interesting facts on the impact of the ban, which will undoubtedly assist in the reduction of healthcare utilisation costs in the future. However, the government can do so much more to improve the lung health of the population which in turn will reduce the burden on the NHS budget. It seems like a no-brainer to me.

I'd like to finish by highlighting a new award that will be presented at the next ARTP conference in January 2018 in Brighton. As healthcare scientists we are renowned for our innovation, our ability to think innovatively around a problem and come up with a better solution. This was nationally recognised this year with the opening of the NHS Clinical Entrepreneur Programme to healthcare scientists. Further to this, the ARTP is introducing its own Innovation award to be presented at the next conference. Please send in your nominations for this award which can be in the form of the introduction or development of new equipment, adapting service delivery or changing your working practice etc. They must all demonstrate how the improvement benefitted the service and benefitted the patients who utilise your service. I know there is lots of innovation that takes place every day in lung function departments around the country. We're not very good at selling ourselves on a national level and sometimes we have to tell everyone how great we are because they're not going to do it for us. So get your nomination in now and be recognised for the brilliant work you are doing.

Karl

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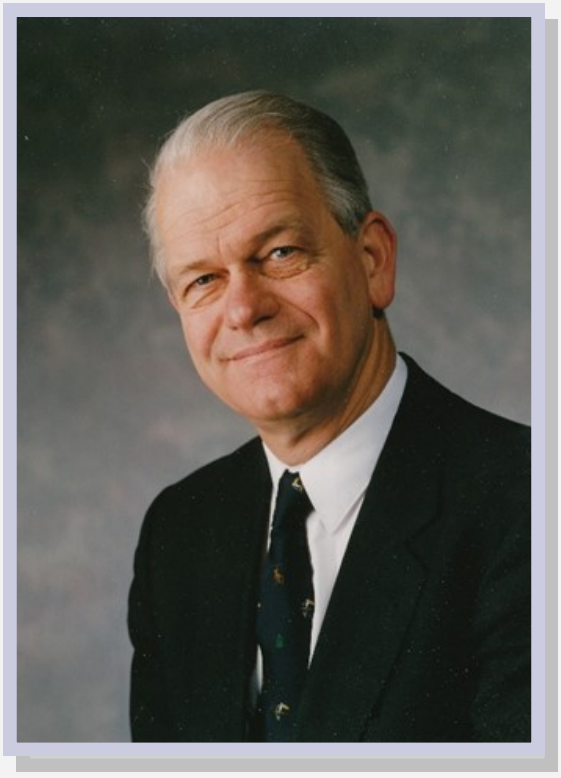
Professor Philip H Quanjer

Emeritus Professor of Physiology Leiden University, The Netherlands;

Co-founder of the European Respiratory Society and European Respiratory Journal



A great sense of loss and sadness marked the recent death of Philip Quanjer, who passed away peacefully at his home in Nijverdal, The Netherlands on July 26th 2017 after a long and courageous battle against cancer, during which he defied all odds in order to complete the tasks he had set himself. Philip was a highly respected member of the global respiratory community, who devoted his life to understanding and describing lung health, remaining highly active in his field up to a few weeks before his death. Indeed, after 'retiring' in 1997, he went on to publish a further 90 papers, an astonishing 55 of which being published during the last five years of his life. His efforts since the 1980s to improve the standard of lung function testing and develop more reliable reference values with which to interpret the results of such tests have won him international acclaim and immense respect and admiration from the global respiratory community. Such developments were essential in order to improve early detection of respiratory disease, irrespective of age, sex or ethnic background, and clarify what factors impact negatively on lung development.

Philip was born on 12th September 1936 in Pontianak (Netherlands East Indies, now Indonesia) and spent his formative years in a Japanese concentration camp (where he learnt to swim in crocodile infested rivers!) until liberation in 1945. His first two years of formal education, which did not commence until he was nine years of age, were spent in Thailand and Indonesia before his family returned to the Netherlands in 1948. Philip met the love of his life and future wife, Else Meijerink while they were both high school students. They married in 1960, while he was still a student at Groningen University medical school (1955-1963), had four children (2 sons, 2 daughters) and recently celebrated their 57th wedding anniversary. Philip was drafted into military service in 1964, serving the Royal Navy at the Navy's diving centre, before embarking on a residency in Internal Medicine at Groningen University Hospital, which he completed in 1970.

Philip's interest in respiratory physiology was evident from an early age, with 2.5 years of his medical school training devoted to physiological work. This was followed by a period of extensive research into exercise-induced asthma and the pharmacokinetics of patients with airflow limitation while he was a young clinician, leading to the award of his PhD on 'Plethysmographic evaluation of airway obstruction' in 1970. After holding various consultant posts in the Netherlands, he was appointed Head of the Respiratory Division at Leiden University in 1972, where he was awarded his chair in Respiratory Physiology in 1980 and where he continued to work until his 'retirement' in 1997.

As well as being a very thorough, astute and wise reviewer of the scientific literature, Philip was an associate editor/board member for several international journals. He also contributed to innumerable national and international committees, task forces and working parties during his lifetime, including the European Society for Clinical Respiratory Physiology (SEPCR: 1975-1990) of which he became President in 1985. He was a co-founder of both the European Respiratory Journal (ERJ) and the European Respiratory Society (ERS), having played a key role in the merger of both the European Journal of Respiratory Disease and Bulletin Européen Physiopathologie Respiratoire in 1987, and the SEPCR and the European Society of Pneumology (SEP) in 1990). He not only participated in several American Thoracic Society (ATS) task forces in the 1990s, but made a very active contribution to the ERS/ATS task force on infant lung function (1992-1996) the first such task force to be organised jointly between the two societies [1]. In 1995 Philip was honoured by ERS to deliver the prestigious Sadoul Lecture. Furthermore, it was Philip who was the driving force behind the creation in 1994 of the section for lung function technologists and scientists within the ERS which, after including physiotherapists and nurses, became Assembly 9.

Philip was an excellent speaker, a brilliant, enthusiastic and committed teacher, an outstanding physician and an intellectually rigorous scientist, characterised by the highest standards of both personal and professional integrity. He was one of the pioneers in strengthening cooperation in the fields of science and technology across Europe, which started within the European Coal and Steel Community (ECSC), the roots of the European Union. From 1978 until 1994, Philip was the scientific secretary of the ECSC working party on "Standardisation of Lung Function Tests".

One of Philip's key characteristics was his ability to see the 'big picture', without ever losing attention to the fine detail. It was he who realised over 40 years ago that adult respiratory disease frequently originated from early life exposures, thereby stimulating his interest in lung growth and development. With his active, enquiring mind, he managed to cross bridges between pulmonology, paediatrics, physiology, epidemiology, engineering, information technology, and statistics, always resorting to self-teaching if he couldn't find anyone to show him the ropes of a new discipline!

As recently described in "A tribute to Philip Quanjer" [2], Philip's reputation will always be associated with lung function reference values. This started with the publication of the first European documents on standardisation of lung function tests, which included recommended sets of reference values in 1983 [3], and culminated in the publication of 'Multi-ethnic reference values for the 3-95 year age range' in 2012 [4], undertaken as part of the ERS Global Lung Function Initiative(GLI). These equations have been endorsed by all the major respiratory societies world-wide, incorporated into most commercially available lung function software and are now in widespread clinical and research use (http://www.ers-education.org/guidelines/global-lung-function-initiative.aspx). The GLI network, which Philip pioneered and played a pivotal (completely unfunded) role in, represents an outstanding example of international collaboration and altruism which continues to grow in both breadth and strength and which will be a lasting legacy to Philip's memory [5]. As part of his efforts to improve the way in which lung function tests were reported, and to prevent unnecessary and potentially detrimental treatment in older but otherwise healthy individuals, Philip was a fierce defendant of the concept of 'healthy ageing' by improving the definition and description of what is and is not normal based on the use of z-scores rather than 'percent of predicted' and 'fixed cut-offs' when interpreting results.

After his retirement, Philip also continued working on projects such as his open-access SpirXpert website which aims to promote understanding of respiratory physiology and pathophysiology, with emphasis on the measurement and interpretation of spirometric test results. The importance of this free website (which was managed by Philip up to the time of his death and which has been translated into many languages), has been recognised by the ERS, who will now take over hosting this resource and continue to maintain it as a free and open access resource for future generations. (http://spirxpert.ers-education.org)

In recognition of his huge contributions to the respiratory community world-wide, Philip received a Lifetime Achievement Award from the Association of Respiratory Technicians and Physiologists (ARTP, UK) in 2013. Although Philip was unable to attend the 2013 ARTP conference to receive this award, a colleague collected it for him so that it could be presented to him at his home in the Netherlands. Philip said he was delighted and honoured to receive the award for something he loves doing, and his pleasure at receiving it is evident from this photograph.

Philip was however far, far more than the sum of all these amazing clinical and academic achievements, as all who had the privilege and joy of working with him can testify. It is difficult to describe the magnitude of his influence on the respiratory community around the world, but the terms 'rock' and 'giant' have been cited frequently in recent weeks. He was a wonderful mentor, not only to the 18 PhD students whom he supervised, but to a wide range of medical, physiological, nursing, diving and technical students and, during latter years, to anyone around the world who sought his help and advice. Those who met Philip were immediately impressed not only by his infectious enthusiasm for whatever problem needed tackling, but by his wisdom and vision, combined with the drive and determination to complete the task in hand.

Philip's ability to 'see the big picture, while paying close attention to the detail' extended into his private life and was perhaps best epitomised by his love of the natural world (including the beautiful garden that he and Else created and nurtured) and by his passion for wildlife photography. The latter resulted in many magnificent images, being shared between family and friends via his and his son's websites, which included not only the superb shots of animals sighted during his annual safaris to Africa, but of a wide range of exquisite birds, insects and flowers sighted at home or abroad. He was a very special, all-round gifted human being who always made the best of life, whom we have much to learn from.

Philip was a truly remarkable man, whose life and work was characterised by altruism and international collaboration. He was an intellectual giant, with an amazing mind, and a clarity of purpose and vision, without the slightest hint of intellectual arrogance. He had a charisma, kudos and gravitas that few achieve and was a man whose understanding and beliefs were wrapped in justice, integrity, honesty and passion. His love of meeting people from all over the world, of talking to them and listening to their views, was captured in his final, very moving farewell message to his colleagues, where he noted that 'feelings of friendship and respect have always transcended geographical barriers.'

Since his death many colleagues have expressed their gratitude, admiration and respect for Philip, noting how much of an impact he had made on their lives, even if they had only met him occasionally. All have mentioned that it has been a privilege to have known and worked with such a leading light of our profession and a truly international citizen. It is not only his vast collection of scientific works so freely shared with others that will provide a legacy for generations to come, but memories of Philip as a wonderful human being. If it is difficult for us, as a respiratory community, to imagine Philip not being around to discuss such a wide range of issues, how much harder for Else, his children and grandchildren, all of whom he loved so much, and to whom we offer our sincerest condolences.

Philip's death represents the sad loss of an amazing individual whose contribution to respiratory physiology and science is immeasurable. He has certainly left his mark on our world, which is a better place for him having lived in it, and he will not only be remembered with fondness and gratitude by all who knew him personally, but referred to in admiration by generations of respiratory physiologists and practitioners yet to come.

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ARTP EDUCATION BURSARY

The use of cardiopulmonary exercise testing (CPET) and other investigations in suspected or confirmed pulmonary hypertension

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Cardiopulmonary exercise testing (CPET) is a non-invasive tool used to quantify cardiac, pulmonary and circulatory responses to exercise (Wasserman et al, 1999)[1]. There are many indications for CPET: including evaluation of exercise tolerance and limitation and evaluation of patients with both cardiovascular and respiratory disease[2]. Recently CPET has been found to provide valuable information in unexplained shortness of breath[3], in particular in patients found to have pulmonary arterial hypertension (PAH), as shortness of breath can occur before any clinical signs of PAH[1].

The World Health Organisation[4] defines pulmonary hypertension (PH) as having high blood pressure in the lung arteries, where they become narrow and there is less room for the blood to flow through. Pulmonary hypertension can be subdivided and a re-classification was performed in 2013[5], which distinguishes between conditions that directly affect the pulmonary arterial tree and those affecting the pulmonary venous system or respiratory structure and function[6].

Pulmonary hypertension is a haemodynamic and pathophysiological condition and is defined as an increase in the mean pulmonary arterial pressure at rest, which is assessed by right heart catheterisation. Pulmonary hypertension can occur alone, but more often is found in multiple clinical conditions[7]. The subdivisions of the condition are due to the different features of each, and the remainder of this article will focus primarily on pulmonary arterial hypertension.

Pulmonary Arterial Hypertension (PAH) is a progressive disease caused by constriction of the pulmonary arteries which connect the right side of the heart to the lungs[8]. It is characterised by elevated pulmonary vascular resistance that subsequently leads to right heart failure[9]. It can occur at both rest and after exercise, and in the absence of raised left sided cardiac pressures[6].

The pathophysiology of pulmonary hypertension (PH) is primarily due to injury to the endothelium, causing increased susceptibility to pulmonary vascular injury;

The purpose of this article is to review the evidence about pulmonary hypertension, specifically analysing the use of different investigations in both the diagnosis and evaluation of the condition. A review of the evidence between 2000 and 2016, using the following key words was performed; pulmonary arterial hypertension, pathophysiology, respiratory function tests, cardiopulmonary exercise testing and reproducibility of results.

including vascular scaring, endothelial dysfunction and smooth muscle proliferation[10]. The pathophysiology of PAH is not too dissimilar; pulmonary endothelial dysfunction encourages the pathological triad of vasoconstriction, cellular proliferation and thrombosis. McLaughlin[11] found that there is a loss of the cross sectional area of the vascular lumen, hence the increase in resistance of the blood flow. This subsequently has a negative effect on the resistance of arteries in the lungs[12].

PAH remains an incurable disease associated with high early mortality[13], with the symptoms at the early stages of the disease being non-specific[10]. One study by Thenappan et al[14] found that PAH had poor prognosis, with mortality of 15% within the first year of diagnosis. PAH is usually silent in nature, until most of the pulmonary arteries have been obliterated, hence why early diagnosis is associated with long term survival[13]. Increasing dyspnoea (on exertion), chest pain (on exertion) and dizziness are some of the early symptoms of the disease[15], which can also be associated with unexplained dyspnoea.

Due to the cellular and molecular pathobiology of

pulmonary arterial hypertension, investigations that test the lung parenchyma are part of the algorithm which facilitates classification of the condition. Remodelling of the smooth muscle into the small peripheral pulmonary arteries occurs in all forms of pulmonary arterial hypertension[16]. It can also cause changes in the gas exchange area, alteration of the alveolar capillary membrane, ventilation and perfusion relationship and pulmonary capillary involvement. Thus diffusing capacity of the lung should be measured as part of the lung function measurements. However, both sensitivity and specificity of an abnormal transfer factor test result is not always predictive of pulmonary arterial hypertension[17]. Sivova[17] found that transfer factor might be useful to detect pulmonary hypertension in systemic sclerosis. Many lung conditions will have a decreased transfer factor, and the Fifth World Symposium on Pulmonary Hypertension[18] proposed exclusion criteria for significant lung disease: TLC > 70% predicted, FVC >70% predicted, FEV_1 > 60% predicted and no significant fibrosis and or emphysema on high resolution CT. Diffusing capacity can be reduced in many other conditions and a study by Arunthari[19] found that transfer factor can be abnormally low in pulmonary arterial hypertension, however it does not correlate well with the severity of pulmonary haemodynamic disorder associated with the condition. Szturmowicz[20] assessed clinical significance of low transfer factor and in idiopathic pulmonary arterial hypertension found that a transfer factor result below 55% predicted had a worse prognosis than those with transfer factor above 55% predicted. In the group with transfer factor less than 55% predicted, there was an increase by four-fold of death within a five year period. Therefore, it could be said that even though Mr X (see *Appendix 1*) has a mild decrease in transfer factor but all other results are normal, these results may or may not be suggestive of pulmonary hypertension.

Once PAH is diagnosed and classified using the above diagnostic tests, evaluation and prognosis of the disease is the next natural aspect to analyse, especially as the disease is progressive.

Cardiopulmonary exercise testing (CPET) is a non-invasive investigation, providing a global assessment of pulmonary, cardio-vascular, haematopoietic and skeletal muscle systems, which may not be adequately assessed as individual systems. The two main modes of exercise for a CPET that can be used are a bicycle ergometer and treadmill. It provides information about both submaximal and peak exercise responses, which will aid in answering the clinical question[21]. As CPET is a non-invasive investigation Rhodes[22] found that it was superior to other non-invasive investigations in identifying pulmonary arterial hypertension when the patient is high risk for cardiac catheterisation.

There are different variables recorded during a CPET, which can be grouped into three main categories: metabolic, ventilatory and cardiovascular. Normal responses to an incremental CPET are compared at discrete time points: rest, anaerobic threshold and peak exercise. However, using these discrete time points can lead to loss of important physiological information (clinical usefulness of response profiles to rapidly incremental CPET). Evidence does suggest that when interpreting the results and using the variables at discrete time points, abnormalities may be missed when the discrete time point variables are within normal limits[23].

The reproducibility of CPET has been assessed and Hansen[24] found that when repeated, CPET has good reliability and reproducibility for the following parameters: peak VO_2, peak heart rate, oxygen pulse, anaerobic threshold and V_E/VCO_2. In spite of this, a study comparing severe and less severe heart failure showed high measurement variability within the two sub groups[25]. As well as test variability during a CPET, the evaluation and reporting of the results is another important factor affecting the repeatability and reliability of CPET results. Hansen[24] found that by using strict guidelines to evaluate the test results, variability was very low. As Mr X had some abnormal responses during exercise, it could be assumed that if the CPET test was repeated using the same protocol and guidelines for evaluating the results, then if there was a change of 8 – 10% in peak VO_2, that could be used as the cut off point for detecting a significant change due to disease and not variability of the test. As pulmonary arterial hypertension is a progressive condition, it would be suggested that investigations should be repeated to monitor disease progress. However, as the condition progresses most patients are unable to perform CPET. Miyamoto[26] found that six minute walk test distance

correlates with survival rate and complements invasive investigations. It was found to be a strong independent association for mortality in left sided heart failure and it suggested that a short distance walked during the six minute walk test is indicative of decreased cardiac reserve. However, as per lung function results; a decrease in distance during a six minute walk test may be due to other conditions[21].

Once evaluated, the CPET variables from the test can then be analysed. Liu[27] observed the pulmonary function and exercise capacity of idiopathic dilated cardiomyopathy (IDCM) and idiopathic pulmonary arterial hypertension (IPAH) patients and found that the group with IPAH had increased FEV_1/FVC ratio, decreased peak VO_2, decreased work rate and decreased stroke volume. In comparison with Mr X's results, he had a normal FEV_1/FVC ratio and peak VO_2. Miyamoto[26] agrees with Liu, finding that patients with pulmonary hypertension have a low peak VO_2, anaerobic threshold and oxygen pulse. However, Mr X's work rate at peak exercise was reduced, as was his oxygen pulse. Liu[27] found that patients with IPAH had better ventilatory function at rest but this worsens on exercise. Sun[28] found correlation with decreased oxygen pulse and increased peak respiratory frequency in patients with pulmonary hypertension, with the mean respiratory frequency measured at 32 +/- 7.8 bpm. This finding correlates well with Mr X's CPET results with his breathing frequency measured at 43bpm at peak exercise. However, this may be due to the patient desaturation on exertion and trying to correct this[29].

Hypoxia can also occur in pulmonary arterial hypertension, however it is not important during the initial development of pulmonary arterial hypertension. Acute hypoxia-induced vascular tone changes are reversible, on the other hand chronic hypoxia changes are not. It causes structural remodelling and proliferation of vascular smooth muscle[30]. Mr X's resting oxygen saturation was 93% and there is clear oxygen desaturation on exercise. This could be classified as acute hypoxia; therefore any vascular remodelling would be reversed.

As pulmonary hypertension affects the pulmonary vascular bed, it could be argued that the V_E/VCO_2 slope is a stronger predictor of mortality in pulmonary hypertension and is prognostically superior to peak VO_2. Many studies have found that the V_E/VCO_2 slope is a strong independent predictor of mortality in pulmonary hypertension[31, 32, 33]. As Mr X has a normal peak VO_2, it could be argued that pulmonary hypertension is not indicated in this case. However, his V_E/VCO_2 slope is increased and by using this as an independent outcome in the test instead of peak VO_2, pulmonary hypertension could subsequently be suggested. However, common prognostic end points from CPET such as peak VO_2, V_E/VCO_2 and oxygen pulse cannot be applied to all forms of pulmonary hypertension. There are differences in gas exchange between chronic thromboembolic pulmonary hypertension and pulmonary hypertension due to vascular occlusion[34].

Mr X's results thus far may suggest pulmonary arterial hypertension, secondary to a massive pulmonary embolism, however by using the diagnostic algorithms available[35] and other objective diagnostic tests, pulmonary hypertension could be confirmed.

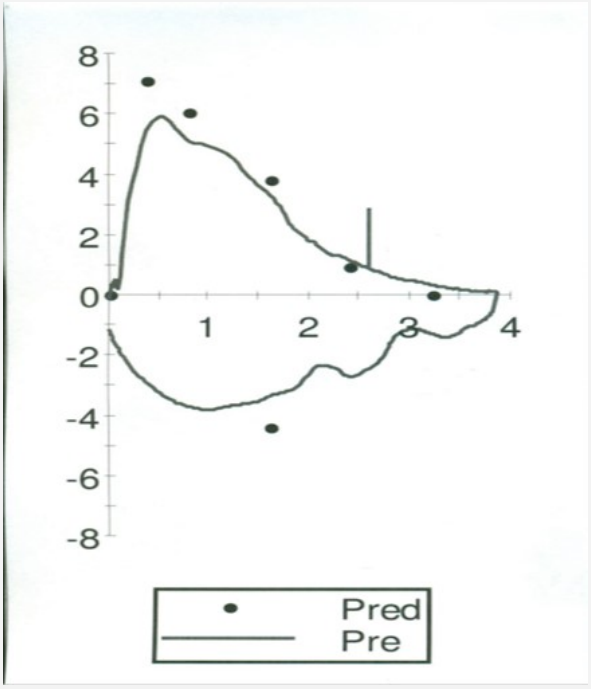
Pulmonary arterial hypertension is a complex medical condition, which is difficult to diagnose. It can be caused by other conditions, which may contribute to the abnormality of any test results. The diagnosis should be sought using diagnostic algorithms and can sometimes only be made when other conditions have been ruled out. Once the diagnosis has been made, prognostic evaluation should be sought with further tests, as the disease is progressive.

Appendix 1

Name	Mr X
Gender	M
Age	73 years
BMI	26.1
Smoking status	EX – 20 pack year history
Medication	Warfarin

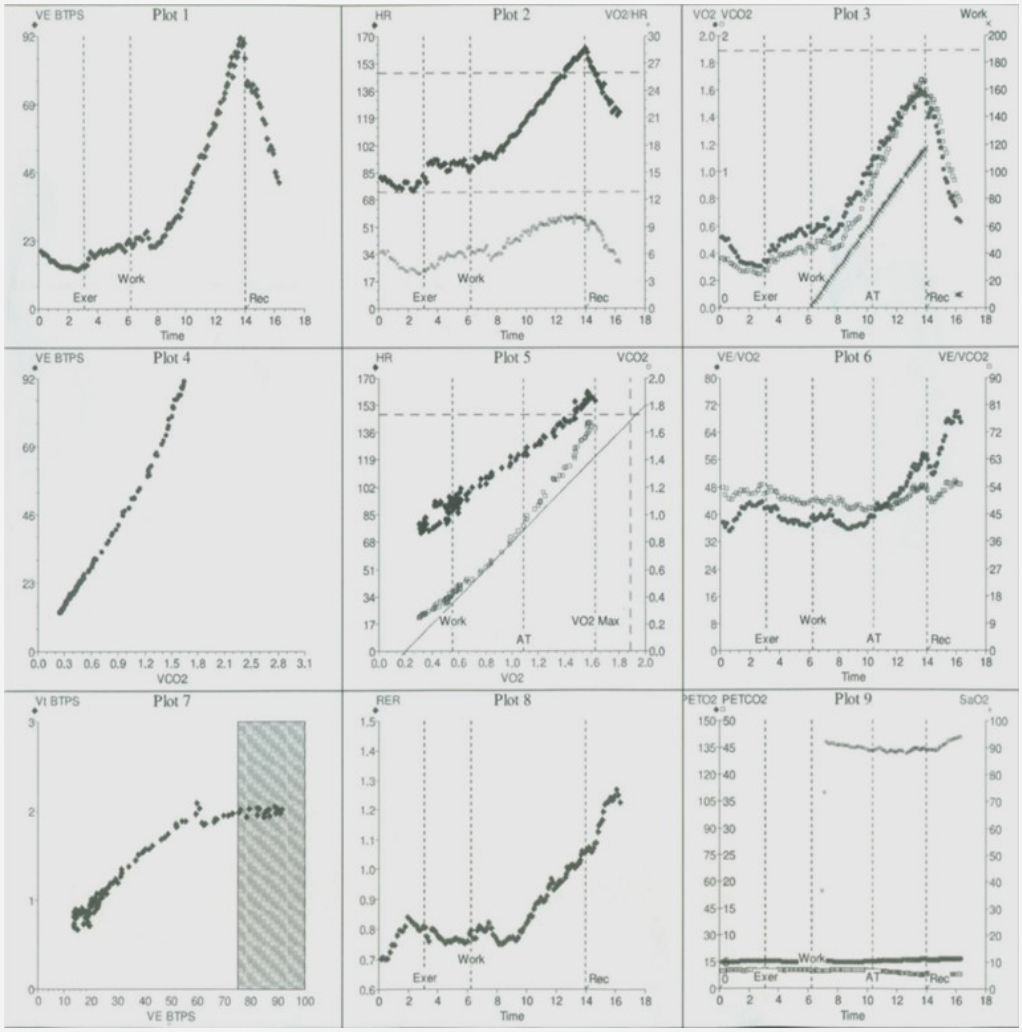
Lung Function results

SPIROMETRY	PRED	ACTUAL	%PRED	SD
FEV_1 (L)	2.46	2.64	107	0.35
FVC (L)	3.22	3.88	120	1.08
FEV_1/FVC (%)	74.14	67.99	91	-0.86
SVC (L)	3.22	4.20	130	1.60
FEV_1/SVC (%)	76.40	62.85	82	
PEF (L/SEC)	7.10	6.11	86	-0.82
LUNG VOLUMES				
SVC	3.22	4.20	130	1.60
TGV (L)	3.40	4.07	119	1.12
RV (PLETH) (L)	2.52	3.52	139	2.43
TLC (PLETH) (L)	6.02	7.71	128	2.42
DIFFUSION				
T_LCO (mM/min/kPa)	7.40	5.01	68	-1.69
KCO (mM/min/kPa/L)	1.26	0.75	60	-1.73
VA (L)	6.02	5.97	99	-0.08



Cardio Pulmonary Exercise Test results

EXERCISE	REST	AT	VO_2 MAX	Predicted	% Predicted
TIME (MIN)					
Exercise Total Time (MIN)	3:03	10:23	13:21		
Exercise Time (MIN)		7:18	10:16		
WORK					
Work (WATTS)	0	64	108	132	82
VENTILATION					
Respiratory Rate (br./min.)	17	26	43		
S_pO_2 (%)	93%		88%		
O_2 CONSUMPTION					
VO_2 (mL/kg/min)	5.1	15.9	23.7	27.5	86
VO_2 (mL/min)	351	1088	1621	1885	86
VCO_2 (mL/min)	285	916	1638	2281	72
RER	0.81	0.94	1.11		
CARDIAC					
HR (BPM)	83	122	156	147	106
V/Q					
V_E/VCO_2	52	47	53	31	
V_E/VO_2	42	39	53	37	



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Life of Breath: exploring the cracks between measured lung function and lived experience

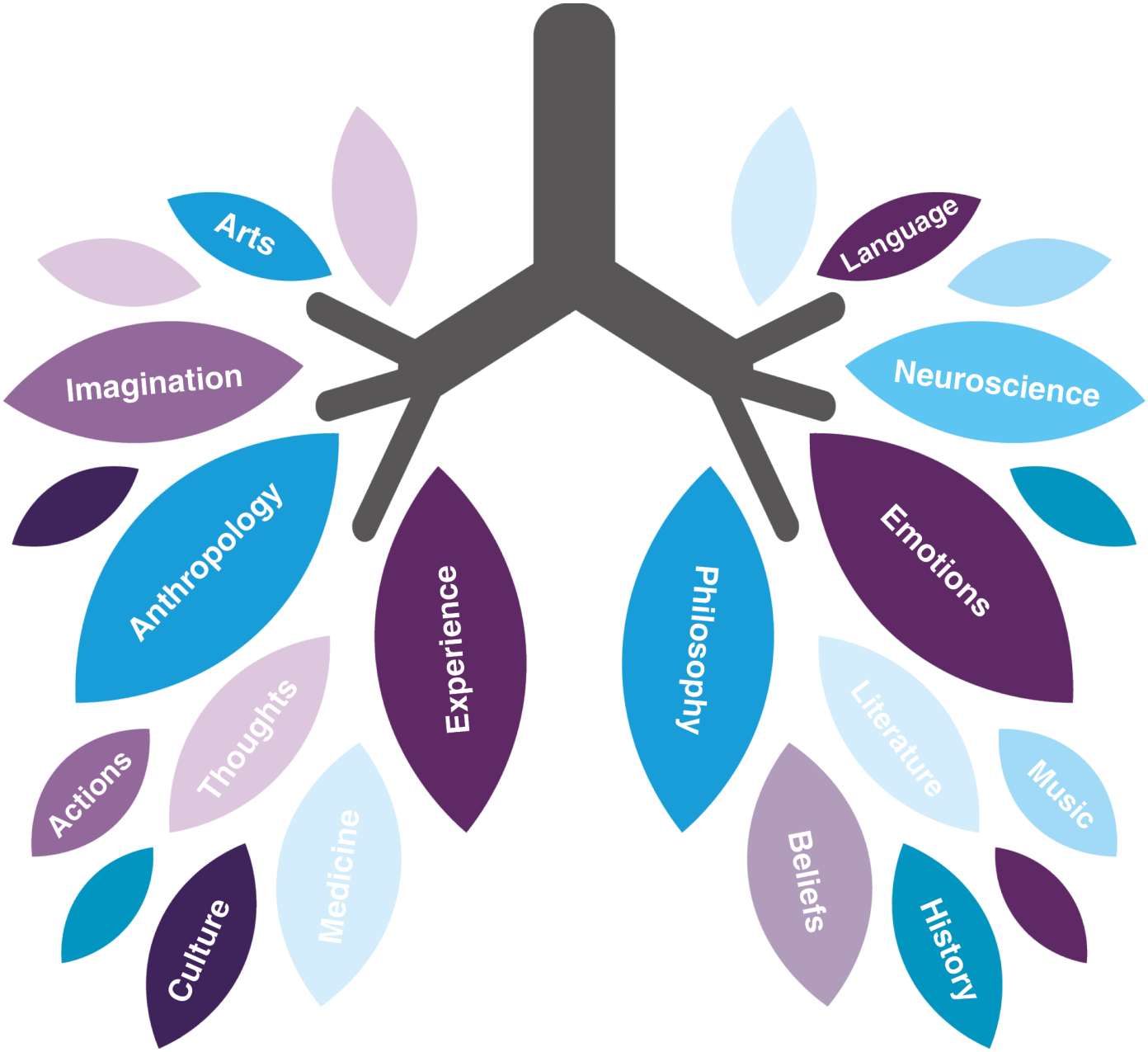
As experts in measuring lung function you are no doubt acutely aware of the fact that breathlessness is a subjective experience. Someone whose objectively-measured lung function is good, may report life-limiting breathlessness. Another person with apparently poor lung function may seem untroubled by symptoms. And why might a climber on Everest with blood oxygen saturation of 90% be elated and invigorated, while a respiratory patient with the same levels feel like they are at death's door?

Life of Breath is interested in these anomalies - the inconsistencies between the objective and subjective, the measured and lived experience of breathlessness. Life of Breath is an interdisciplinary research project funded by the Wellcome Trust. The Life of Breath team and collaborators, led by Prof Jane Macnaughton (Durham University) and Prof Havi Carel (University of Bristol) work together to find new ways of answering questions about breathing and breathlessness and their relationship to both illness and wellbeing. The Life of Breath team includes researchers from a number of different subjects including medicine, philosophy, anthropology, history, neuroscience, arts and literature. We also work with the British Lung Foundation, people affected by lung disease, healthcare professionals and people who use their breath in interesting ways (e.g. musicians).

Our research questions include; What does breathlessness feel like? Does it feel different when you are ill? How do our thoughts, emotions and beliefs affect our breathing? What can we learn about breath from different cultures? How is breath represented in literature, art, film and music? Can the ways people thought about breath in the past help us today? Would better ways of describing or visualising breathlessness help patients and doctors?

On the next page you can read an article by Dr Andrew Russell, one of our researchers, on 'Eight things that have changed since the smoking ban'. On our website www.lifeofbreath.org you can find more interesting reads on a variety of topics from palliative care to breath in science fiction. We also have a podcast (search for 'Life of Breath' on iTunes or other podcast apps) a bi-monthly newsletter and organise a variety of events.

Would you like to be involved in our research? We hope that our work will lead to some insights or interventions which have clinical value so we are always looking for ways to build our relationships with healthcare professionals like you. We are also looking for patients who would be willing to share their experiences with us. Please do get in touch via the website or on mail@lifeofbreath.org or follow us on Twitter @lifeofbreath.



Dr Sarah McLusky

Project Manager, Life of Breath

Eight things that have changed since the smoking ban ten years ago

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Dr Russell received a BA in Human Sciences from Oxford University in 1980, completing a Masters degree in Biomedical Anthropology at the University of Pennsylvania. After returning to the UK he moved to the Inner Hebrides working as a senior desk officer for Project Trust, an educational charity sending school-leavers overseas to do voluntary work. He completed a DPhil at Oxford in 1992, based on fieldwork carried out in the hills of East Nepal amongst the Yakkha, an ethnic group previously unstudied by anthropologists.

His current research primarily focuses on tobacco, its use and control. He is a founder member of the interdisciplinary Smoking Interest Group, a collaboration between the Medical Anthropology Research Group and the Centre for Medical Humanities, working closely with the UK Centre for Tobacco Control Studies and FUSE – the Centre for Translational Research in Public Health, as well as FRESH, the northeast of England's tobacco control office.

It's hard to think back to what English pubs and clubs were like before the law about smoke-free public places came into force ten years ago. Do you remember the dense fog, the smell of tobacco smoke on your clothes and hair after a night out, and the ashtrays loaded with cigarette butts?

The change in law has been described as[3] The most important piece of public health legislation for a generation.

Of course, bringing it in had its challenges. Various options were proposed, including a plan to exempt private clubs and pubs that didn't serve food – so-called "wet pubs" – but in some parts of England this would have excluded over half of all licensed premises.

Eventually, this proposal was quashed, mainly because of public health concerns. People with jobs forcing them to remain in smoky environments often had no choice but to do so – and why should they be subject to the health risks of secondhand smoke?

But apart from making public places more pleasant and healthier to be in[4], the new law also had some unexpected results.

1. MORE PEOPLE HAVE GIVEN UP SMOKING

There was a spike in people deciding to stop smoking as a result of the ban. Everyone knew the health risks of smoking – the ban simply cut out many of the places where people might have wanted to light up. Ever since the law came into force, smoking rates have gone down year-on-year[5]. And increasingly young people in particular seem to be going off the idea. The number of children under 16 who regularly smoke has halved to 3% since 2007[6] – the lowest figure on record.

2. FEWER PEOPLE HOSPITALISED

Figures also soon showed a significant decline in hospital admissions for heart attacks, asthma and lung infections. In the year following the law, there were 2.4% fewer heart attack cases[7] recorded in Accident and Emergency departments than the year before. This might not sound very much, but that is 1,200 fewer cases in the country as a whole. These figures are even more dramatic if you bear in mind that many workplaces had already gone smoke free before the law came into effect. This makes the fact we can see a distinct drop before and after the ban came into place even more remarkable.

3. GOODBYE GLOSSY PACKS

The success of the ban also gave people the courage to tackle other smoking-related issues that might once have seemed impossible to address – such as plain packaging[8] and other forms of advertising at the point of sale. Figures from Australia[9] – which imposed plain packaging three years before the UK – found that restricting the colour, size and font on cigarette packets led to a noticeable drop in the number of people smoking. Similar projections were made for the UK, with scientists claiming[10] plain packets could encourage more than 300,000 Britons to quit smoking for good.[11]

4. INCREASED AWARENESS OF PASSIVE SMOKING

The smoke-free law also made people more aware of the dangers of secondhand smoke everywhere, including in their own homes. This is a step in the right direction for people with long-term lung conditions – as the Life of Breath project[12] at Durham and Bristol universities shows how sensitive to air quality these people are. For them a smoke-filled environment is a nightmare.

5. NO MORE SMOKING AT STATIONS

Some companies went further than required by the new law. The Association of Train Operator Companies and Network Rail, decided to make all station premises smoke free[13]. Perhaps they were remembering the fire at Kings Cross underground station in 1987. It killed 31 and was blamed on a lit match thrown away by a smoker exiting the station.

6. DROP IN TEEN SMOKERS

Vending machines, where young people could often obtain their cigs out of the watchful eye of adults, are also a thing of the past. And it is now illegal to buy cigarettes if you are under 18. This was previously set at the age of 16 before 2007. Taxes on tobacco products[14] have also continued to rise, making it even more difficult for young people with less money in their pocket.

7. SMOKING BANNED IN CARS WITH KIDS

Smoking in private cars where children are present is now banned[15]. This is important because children suffer more from secondhand smoke than adults, as their airways are smaller and they breathe faster And yet smoking in pregnancy – with the risks this carries for mother and baby[16] – are still high in some parts of Britain[17]. And surprisingly, given the ease with which tobacco addiction can be managed these days, smoking is still allowed in some NHS grounds[18].

8. E-CIGS HAVE ARRIVED

E-cigarettes have muddied the waters of tobacco control[19], because although they are without doubt safer than cigarettes[20], some people firmly believe they too should be part of the smoke-free laws[21].

Whatever your view on that score, support for smoke free places is higher now than it was when the law first came in[22]. In other words, there are very few people – both smokers and nonsmokers – who would like to return to those foggy days of smoke-filled clubs and bars.

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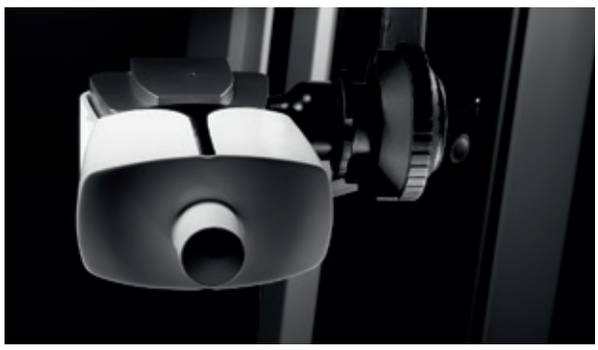

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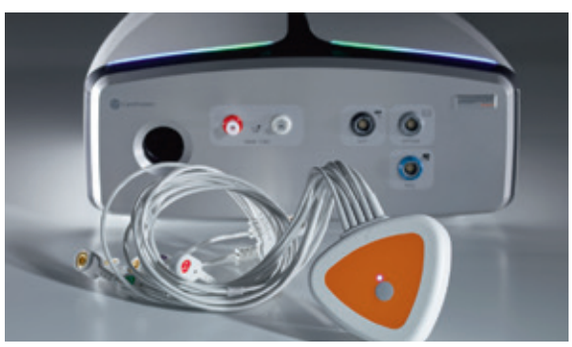

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Changes to the oxygen prescribing process from August 2017

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c/o Respiratory Medicine Dept, Central Middlesex Hospital, Acton Lane, London NW10 7NS

The system to order oxygen for adults and children has undergone a significant change since 2006 and the old Prescribing Controlled Drugs on FP10 Prescription Form days. The oxygen supplier to London was changed again in 2012 to a company called Air Liquide. Their remit is to provide oxygen to patients via a range of devices and disposables, as well as to maintain that equipment, perform regular safety checks, instruct patients and their carers in how to use the oxygen appropriately and respond in a timely way to any new orders from health care professionals or repeat orders from the patients themselves. They operate 24/7, running urgent, next day and routine (3 day) deliveries, each with an associated cost, as well as a cost for each visit that varies depending upon the cause of the visit.

Any health care provider can order oxygen, but there is a 2-tier system for ordering oxygen, and as **from the 1st August 2017, all oxygen orders in London and the South West must be directed through the Air Liquide internet Portal** – faxes, paper copies or scanned and emailed orders will no longer be accepted. Other areas may still be using the revised paper-based forms. See Appendix A

The ordering system is quite simple – there are 2 Home Oxygen Order Forms (HOOF) A & B.

HOOF A is for non-specialist HCPs who wish to order oxygen from a limited range for patients at home – typically from GPs in primary care for a terminal patient who is hypoxic, or from hospital when the patient may not be ready to come off oxygen by the time of discharge, but can go home. This is typically Long Term Oxygen Therapy (LTOT) as no ambulatory devices are available on a HOOF A. Ambulatory devices, that include battery operated portable concentrators, liquid oxygen and even a device to fill your own cylinders, as well as the cylinders themselves, are only accessible via a HOOF B.

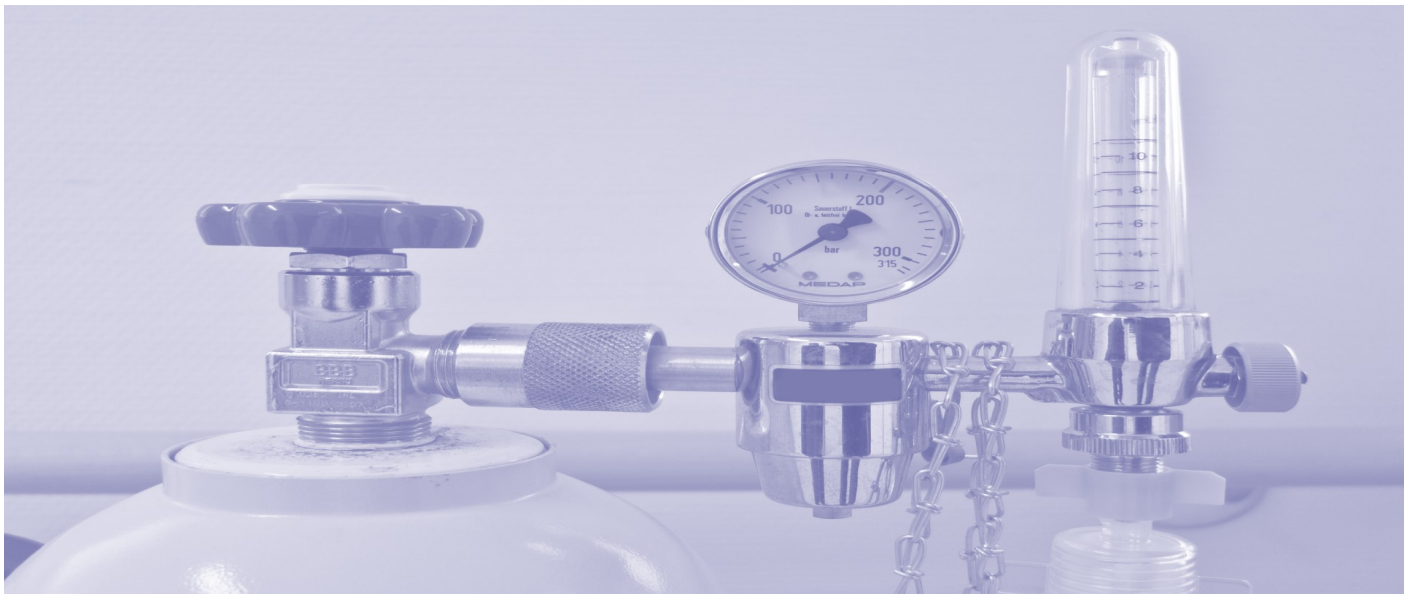
HOOF B access is now strictly limited to identified specialist clinicians, again via the Portal (logins required), to restrict access to equipment, and to reinforce that a HOOF B order is a specialist prescription and should replace all HOOF As in a timely way, as all patients started on oxygen via a HOOF A (except terminal cases), should be referred for follow up with a specialist for review, if not already under one.

Once someone is considered for an oxygen assessment – it needs to be clear what type of oxygen assessment is required.

There are really only 2 types of oxygen :

1. Long Term Oxygen Therapy (LTOT) 15-24 hrs a day and
2. Ambulatory Oxygen (for going out of the house).

There used to be a trend for ordering oxygen as required (pro re nata—PRN) for symptomatic relief but this has no real medical support or clinical justification. Other methods of breathlessness management should be used, not oxygen. Oxygen is only to reverse hypoxia. Each type of oxygen prescription requires a specific assessment in a specialist clinic, which can result in a blood test of arterial blood via artery or ear lobe capillary to establish



LTOT need, or when assessing ambulatory desaturation – a simple 6 minute walking test on air (two tests to account for learning effect) is required in most instances. Both tests are repeated on different oxygen flow rates and devices to finally establish the correct prescription, for flow and device.

Practical and safety considerations are just as important as clinical with regards to oxygen – it is not mandatory that someone has oxygen – they can refuse or the Healthcare professional (HCP) can decide that oxygen should not be started e.g. in someone who still smokes, or who may be frail, walks with an aid, has poor sight and may be at risk of falling over the long tubing. Housing is important – access, size, stairs, multiple occupancy, dependents, nursing/residential home. A formal risk assessment is now mandatory when considering oxygen for someone – and the Initial Home Oxygen Risk Mitigation Form (IHORM) must be completed and placed in their medical notes, to acknowledge the risk assessment has been performed. Sadly we are still seeing patients admitted with inhalation and facial burns from smoking whilst on oxygen, or even worse, these are proceeding to house fires and severe burns, placing themselves and others at risk.

If the assessment shows that oxygen is required and the risk assessment has been done, and the patient wants the oxygen, then the patient needs to give consent via a consent form enabling their information to be kept on a database, and this is then stored in their medical notes.

Only after this should the clinicians proceed to the Portal and order the oxygen. Before any details can be entered, the clinician must acknowledge that the IHORM and Home Oxygen Consent Form (HOCF) have been completed and it is correct to proceed. Consideration of the flow (litres/min), hours per day required, device choice, interface choice and speed of delivery necessary must all be taken into account. A conversation must occur regarding practical issues and lifestyle to establish:

- How often and for how long oxygen will be needed outside the house
- The weight and transportability of the device
- Whether the patient is able to trigger the device
- Whether two machines are required if they want one upstairs and one downstairs
- If a trolley is required for the cylinders
- If a conserver is required to enable the cylinders to last longer
- Whether liquid oxygen may be best for a patient who still is very active and capable

This is a complex process often done poorly, hence the need for specialist assessment and review. If this is not done correctly at the outset, then we often find that patients have a poor understanding of why they require oxygen, what it is hoping to achieve, and that they use it inappropriately. Removing oxygen is much more difficult once the decision to start it incorrectly has been made in the first instance.

All oxygen assessments should only be considered in patients when they are stable, which usually means 5-6 weeks post any acute event. Reviewing patients is just as important as starting oxygen. Too often oxygen is initiated but not followed up. This is when we see the most problems around adherence and understanding.

Some myth busters need to be shared:-

- Oxygen is NOT for breathlessness, it is for reversing hypoxia, so PRN oxygen is of no clinical benefit and should not be prescribed.
- *"If I start using it I will become reliant on it"* – in actual fact LTOT patients who use oxygen 24 hrs a day do best of all[1,2,3].
- *"Once I need oxygen – that's the end, I wont be able to go anywhere and will be stuck in the house"* – if on LTOT, there are still 8 hours per day that oxygen does not have to be worn for, as 15 hours is the minimum each day. Also, having oxygen to go outside with is meant to improve how far a patient can walk or enable them to recover more quickly so they can do more – Oxygen is meant to allow you to do more, not less.
- Continuous oxygen is to help the lungs – it has the most effect on the heart and circulation, and lowers the pressure within the blood vessels in the lungs, allowing the heart to pump more efficiently and so the fluid is moved round the body better and the swelling in the ankles improves.

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For further information and prescribing documents see:

https://www.networks.nhs.uk/nhs-networks/london-

Appendix A

Updated Home Oxygen Order Forms & Consent/ Initial Home Oxygen Mitigation Form IHORM

From March 2017, the home oxygen order forms and consent form are being updated. From the 31st July 2017 only the new HOOF forms will be accepted by the home oxygen suppliers, which include confirmation that consent and IHORM's have been signed (at the time of raising the HOOF or previously)

The HOOFs will have the following changes

- Tick boxes are now included in the declaration part of the form. To confirm that the consent form and the new IHORM have been completed or confirmed with the patient that they have been previously completed.
- The clinical code 21 has been removed as no patient should be requested oxygen without the clinician knowing why oxygen is being requested. Clinical code 20 has remained but the wording is now "other if no other code applies"
- Clinical code is now mandatory for all HOOF requests.

The consent form / IHORM will have the following changes

- Consent form remains the same and is on the back of the form.
- The IHORM is on the front of the form and consists of a number of questions the clinician needs to discuss with the patient or their carer before oxygen is requested.

Frequently Asked Questions

Where can I find this form? Information will shortly be available on the Primary Care Commissioning website (search PCC Home Oxygen) to find the page pointing clinicians as to where to obtain the form.

Why are we being asked to fill in these forms? The IHORM has been introduced to reduce the risk of a serious incident occurring if medicinal oxygen is installed in a home environment. So before a patient is initiated on oxygen some relevant questions need to be asked. The IHORM has been developed with the support of clinicians, suppliers, the fire and rescue services and BTS Home Oxygen Quality Standards Development Group. It has been peer reviewed and sent out for national comment to clinicians via at the regional home oxygen leads.

Why has the HOOF changed? It was found that patients were not always being asked to sign consent forms when started on oxygen. There was no action on the HOOF to confirm a consent form had been signed, with just a declaration that one has been signed. The tick box to confirm this had been removed from the HOOF rolled out in 2012. This has now been reintroduced and must be confirmed by the Healthcare professional either by getting the patient or carer to sign the consent form/ IHORM or have verbally confirmed that a consent form/ IHORM has been signed in the past.

What do I do if the patient is already on oxygen? Verbally check with the patient or carer if a consent form has been signed in the past, if not fill one in and place in patient's notes.

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Verbally check with the patient or carer if an IHORM has been completed in the past. If not fill one in and place in patients notes. This may raise issues and concerns around continuing oxygen for this patient. This should be raised with the local HOS team, respiratory specialist or lead consultant to discuss next steps.

Our team already uses a risk/mitigation form that covers the questions in the IHORM? If a risk/mitigation approved form is already used by the specialist teams/home oxygen services or is a regionally endorsed form AND the questions covered in the IHORM are assessed in the local form then this can be used as an equivalent. Once this form has been filled in and the consent form signed then the confirmation boxes on the hoof can be ticked off. E.g. for clinicians in the East Midlands region they would continue to use the EMHORT for assessing patients and tick the IHORM box on the HOOF.

What about oil based emollients and creams? These products should not be used with patients on home oxygen. This advice should be included in the information your patient receives from the supplier.

What if I am not with the patient? E.g. GP's requiring palliative care oxygen for end of life patients. End of life patients are a particularly challenging group. Although the oxygen may not be in the patient's home for very long, the risks may be increased due to their ill health and lack of mobility. Consent and IHORM's should be filled in after discussions with carers/family if the patient is too unwell to discuss these issues.

If the patient is not hypoxic, other medication and symptom relief for breathlessness can be instigated to help maintain the patient at home.

The patient does not have capacity to sign the consent form? The consent and IHORM should be filled in with the input and help of a carer or someone with parental responsibility or lasting power of attorney who will then sign the form. For further guidance in relation to consent please see the IHORM Supporting Notes.

What if the IHORM indicates that the patient is too high a risk to install oxygen? Clinicians make risk benefits decisions every day, home oxygen and particularly long term oxygen therapy has been shown to extend life but in most cases is not lifesaving. Once oxygen has been installed to a high risk patient there is a huge amount of work required to remove it. In these cases discuss with specialist teams mentioned in the IHORM if the risks identified could be mitigated to allow oxygen to be installed or the risk is too high.

Clinical teams Caring for Children

What if my patient is a child? A consent form and the IHORM questions should be discussed with the child's parent, carer or lasting power of attorney then signed in the usual way. For further guidance in relation to consent please see the IHORM Supporting Notes. It is unlikely that a child would be too high risk to install oxygen, but the IHORM will help raise awareness for parents and carers of children on oxygen.

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^ Ref: Goldman et al - Forced oscillation technique and impulse oscillometry - Eur Respir Mon 2005;31:72– 105.

ARTP. THE BIRTH OF A SUPER POWER

Doreen Russell, Manager Clinical Physiology Services, Liverpool Heart and Chest Hospital

An ageing box file has sat for many years on a shelf in the corner of my office. It hasn't always been the same shelf. The Respiratory Laboratory has moved home several times over the years and on each occasion, faced with the despairing cries of "can we throw this out" I have carefully dusted it down, packed it in the knotted, spotted handkerchief and taken it with me to settle in another quiet corner for several more years, holding its secrets like some form of Aladdin's Lamp.

However the time has come for a thorough clear out as I shall retire this month from 49 years in the NHS and 47 years at Liverpool Heart and Chest Hospital (it has evolved through several name changes).

So, browsing the ARTP forum and seeing the general interest in how we evolved as an organisation, I took a peek inside the file. I could hardly believe the amount of information in there and slowly the history of the ARTP as we now know it unfolded. Hopefully you will find the next few minutes makes interesting reading.

The inaugural meeting of the Association was held at King's College Hospital Medical School on Saturday 6th December 1975. Twenty six attended.

Sponsorship donations had been received from Allen and Hanbury and A H Robins Co. Ltd.

The meeting was opened by Mr. Len Smith of King's College Hospital who informed the group that there had been over 80 replies to a national questionnaire in favour of the formation of the Association. He then introduced Dr. D C S Hutchinson as Chairman of the Association. The Chairman confirmed that many chest physicians were sympathetic to the aims and needs of the Association.

My own involvement came from the networking and enthusiasm of Dr Colin Ogilvie whom many of you will know was a Consultant Chest Physician here in Liverpool and responsible for some of the early work on the modern measurement of the transfer factor.

As the Association had at that point no constitution, it could not be recognized by other organisations. It was agreed that a steering committee should produce the first draft constitution before March 1st 1976. The draft would be submitted to members and amendments accepted until 1st April 1976, after which a second Draft Constitution would be produced.

The meeting was opened by Mr. Len Smith of King's College Hospital who informed the group that there had been over 80 replies to a national questionnaire in favour of the formation of the Association.

The annual subscription was agreed at £5 for senior members and £3 for juniors! (And still people complained!)

The steering party consisted of:

* **D McKenzie, Aberdeen Royal Infirmary**
* **H Gimblett, St Martin's Hospital Bath**
* **S Gough, Papworth**
* **M Wilkinson, Derby Royal Infirmary**
* **Derek Cramer, Brompton**
* **S Wallis, Brighton,**
* **D Richardson, Brook Hospital London**
* **C Bright, University College Hospital**
* **L Smith, King's,**
* **D Johns, Brompton**
* **C Hodder, London Chest**
* **B Latham, St Thomas's Hospital**
* **J Jones, Bristol**
* **S Clay, Cardiff**
* **Dr J Reed**
* **Dr DCS Hutchinson, King's College Hospital**

I've included all these names to demonstrate just how many years some people and some hospitals have been involved!

By April 1976 the Steering Committee Working Party had completed the Constitution and the first General Meeting was scheduled to take place at the Brompton Hospital on Saturday 12th June 1976. It was agreed that the Association would be formally launched at this meeting.

Also in the box is the official agenda from this meeting.

Just about legible and yellow with age, (the paper, not me, I hope) I discovered the minutes of what I think was the first Executive Committee meeting which took place on Thursday 29th July 1976 at the Royal Post Graduate Medical School.

It was at this meeting that our wonderful logo was approved. It was designed by a man named Spike Clay from the Pneumoconiosis Unit at Llandough Hospital.

The main item on the agenda was the first Autumn meeting which was held in Penarth on 4th December 1976 with guest speakers Dr J Cotes and Dr A Seaton.

The cost of lunch, tea and coffee was the princely sum of 75 pence!!!!

The lack of formal training for technicians on a national scale was discussed at length under any other business. I agreed to be Education Secretary and do some research into the different paths technicians were taking to undergo training. We did a questionnaire which went out to all regions. Unfortunately, I don't have the breakdown of the results but I do remember feeling completely overwhelmed by the inconsistencies! As we all know, that didn't change for some considerable time.

For those who like to remember the names from history I can tell you the first Executive Committee consisted of:

* **Len Smith (Chair)**
* **Sally Gough, Papworth (Secretary)**
* **Doreen Pollard, that's me, but I'm now Russell (Education)**
* **Ann Hart, Hammersmith (Recruitment Officer)**
* **Jane Jones (London Chest, I think)**
* **Spike Clay (Llandough)**
* **Ian Wade (sorry there's a memory blip here)**
* **Sue Bradbury (City General, Newcastle)**

I seem to remember Dr. Jim Reed from King's College Hospital dealt with all the membership fees and enquiries.

I also have a list of all the Regional Organisers with some fairly famous or maybe now infamous ARTP people on it!

The production of a Newsletter was debated, with some concerns about having enough information to fill one on a regular basis. **Those were the days when we were rather a shy species with not a lot to say for ourselves. How times have changed, and quite rightly so!**

Delving into the box once more I have found what must be our very first Newsletter. It is dated September 1976 and I have the first three consecutive copies.

Interesting reading? Perhaps the feeling you may have seen it all before?

I believe everything I have written here is factual but it's been difficult to piece together all the facts from these scraps of yellowing paper. There are bound to be those I haven't mentioned who may have done wonderful things for the ARTP. If you are one of these, please don't be offended but contact me and let's complete the whole picture.

August 2017

ARTP Association for Respiratory Technology & Physiology

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Matt Rutter

Alan Moore

Prof. Brendan Cooper

ON THE BLOWER

Welcome to another "On The Blower", in this edition we have an update on the imminent ARTP industry survey, a review of CPAP mask fittings provided by Fisher & Paykel and recent news and offers from the manufacturers.

The ARTP industry survey has been going through some changes (not just the name) as we have strived to improve it since 2015. We have moved away from the excel format to a more easily accessible online version through survey monkey, but there will also be a hardcopy being sent to heads of department, for anybody not being able to use it.

The survey is available at: www.surveymonkey.co.uk/r/ARTPindustrysurvey

Or via the ARTP website, in the 'Professionals' section.

The format is the same as last year with some improvements to make it easier to complete. You will be asked to assess each supplier individually and choose the areas that they provide equipment to you for. E.g. Spirometers, full lung function, Feno, sleep therapy etc. If you feel that one area stands out, whether it good or bad, we would ask you to assess this separately. From that point onwards it should feel familiar to last year asking you to rate the following areas: Equipment, Sales, Service, After Sales and an overall rating. You can provide additional comments and suggest people from the company of worthy mention. You have the option to assess more suppliers or go to the final page to fill out your details. Please note you will need your ARTP membership number (if you do not know your ARTP membership number, please contact admin@artp.org.uk). The closing date for this years survey is 31st October 2017.

I am also pleased to announce that this year, one lucky respondent to the survey will receive the new **Industry Bursary,** which consists of free registration and accommodation to next years conference in Brighton, as well as a contribution toward travel to get there.

Don't just wait till the survey to feedback to us on what has been done well, what needs improving or issues you may be having. The watchdog@artp.org.uk email is available all year round with all topics handled with discretion.

MR

News and Updates

Drive DeVilbiss Healthcare have recently launched a new pulse oximeter called the Hb0-2000 and compressor nebuliser called the AirForce One.

The Hb0-2000 has been designed for daily non-invasive screening for patients $Sp0_2$ and pulse rate detection. The device features a state of the art OLED screen display with six directional display modes, which also displays plethysmograph waveform, visual alerts for high or low values and battery status indicator. The compact, lightweight and durable design makes it ideal to be used in home and clinical environments. The device comes ready to use with a lanyard, batteries and instruction manual.

http://www.devilbisshc.com/products/hb0_2000/

The new AirForce One compressor nebuliser offers a simple yet reliable device for those living with conditions like COPD and Asthma. It fits into home and clinical settings discreetly with its compact, lightweight and quiet operation. With a strong flow rate and consistent MMAD, users can receive effective aerosol treatment using the AirForce One. All nebuliser accessories come supplied with compressor and users can start treatment immediately.

https://www.drivedevilbiss.co.uk/products/airforce-one

Both devices are proving to be popular amongst the NHS, community, private and end users.

Matt Rutter

Alan Moore

Prof. Brendan Cooper

The following article was provided by Fisher & Paykel and is a summary of CPAP mask fitting, how important it is for adherence to therapy and what is most important when it comes to design.

Mask Matters Most – *Executive Summary*

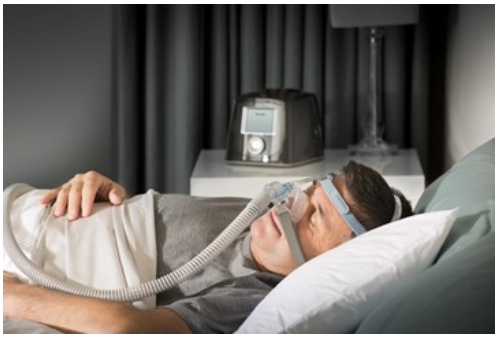
Background

CPAP use involves a multi-stage journey that an OSA patient traverses, starting from diagnosis through to receiving therapy and follow-up visits. The importance of CPAP therapy adherence in the effective management of OSA has been highlighted extensively in the literature.[1-3] Epidemiological data derived from a review in 2010 shows that, on average, 5-50% of OSA patients do not accept CPAP therapy and of those who undertake therapy, only 17 to 71% remain adherent.[4]

The patient's early experience with a CPAP device is a strong predictor of long-term use and can be used for estimations as early as three days after treatment initiation.[5] There are numerous components of the device and accessories that the patient interacts with on a daily basis - the interface being the one component that the patient interacts with closely for the majority of therapy time. The degree of interaction can be impacted positively by catering to different interface design requests that patients may have - including, but not limited to, their facial features, sleeping positions and, more importantly, the way they breathe. Through the literature presented in this summary, the effect of the interface on CPAP therapy will be discussed, thus drawing focus to why the mask matters most. Lack of initial mask fitting and support, leak, facial abrasions, mask discomfort and claustrophobia have been identified as the most common causes for poor adherence to CPAP therapy.[6] Mask-related issues are major driving factors for manufacturers to design small and lightweight yet effective masks that can easily be integrated into the patient's lifestyle.

Initial setup and support

The mask plays a pivotal role in initial PAP therapy acceptance. In addition, therapy efficacy is affected by comfort associated with mask fit and optimum pressure selection during initial titration.[7] Bachour et al. examined initial mask acceptance rates and the effects of mask switching on mask-related symptoms. Results obtained suggest that patients who switched their mask initially were at a seven-fold higher risk of abandoning CPAP therapy during the year following the switch in comparison to those who did not switch.[8].



In another recent study, Neuzeret et al. investigated the effect of initial mask choice on CPAP adherence. OSA patients were randomized to receive CPAP therapy via different nasal masks. Findings from this study show that initial mask selection can influence adherence and healthcare utilization.[9] Further, mask acceptance was significantly associated with fewer mask leaks, and consequently those who experienced fewer mask leaks were found to be more compliant with their therapy. The studies discussed above detail the importance of initial impression and performance of a mask on therapy adherence.

Mask performance and adherence

Mask type, performance and complaints associated with use can affect adherence also. Borel et al. evaluated the impact of nasal pillows, nasal and oronasal masks on CPAP adherence in a cohort of OSA patients. Non-adherence to CPAP was linked with the use of full face masks, depression, low effective pressure and side effects.[10]

Similarly, Andrade et al. reviewed literature looking at the impact of mask type on effectiveness and adherence to CPAP.[11] From their meta-analysis, the authors concluded that adherence to CPAP treatment is influenced by the mask. Some recommendations that are suggested in the review include: a) the use of a nasal mask as the first choice; and b) continued monitoring of oronasal mask users as they are at higher risk of non-adherence and discontinuation of therapy.

Mask comfort

Claustrophobia is another factor that can influence CPAP adherence. In 2008, Weaver and Grunstein investigated various challenges to effective treatment.[3] The authors attributed non-adherence to claustrophobia, unattractive headgear, complex straps and facial imprinting. In another study, Aljasmi et al. observed that mask comfort determined CPAP usage. Those that did not feel comfortable with their mask used their device less frequently than those who did. In addition, patients who experienced claustrophobia caused by mask restriction or suffocation had lower frequency of nightly CPAP use of four hours.[12]

The mask matters most to us

The literature presented here, which highlights the degree to which adherence is impacted by the mask, reinforces the importance of initial setup, mask comfort and the need for the mask to be able to fit a wide range of patients. Focusing on patients who do accept CPAP therapy and subsequently those who discontinue therapy provide excellent opportunities for manufacturers to enhance good clinical practices upon initial setup as well as early intervention strategies.

CPAP masks are carefully designed and developed at Fisher & Paykel Healthcare (FPH) with three aspects in mind: comfort, seal and the ease of use, to ensure that OSA patients receive the best care possible. The ultimate goal is to provide intuitive masks that can greatly reduce the time spent by respiratory therapists at initial mask fitting and in providing education. In addition, the mask could be beneficial during CPAP titration studies in-lab due to usability aspects incorporated into the design.

The tremendous number of research and engineering hours - along with all the testing and validation that a mask undergoes before market release - illustrates our level of commitment to patients (end-users) as well as to healthcare providers and is instrumental in the development of effective and comfortable interfaces. Parameters that are taken into consideration for mask design include; structure and dimensions of the nose and other facial features that are meticulously collated in a central anthropometrics database. Design inspiration is also drawn from customer insights obtained by engineers in patients' homes as they prepare to go to sleep and as they clean mask parts on a daily basis. By consistently applying this design paradigm, F&P has launched masks that focus on seal performance and comfort.

Matt Rutter

Alan Moore

Prof. Brendan Cooper

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Intus Healthcare have signed a new distribution agreement with Circadiance to become the sole distributors of the SleepWeaver masks once again. Intus launched the SleepWeaver Advance back in 2010, the first CPAP mask made of fabric. The range has grown and developed, and now includes full face and paediatric options, providing an option for almost any patient.

The agreement with Circadiance also includes the NeoPAP paediatric ventilator; a sophisticated CPAP delivery and treatment system developed to treat newborns and infants with respiratory distress syndrome (RDS) or who are recovering from RDS. Pricing will also be announced in the near future and interest can be registered now.

If you would like to find out more about either the SleepWeaver mask range or the NeoPAP, you can contact Intus by calling 0800 024 8050,
emailing trade@intushealthcare.eu or visiting www.IntusTrade.co.uk.

Matt Rutter

Alan Moore

Prof. Brendan Cooper

ON THE BLOWER

1. We have extended our range of low-cost disposable accessories available for all sleep equipment and now have available:

* Disposable RIP Effort belts for all ages
* Disposable Standard (non-rip) Effort belts for all ages
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2. We would also like to remind customers that S-Med can now offer complete remote support across the NHS Digital Network (previously N3). We will be offering existing customers with service contracts a free upgrade which will include Remote Access for both service and support as well as for remote training. Any customers wishing to use this exciting new facility should contact us so that we can set this up.
3. SOMNOmedics now offer a new IC-EMG (intercostal EMG) Sensor - a direct effort signal from the diaphragm, this can be used to differentiate differences between Respiratory insufficiency / Inspiratory muscle dysfunction displaying the true effort curve signal within the RAW Data synchronised to the traditional effort signals. Helping to diagnose:

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* neuromuscular problems

This sensor is now available across the range of SOMNOmedics sleep equipment.

4. We are working on a new consumables and accessories page for our new website http://www.s-med.co.uk/ an easier way for customers to access our frequently updated range of consumables and accessories.

We announced in our last OTB that we were currently looking to expand our service provision within the UK to support our customers and the patients that you serve. We are now pleased to announce that we have filled both positions, and we would like you to join us in welcoming Andrew Welch and Sam Partington to the Vyaire Medical UK RDx team. This expansion means that Vyaire Medical Respiratory Diagnostics, now has 15 people based in the UK, supporting you, our customers.

At Vyaire Medical we continue to be committed to delivering high quality products and services for all our customers, and this recent expansion to our service team will only further enhance our customer support moving forward.

Vyaire Medical is also running a special promotion on our Vyntus APS (Aerosol Provocation System) – PC/laptop based dosimeter with integrated bronchial challenge software. For all orders placed on or before 30th September 2017, you can claim a 15% discount on your total purchase. Please contact your local Account Manager or our Customer Care team on 01256 388512 or 01256 388517 for more details. Please quote ref APS15.

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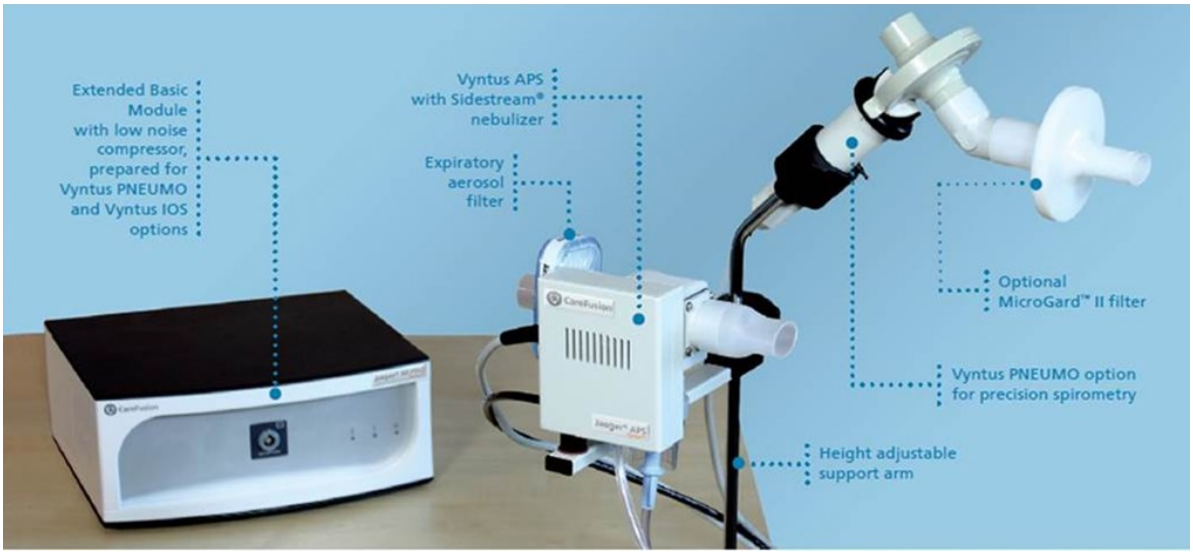

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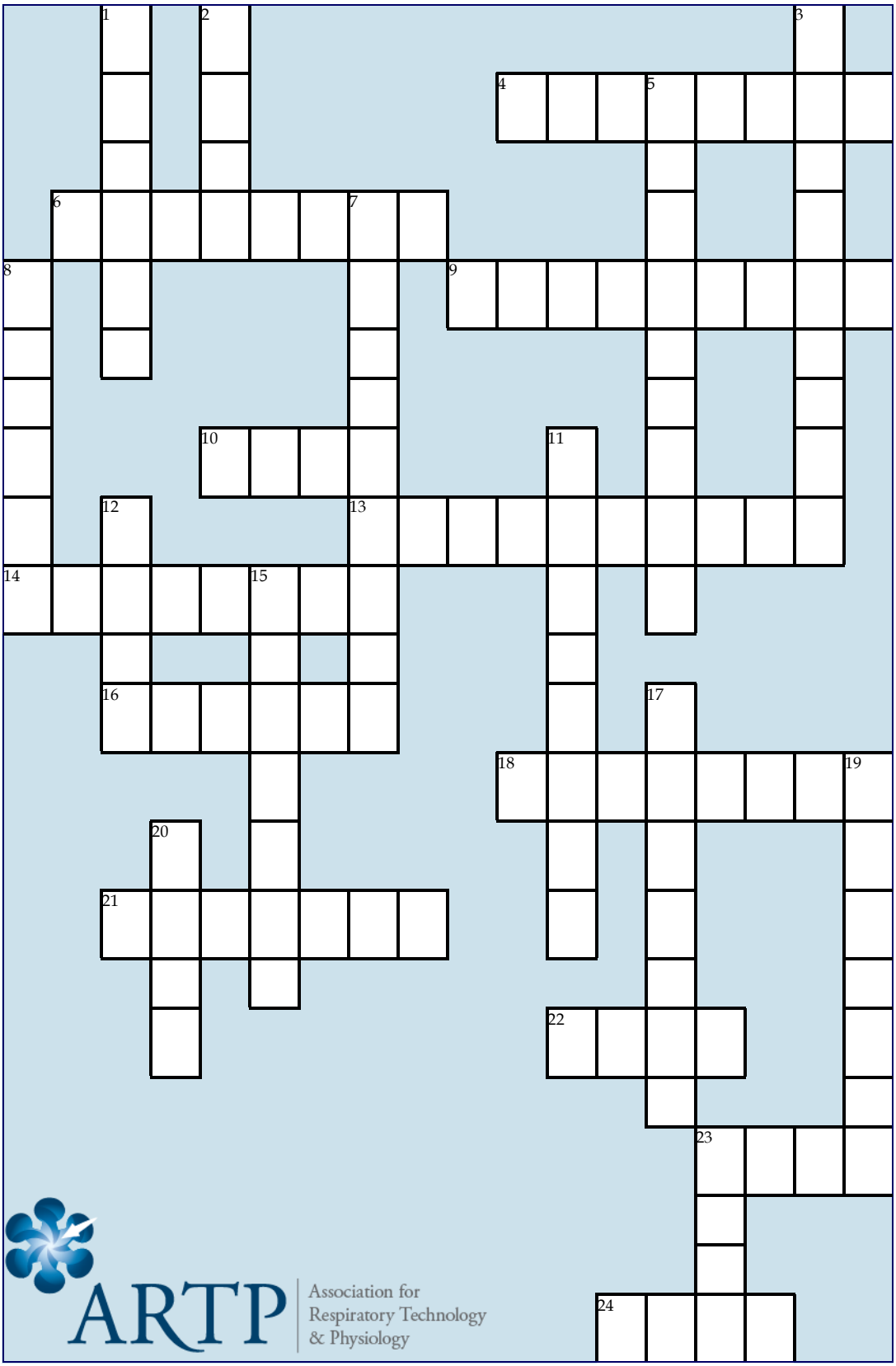

CLUES

Across

4. Rearrange scrub and briefly honourable for airway (6)

6. Stick-on or relocate perhaps to check on gas uptake? (8)

9. Almost a survey plus almost a skin cream is bad for lungs (9)

10. This is placed inside a cubicle for plethysmography (4)

13. Sneaky view of new extra effort in lung function test? (10)

14. Almost drive out the demons with effort (8)

16. Nearly make haste mother may cause wheeze (6)

18. Scarring ribs if so (8)

21. There you are French and the Spanish mixes to air sacs (7)

22. View dog during brief exercise test? (4)

23. Our almost lengthy primary concern (4)

24. Carbon Monoxide symbolised initial Private Detective for lung complaint (4)

Down

1. Flea and nearly grain for half of inflammation test gas (6)

2. Prick this to prove allergy (4)

3. Almost tug my French and near Scottish town relating to the lungs (9)

5. Bile nurse rearranges him/herself to give medication (9)

7. Phase my, em… lung disease (9)

8. Keep this down or you will damage your ears (6)

11. My French bull's cockney skin accompanies carbon? (8)

12. This is not alpha and added to new giant so gives drug type (4)

15. At home almost greeter to prescription device (7)

17. Reorganise race hat to large airway (7)

19. Starts as a drag, ends damaging lungs (7)

20. Lupus, could be laminar or turbulent (4)

23. Have a swim in this backwards (4)

All answers related to lung function.

Answers will be published in the December issue