ARTP
Association for Respiratory Technology & Physiology

# INSPIRE

December 2023
Volume 24
Issue 2

## INSIDE THIS ISSUE:



ISSN 2634-954X

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*INSPIRE* is published three times per year: April, August, December.

**DEADLINE FOR ARTICLES:**
Six weeks prior to publication.

**ADVERTISING RATES**
Please contact ARTP Administration for more information at admin@artp.org.uk or see the ARTP website Advertising through the *INSPIRE* Journal (artp.org.uk)

ISSN 2634-954X

# First word

Dear Readers,

Welcome to the December edition of *INSPIRE*. I had a slight panic around September when my content for this edition was looking very slim. However, I was relieved when a few articles were submitted from successful bursary applicants. The quality of submission was very impressive – as you'll see – and it is a great reminder to ARTP members that you can receive a bursary to attend a national/international conference and in return you simply have to submit a successful piece of work to this journal.

For this edition, we have the regular '**Word from the Chair**' and a recap of ongoings in the manufacturer's world with '**On the Blower**'. The research committee have supplied their '**Fresh Air**' article: a reflective piece focusing on the first year of the STP programme coming from both the trainer and trainee's point of view. Dawn Marie Shackell has provided us with our first '**Lab in the Limelight**' giving an insight into her flourishing department at Norfolk and Norwich University Hospital..

I have a new feature looming for the next edition which will be called **'Respiratory Life Stories'** where I will interview a prominent figure in respiratory medicine and go through their career and life working in the trade. As ever, if you have any suggestions for who you would like to see interviewed, or indeed have any other suggestions for new features, please don't hesitate to contact me.

Finally, I'd like to wish you all a very merry Christmas and a happy New Year. Have a well-deserved rest and recharge ready to keep our profession going strong in 2024.

**Paul Burns**
**inspire@artp.org.uk**

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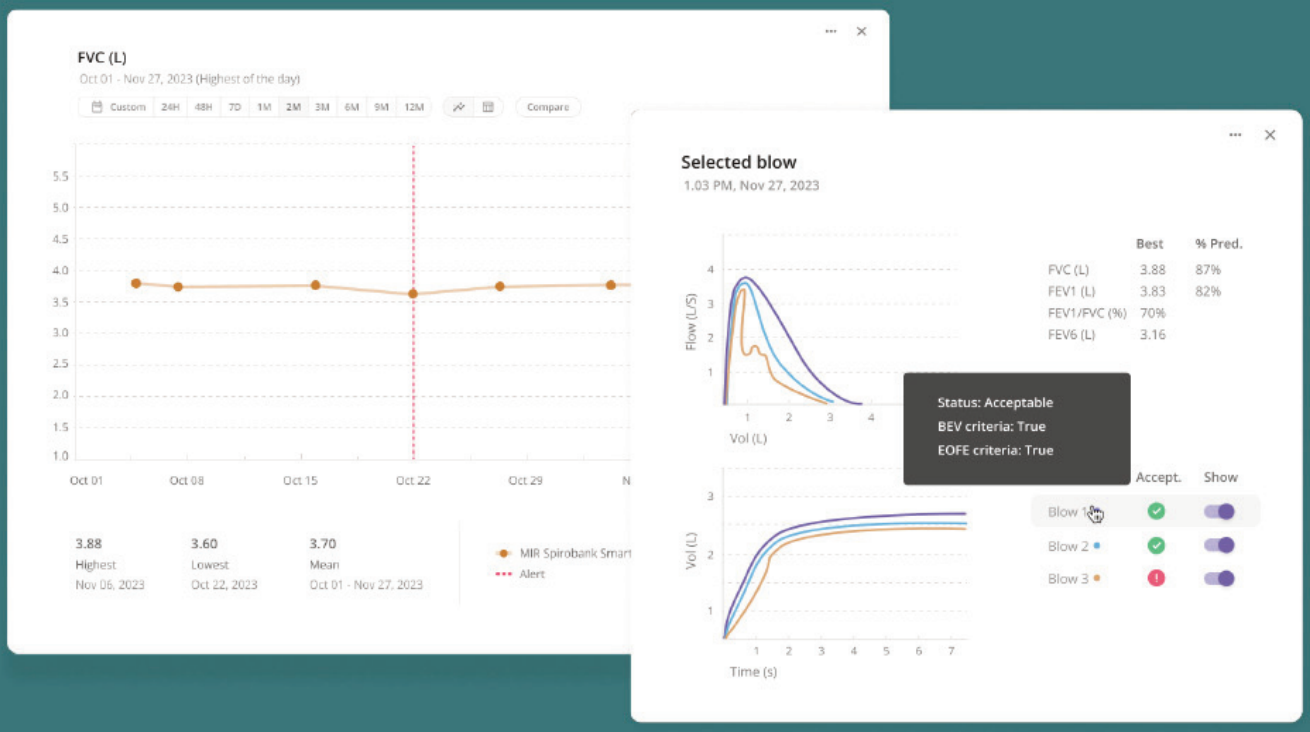


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# A Word from the Chair

**Julie Lloyd,** *ARTP Honorary Chair*

**Welcome to this edition of Inspire and to another 'Word from the Chair.' Since our last edition, the clocks have gone back (although there's still a couple in my house that I haven't sorted!) and the days are becoming shorter and colder. Although I always miss the warmer days of summer, autumn brings its own treats and not just the ones for Halloween! When we have been out walking, when it's not raining, the colours on the trees as they turn and begin to shed their leaves have been spectacular this year.**

By the time you are reading this, ARTP will have delivered another excellent National Strategy Day for leaders in respiratory and sleep science. Thanks to the incredibly hard work of Dr Joanna Shakespeare and Laura Jess, the content of this meeting improves year on year. This year we have been fortunate to hear from Dr Vicki Chalker, who was appointed as the Deputy Chief Scientific Officer, NHS England in September this year. The program also included presentations from each of the four nations, a session focusing on tacking health inequalities and updates on the Diagnostic Agenda and the impact of the revised IQIPS standards. It really is a 'must attend' meeting for senior healthcare scientists and what's even more impressive is that it remains free to attend!

The ARTP Events Committee, led by Laura Jess, are also working at pace to finalise the scientific program for the ARTP Annual Conference 25-26th April 2024 at Harrogate Convention Centre. The 'early bird' registration for Conference offers a considerable saving, so please try to take advantage of this as soon as you can.

Given the success of our previous conferences, we are really pushing the boat out in Harrogate with more space for delegates and manufacturers and a larger program with more parallel sessions than we have ever delivered before. The annual Conference is a great opportunity to showcase your research, service improvement and audit. It is a friendly and supportive environment so now is the time to pull together your abstract as the deadline

is Wednesday 10th January 2024 at 12pm. ARTP are working with the Association of Chartered Physiotherapists in Respiratory Care to see if we can deliver a joint symposium during the Conference to reflect the ways in which healthcare scientists and respiratory physiotherapists work so well together across boundaries.

We are putting the finishing touches to the social program, which is an excellent opportunity to network with colleagues and to celebrate the success of our trainees over the previous twelve months. We already have delegates that have registered to attend, and I am hoping that – as it is my last Conference as your Chair – it will go with a bang!

ARTP haven't just been busy with organising events; our educational program has continued to deliver increasing numbers of exceptionally high-quality courses including the recent Blood Gas sampling course in Birmingham and the Cardio-respiratory Exercise Testing course in Bristol, and the ever-popular Lung Function Testing Physiologists Reporting Course, and Lung Function Masterclass for 2024 – places always fill up fast, so make sure you reserve yours soon.

The Spirometry Committee are often the unsung heroes of the organisation as they work tirelessly to deliver the ARTP Spirometry Certification programs to ensure that our patients receive quality assured diagnostic spirometry to support the national Early and Accurate Diagnosis agenda. They are in the process of completing our first annual revalidation audit of spirometry registrants, which by all accounts has gone extremely well.

As ARTP Chair I am mindful that I and my committee colleagues are here to serve you, the ARTP members, and we are keen to engage with our membership as much as possible. If there are any areas of work that you feel require our attention or in which you wish to become involved, please feel free to contact me at chair@artp.org.uk.

I will close this 'Word from the Chair' with a wish that the upcoming winter period is not too challenging for your services and that you all manage to spend some time away from work during the festive period with those that you love.

# ON THE BLOWER

Brendan Cooper
*Chair Manufacturers Liaison Committee*

**In this edition of 'ON THE BLOWER' we feature an update on the MLC Buyers' guide project, field safety notice remediation update from Phillips, and a new FDA warning regarding the Dreamstation 2 CPAP machine. There is also an interesting piece on a new portable plethysmography device, notes from the recent MLC meeting, and information on structure and personnel changes at Vitalograph.**

## BUYER'S GUIDE

I am please report that the MLC Buyer's Guide is making good progress as Karamo Cham (Band 7 at Whittington Hospital) and myself have developed an early draft which will need some further working before a hopeful launch at the ARTP Conference in 2024. We will be sharing it with the MLC soon as well as asking industry colleagues to cross check their information and contact details. This will be an on-going, iterative process that will be reviewed regularly, and we hope it will become a resource for all the UK respiratory workforce to access and drive them to use the ARTP website more.

## NEWS & VIEWS

### Philips Respironics woes continue?

The FDA have released their latest bulletin *FDA Cautions Public of Safety Issue with Philips' DreamStation 2 CPAP Machines | FDA* outlining overheating issues with their Dreamstation2. After their massive recent global field recall programme this must surely push Philips into liquidating Philips Respironics which is set up as a separate company. The smart money is a likely a re-brand to "Respironics" to spare Philips blushes. With the other recent changed advice form Resmed on their magnetic straps, the CPAP world remains in a state of chaos and confusion. We advise ARTP members with the relevant Philips Respironics devices to produce an action plan that works with the company to inform users about the problem. We can't confirm this, but very often in the battle to drive down production costs/increase profits, companies can end up using inferior components that produce unintended consequences that results in a recall. What frustrates our clinical teams on the frontline is cost in time and effort to correct the manufacturer's mistakes.

### An update on the Field Safety Notice on Philips sleep devices, FSN 2021-06-A CPAP and Bilevel PAP devices.

Philips have been in touch regarding the Sleep Field Safety Notice remediation.
They have announced that from Monday 20th November 2023, we will be able to recommence supply of the Philips Dreamstation range, this includes our Dreamstation CPAPs, Dreamstation STs, Dreamstation BiPAP, Dreamstation AVAPs and ASVs.

In order to recommence supply of new devices to individual trusts and hospitals to use on newly diagnosed patients, they need to have completed remediation with the trust, this

includes the following.

1. All unretrievable device serial numbers documented.
2. Return of all affected devices.

Your local Account Manager will be reaching out to discuss how you can move forward with remediation and/or supply of new devices in the coming weeks. They will also be able to discuss any over supplied devices you may have through the remediation.

If you have any additional questions, require support, or an update on your recommencement of supply status, please do contact your Philips account manager.

**Oh, you are a One!**

I've been contacted by the makers of PulmOne, who are new to the UK lung function market. They make some interesting claims that they have "a new and first of its kind portable pulmonary function testing machine" they wish to launch in the U.K.

I always take such statements on uniqueness with a pinch of salt. Firstly, over the decades there have been many portable lung function testing machines. I mean, isn't that how most spirometers work? There have been systems that measure spirometry and gas transfer such as the ndd EasyOne Pro, the Morgan Medical Transflow and more recently the Vitalograph VitaloROV. (There are probably more – but you'll have wait until the ARTP Buyer's Guide is ready!) In the absence of airflow obstruction, the alveolar volume (VA) is a good surrogate for measuring TLC by single breath gas dilution – so their claim is not unique in that sense.

Of course, CosMed and Jaeger produced the Q4 and Oxylog portable CPET devices respectively many years ago and they are clearly portable lung function measurement devices.

So, whilst their PulmOne portable concept isn't new, what is its "first of its kind" claim all about then?

The Minibox+ is a desktop and/or portable plethysmography device which can carry out spirometry as well as full lung volume measurements or DLCO and has been proven to be as accurate and apparently more replicable than the conventional body box.

They state that lung volumes are obtained with tidal breathing and no panting technique but using "PulmOne Events". In the review of the PulmOne by Berger *et al*[1], there is an appendix that attempts to explain how the methodology works. In essence (this is a personal interpretation) it seems an interrupter technique exploits volume, pressures and flow to determine lung volumes at the point of interruption. However, in the appendix you reach an impenetrable obstacle in the following statement...

> *"... the final determination of TLC by the minibox method depends **upon empirical adjustments that remain proprietary**, the selection of measured parameters is guided by a physical model."*

So of all the methods of measuring lung volumes, this remains the only one that is unproven and open to full scientific scrutiny. Indeed, at previous ERS Congresses there has been

controversy over accepting the poster/abstract/presentations on PulmOne because of this lack of true scientific transparency. As a senior clinical scientist, I personally deplore this approach to science. What they need is a good patents advisor for whatever their intellectual property is!

The company have got around this "intellectual hiccup" by citing their validation/comparative study (Berger *et al*[1]) and by blurring over the lack of full traditional scientific integrity in the guise of commercial intellectual property. Indeed, they have previously used leading respiratory lights in physiology to add credibility to their claims - not unusual in our world of clinical physiology.

It raises a question about the possible/potential use of AI in the future, for example to glean certain information from a "new test" and then to extrapolate this data and other testing data (e.g. evidence of airflow obstruction) to make an "estimated guess" at the true value of the volume. This "black box" approach means it's not possible to check errors and assumptions of the measurement and moves us one step away from scientific proof of the measurement.

So, as scientists we need to ask whether such approaches are valid and acceptable? At the end of the day, if the test is either faster, easier, cheaper, and therefore "better" than fully established /validated technology, and the result is the same, then should we be adopting this into our routine practice?

However, their own on-line appendix shows a Bland & Altman plot from some unpublished comparative work by the great Denis O'Donnell where the difference in TLC between PulmOne and plethysmography is between 600-700mLs compared to the usual 200mL seen between different techniques like nitrogen washout and helium dilution and body box (see Susan Blonshine's work comparing lung function devices with simulators[2]). The data in the Berger *et al*[1] paper shows differences of less than 10mLs. It is not clear why the commercial study versus independent results are so different.

If it is equivalent, and the Berger *et al*[1] review suggests that is the case, then it may get around the reality of some patients finding body plethysmography difficult to perform. The MiniBox+ is cabinless which eliminates the claustrophobic feeling patients may experience and helps with patients who have challenges to access if they are disabled.

Finally, The MiniBox+ is semiautomated meaning results can be obtained in as little as 20 minutes giving results immediately upon completion of testing. More information can be found here: www.pulm-one.com

The purpose of this article is to be thought provoking and to question the evidence. Hopefully there will be more independent studies in the future to validate this new technique in a variety of patients and in different setting.

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2. Mottram C, Blonshine S, Kijek K, Road J. Impact of a pulmonary laboratory quality control oversight on continual improvement European Respiratory Journal Sep 2012, 40 (Suppl 56) P3206.

## NOTES FROM THE ARTP MANUFACTURER'S LIAISON MEETING (AUGUST 23)

This meeting was attended by ARTP scientific and clinical colleagues only and no manufacturers were present. The purpose of the meeting was to move forward on issues raised at the main MLC meeting held at Congress in Brighton earlier in the year. The main issues covered are summarised here.

### Servicing costs

The MLC has been looking at suggestions on how to address increased servicing costs for lung function equipment. Ideas included (i) Trusts having a "contingency pot" for when costs have increased beyond inflation and (ii) suggest asking manufacturers to itemise their costs. The plan is to produce an ARTP database of service costs from members from which we can prepare an article for Inspire by the MLC. We will be asking the membership for help with this database in the coming months.

### Sustainability

Another piece of work will be a new taskforce on respiratory physiology sustainability. We plan to approach manufacturers for details of their company's strategy on sustainability. Furthermore, we plan to contact the ARTP membership asking what they wanted from sustainability and also suggested self-help guides for Trusts to use when they first experience issues with equipment.

### Manufacturer's Awards 2023/2024

MLC and ARTP Board are reviewing the ARTP Manufacturer's Awards in time for the next ARTP Conference in Harrogate. There is a move towards more of a nomination-based process which is reviewed by an independent panel who will select the winner from a set of criteria. Nominations would be sent to the panel to review and would be anonymised to ensure there is no bias. The ARTP membership will be notified of this new process in good time to participate in the process. We pride ourselves on the excellent relationship we have between ARTP and the manufacturers that is the envy of many other professional bodies in healthcare.

### Patient guidance on rogue medical equipment sellers

MLC is concerned that there are companies that make equipment such as oxygen concentrators available for purchase by the public with no medical need via the internet. We are aware that MHRA and advertising standards will not take any action on this because there hasn't been proven harm yet. ARTP MLC are planning to put a statement on the patient section of the website discouraging patients from buying equipment independently and/ or without a prescription. We feel that the Buyer's Guide may help patients select reputable devices through reputable and ethical companies.

We look forward to your feedback of **"On the Blower"** and the issues we have presented. We want the MLC to be your voice and to help us pursue projects and taskforces that affect your service and patients. We look forward to hearing your responses via our ARTP Watchdog link on the website.

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## Onwards and Upwards

In 2023, as we celebrate our 60-year anniversary, we continue to invest in the company, our products and services, and, just as importantly, our staff. We hope these changes will be seen in even better support for our customers and improved solutions to their needs.

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We want to ensure the continued success of the VitaloPFT Series of PFT devices in meeting the needs of our customers and their patients both now and into the future. We have, therefore, created a new PFT Solutions team within Vitalograph, under the experienced leadership of Adrian Fineberg, with the new role of EVP PFT Solutions. Working with key opinion leaders, existing and new staff members, his mission is to provide customers with the very best in quality PFT solutions and education resources.

## New members of the PFT Solutions Team

### Tasmin Sharley, PFT Solutions Senior Product Specialist

Tasmin has a MSc (Respiratory and Sleep Science) as well as a BSc (Hons) in Human Biology and joins us from University Hospitals Bristol and Weston NHS Foundation Trusts Bristol Royal Hospital for Children where she was Lead Paediatric Respiratory and Sleep Physiologist managing the respiratory and sleep service. Tasmin has a wealth of experience and knowledge of pulmonary function testing and cardiopulmonary exercise testing. She has also been a senior lecturer in the department of applied science at the University of the West of England where she delivered lectures on respiratory physiology.

### Joe Topham, PFT Solutions Product Specialist

Joe is an experienced Respiratory Physiologist, has a Bachelor's degree in Healthcare Science and joins us from Nottingham University Hospitals NHS Trust where he worked as a Specialist Clinical Physiologist. His role will be working with Tasmin to support and educate direct customers and distributors in the UK with all Vitalograph products/solutions and provide Level 2 support and education to our global distributors on the VitaloPFT Series devices and associated solutions.

In addition to these new starters, we also wish Charlene Mhangami all the best as she starts her maternity leave.

## Vitalograph PFT Laboratory

The expanded service department at Vitalograph main offices now includes a dedicated PFT laboratory to facilitate product demonstrations and training sessions. Situated in Maids Moreton, near Buckingham, this resource gives new and prospective customers the opportunity to get out of their department to view equipment without distraction and as well as enable us to put on a full educational programme.

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# FRESH AIR

Edited by **Dr James Stockley** *ARTP Chair of Research and Innovation*

**Dear Reader,**

**Welcome back to 'Fresh Air'. These articles are designed to communicate novel trends in research, innovation, and clinical practice from both respiratory and sleep sciences. Our aim is to provoke thought and conversation within the ARTP community that we hope will benefit the future direction of physiological practice.**

**For this issue, we are fortunate to have a compilation of reflective pieces on the Scientific Training Programme (STP). STP is a three-year work-based learning scheme, supported by a University Master's degree. Oliver Stackhouse is a current STP student working at Birmingham Heartlands Hospital. He is supervised by Max Thomas, a former STP graduate who has now progressed to the Higher Specialist Scientific Training (HSST) programme. Paul Burns is the manager of the Respiratory & Sleep Physiology Department at the Royal Hospital for Children in Glasgow and has also provided some insight on supervising STP students in Scotland. We hope this article is of interest, particularly to those considering either undertaking the STP or supervising students. For more information, visit https://nshcs.hee.nhs.uk/programmes/stp/**

## Reflections on the NHS Scientist Training Programme (STP): trainees and trainers – past, present, and future

### The STP so far: a reflection on the application process and my first year on the Scientist Training Programme

**Oliver Stackhouse** *2nd year STP at University Hospitals Birmingham NHS Foundation Trust*

Similar to many 22-year-olds growing up in my generation, I had very little idea of what I wanted to make of myself. A 3-year undergraduate degree in Sports Science paved the way for me to enrol onto an MSc in Clinical Physiology, but even when I was halfway through my Master's degree, I was still very unsure of what I would be doing 12 months from then. One of my tutors mentioned that the application process for something called the STP had opened and advised us all to look into it, especially if we were having career-related doubts. After brief research, I realised that this was exactly what I was waiting for: a fantastic opportunity for me to take a huge step in beginning a career.

The application process itself was difficult, yet this was expected given the competitive nature of the programme. Firstly, I selected Respiratory and Sleep Science as my speciality, despite having next to zero knowledge about the speciality and what it entails. I was tempted by cardiology, however due to the substantially higher demand I thought I had more chance with respiratory and sleep. After deciding specialties and desired locations, I completed the two required documents (each of 500 words): one

## FRESH AIR

describing my perceived scientific skills; one summarising my previous clinical experience. Obviously, as I was still at university, my clinical skills were minimal but, fortunately, I was about to embark on two placements at different hospitals. Therefore, I was able to discuss what I was hoping to achieve on these placements for the required document.

The second part of the application involved a quickfire situational awareness exercise, where candidates answer 100 multiple choice questions revolving around what one would do during specific scenarios (completely unrelated to the chosen science). This sounds simple, yet candidates are only given 60 minutes to answer the full set. A combination of a candidate's scores from the first and second part of their application would then result in a rank. If this rank was high enough, candidates would be offered an interview.

Preparing for the interview was challenging as I had no idea of what to expect. I attempted to cover all bases but, due to my limited knowledge in Respiratory and Sleep Science, I struggled to prioritise what to revise. As predicted, I found some of the interview questions stumped me. For instance, I was asked how to calibrate a spirometer as well as some questions on oxygen therapy. As I was a direct entry into the programme from university, I had no pre-existing knowledge of these advanced respiratory physiology practices. Therefore, I felt the answers that I gave were vague and definitely not what the interviewer was looking for. However, I believe I compensated for my lack of specific scientific knowledge with the values-based assessments, where I came across as an empathetic and compassionate candidate who would excel in patient-facing scenarios. As I have learned over the last 12 months, the ability to successfully communicate and build relationships with both patients and colleagues is an important trait that can have more impact on one's career than understanding physiological processes and equipment calibration. For me, the latter is much easier to learn than the former! To my delight, I was offered the role and began preparing for life in a new city.

The first few months of the programme were difficult for me due to the vast number of different challenges I had to face. The idea of moving to an unfamiliar city by myself at a relatively young age (22) was daunting and definitely a big contribution to my slow start. On top of moving away from family and friends I had several issues with acquiring long-term accommodation, which resulted in me staying in cheap hotels and hostels across the city in the first instance. This initial three-week period took both an emotional and financial toll on me but, also, led to self-doubt over my choice to pursue the STP. However, the situation quickly improved as the first 5-week period at university afforded me sufficient time to find a suitable place to stay in Birmingham and, thereafter, my outlook became far more positive.

After settling into a house in the city and establishing my own routine, I still had to work through a number of other daily challenges. I originally lived a long distance away from my main workplace and cycling or public transport were my only options. If I cycled, I would have to navigate a combination of steep hills, the British weather, and the Birmingham motorists, whereas if I travelled by bus, I would not be home until late evening due to traffic. This was profoundly demotivational for me as it often resulted in me being late for work and frequently overtired in the workplace. However, with help from my training officer and a vast amount of reflection and planning, I successfully managed to improve my professional conduct, which I have maintained at a high standard ever since.

Even though it took a while to find my feet during my first year as a Trainee Clinical Scientist, there have been a great many positives to take away. Firstly, Respiratory and Sleep Science is an incredibly interesting discipline. There are a plethora of different roles within the workplace and no two days are ever the same. The patient-

facing aspect of the job allows me to thrive due to my outgoing and compassionate nature. I have gradually built strong relationships with fellow work colleagues, and I now feel a valued member of the team which, in turn, makes me feel proud and motivated to improve further. The nature of the STP has given me a broad experience due to placements in neurophysiology, cardiology and critical care, which have all helped expand my clinical horizon. I appreciate that I have been given a very rare opportunity, for which I am very grateful. And I felt it important to conduct myself in the best manner possible during these rotational periods as I was not only representing myself but also my department.

In terms of my professionalism and career progress, the difference between now and this time last year is very apparent. My fundamental understanding of Respiratory and Sleep Science is substantially more than it was upon commencing STP. In my first year, I have become proficient in performing a number of pulmonary function tests and have learned how to communicate with a variety of different patient groups, whilst remaining professional and friendly at all times. I have also learned how to deal with challenges in a way that does not lead to mental or social impact. I now look forward to going into work and learning as much as possible to further bolster my scientific toolbox and help myself become the best clinical scientist possible.

## The STP back and forth: A reflection on the graduating from the STP and taking the lead on education

**Max Thomas** *STP student 2014-2017 and current STP training supervisor at University Hospitals Birmingham NHS Foundation Trust*

I am writing this after reading the first-year reflections of Ollie, our current second-year STP student. It has left me feeling partly nostalgic but also reignited the overwhelming sense of uneasiness I experienced during the STP. The ‘percent complete’ graphic that appeared on your portfolio dashboard constantly reminded you that there was always more. That sense of duty stays with you throughout the programme right up until the moment it ends. I loved my training and the STP. I loved the rotations and learning how these physiological measurements I’d learned about at university are applied in a clinical setting. I loved meeting the staff and patients and forming connections. I loved seeing how all these different services operated – the people-management and inter-departmental politics, the organisational structures, and the logistical challenges of service delivery. The STP was designed to create a structured pathway for clinical scientists to progress to leadership, but it felt like a baptism of fire. It was a behemoth of a clinical training programme – you could always have done or be doing more. However much I complained at the time, I’d pick the same route again now. It made me something I was not: humble.

Ollie is the first year of a new cohort of STPs on the new curriculum for Respiratory and Sleep Science. The STP now involves a first year with shorter rotations, focusing more on observation and reflection rather than competence. I think being able to understand and reflect on a procedure is a realistic end goal for a student on a 3-month rotation. Although not explicitly stated in the learning objectives, it felt as if our cohort was expected to be competent in performance

and interpretation. It was a lot to ask of 1st year Respiratory and Sleep Scientists to interpret ECGs, a full blood panel, radiology measurements, and basic vascular ultrasound techniques among others. Perhaps that was a self-imposed goal, but the wording of the competencies fuelled that thinking. Reflecting on the experience and being peripherally aware of the investigations you may refer for is more akin to what medics are expected to achieve. Competence is an ongoing process where you develop a skill and maintain it. There was no chance of maintaining competence in the skills you were learning on rotations as you would use them infrequently... or so I thought. I now interpret ECGs daily and have performed more ankle-brachial pressure index measurements that I could have anticipated. The STP ended up equipping me with the skills to deal with more beyond respiratory and sleep investigations; and that was exactly its purpose.

When supervising the next generation of STPs, you see them encounter the same hurdles that faced you at the time. You experience the same frustrations that your educational supervisors likely experienced. Although, I have taken a less hands-on approach to managing my students than my initial workplace supervisor. The selection process for the STP means you're almost certainly going to have someone very capable to perform the scientific aspect of the work. What often needs the most attention is interpersonal skills: communication, empathy, active listening, and skills of influence. Rational thought can only get you so far in leadership; emotional literacy is the currency of influence. The STPs of the past, present, and future will all have no difficulty becoming competent at making the measurements we ask of them. The real value of the training programme is in the professional development and leadership elements. The sooner the trainee realises that, the greater their potential to make change is.

## The future of STP supervision: the first STP experience of an education lead in Glasgow

**Paul Burns** *service lead for Respiratory and Sleep Physiology at Royal Hospital for Children, Glasgow*

The STP process works very differently in Scotland compared to England. NHS Education Scotland (NES), which is equivalent to the National School, provides funding each year for a set amount of STP placements in boards within NHS Scotland. Respiratory and sleep usually don't get many places. These posts are three-year supernumerary and are completely funded by NES. Similar to England, the successful candidates will work for three years in a physiology department and will also attend University of Manchester at given periods.

When I first took over as department lead in early 2020, I applied for one of these supernumerary posts. Initially I was told I was unsuccessful. As usually happens within physiology, cardiac had received the majority of funding and respiratory and sleep had not received any. However, a few months later I received an email to ask if I still wanted a trainee as there had been an underspend – result! I would have the benefit of an additional member of staff without any financial impact on my department/board.

The application process in Scotland is also different in that a trainee post is advertised and the usual vacancy processes are followed. I got

## FRESH AIR

the vacancy advertised and due to the attraction of the role, there were in excess of sixty applicants who applied. After spending time shortlisting and interviewing, the successful candidate was a Master's graduate in exercise science that had already been working for us as an assistant physiologist for six months.

Being an STP work-based trainer was very new to me. I quickly used the knowledge of Google to find trainer webinars delivered by the National School. These were helpful to a degree as they gave me information on the fundamental structure of the three-year course. They also gave me information on processes, such as ongoing assessment via the online portfolio and the assessment system that was used. However, they were not specific to respiratory and sleep, hence there were still large gaps in my knowledge as a new work-based trainer for my student.

The first time-consuming role I had was to organise a training plan. I devised a document that would cover the duration of the course but understood this would have to be fluid in design. I then had to organise the rotational placements for my student. Luckily, we have strong relationships and contacts within other departments so I was able to send out some emails and make a plan. Being a solely paediatric centre, I was keen for my student to get some experience with adult patients. We work in a large NHS trust, which made this easier as all of his placements were able to be taken within Greater Glasgow and Clyde. I was fortunate to get an excellent candidate who already had significant experience in performing spirometry and bronchodilator responsiveness. We are a large department who cover respiratory and sleep for both basic and advanced tests, which meant that the majority of my STP student's training could be done in-house.

Reflecting on my first year as a STP work-based trainer, I have learned a lot about the process and what is required. Regular meetings with your trainee are important to ensure they are progressing sufficiently and feel supported. A good training plan is vital, although it may evolve throughout the programme but a structured guide outlining areas of learning and training is essential to ensure the STP student meets the required standards. It can be too easy to simply use them to cover clinical work and, although it is important to give them a workload so they can learn how to manage it, it is also important that specific time is given to them to learn new techniques. Good links with other more experienced work-based trainers are very helpful. I have regularly contacted my friends/colleagues down south to ask advice on various STP-related issues.

Going forward, I hope to have future STP students and will definitely benefit from the experience I have gained.

# Using technology in international and interprofessional education for health science students: a cross-sectional evaluation of student experiences and learning

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**Abstract**

Purpose: This study aims to determine the effect of an online international collaboration activity on professional and cultural learning among undergraduate health science students.

Methods: Two online teaching sessions were hosted between Healthcare Science and Physiotherapy students, from Swansea University and Universidad CEU San Pablo respectively. Within this activity, students were asked to present and discuss different approaches to patient cases. An online questionnaire was distributed after the second teaching session to evaluate student experiences.

Results: Evaluation data from 14 (61%) students was collected. Students felt their knowledge about international healthcare systems improved throughout this teaching activity. 96% of students considered that their understanding of other roles in the patient pathway had increased, with 91% feeling an improvement in their professional development. Students enjoyed learning from other healthcare professionals, learning more about the patient pathway and the social nature of this activity. Students identified that the choice of online platform used could have been more fit for purpose.

Conclusion: It is possible to complete successful international and interprofessional education online. The primary objective was met; with analysis showing generally positive experiences in relation to professional development, interprofessional understanding and cultural awareness. However, this activity has highlighted the importance of utilising an appropriate online platform when face-to-face events are not possible.

**Keywords**: Interprofessional education; Online learning; Health science; Student experiences

## Introduction

The World Health Organization (WHO)[1] defines interprofessional education (IPE) as 'students from two or more professions who learn about, from and with each other to enable effective collaboration and improve health outcomes' (p.7). By providing these learning opportunities it is hoped that professionals-in-training can gain knowledge and experience of other roles within the multi-disciplinary team, aiding the production of effective patient-centred pathways, whilst combating ignorance and prejudice of differing professions[2].

Higher education providers are somewhat responsible for implementing IPE to ensure that a collaborative practice-ready workforce is created. In response to the WHO recognition of its importance, IPE standards have been published by organisations such as the UK-based Health and Care Professions Council (HCPC) to ensure that educational institutions are supported and accountable in doing this. When evaluating the provision of IPE, the HCPC has identified that there are pitfalls in how it is carried out. These include the reliance on ad-hoc experiences, and poorly defining the relevance of how understanding other professions leads to improved quality of care[3].

In response to the guidelines and recommendations to avoid pitfalls, IPE should therefore be a planned event, that provides education on the roles of the involved professions, alongside demonstrating how the professions work together to provide a more complete service to the patient. One such method which has had success in meeting these recommendations has been demonstrated by Leadbeater et al[4] where online platforms were used to guide case-study based workshops with different healthcare professionals to improve their understanding of one another.

Alongside IPE, further themes that are recognised with increasing importance as a result of globalisation are global health education (GHE) and cultural competency. Although GHE is poorly defined, a recent systematic review by Umphrey *et al.*[5] synthesised literature to describe it as a field focused on advancing international and interdisciplinary healthcare, whilst addressing inequities. The Global

Health Learning Outcomes Working Group set to standardise core competencies of GHE, and identified the importance of building awareness of how health care systems are structured and function differently worldwide[6]. The discussion of this with people of different ethnicities in a safe, supported environment aids the early development of cultural competency[7]. This ongoing learning process starts with awareness of one's own cultural beliefs, values and experience of healthcare, alongside the exploration of others'[8].

Commonly, teaching aspects of cultural awareness has occurred through didactic teaching. This has been criticised for potentially strengthening incorrect stereotypes and not fully allowing the student to prepare for interaction[7]. However, advancements in technology allow exposure to different cultures whilst minimising logistical barriers. Therefore, educational institutions are able to provide opportunities to all students to develop cultural awareness through exploration rather than content-based teaching, whilst maintaining a convenient, supported environment to do so. Support for the use of technology in achieving this has been demonstrated by Bragadóttir and Potter[9], who found online collaboration in nursing students led to increased awareness of commonalities and differences in culture and healthcare, in addition to increased cultural sensitivity.

Due to the COVID-19 pandemic, an acceleration in the use of technology has been seen in educational settings[10]. Despite this being due to necessity, Bragadóttir and Potter[9] concluded that it provides a method of increased participation and diversity, whilst in a meta-analysis by Umphrey *et al*[5] it was additionally noted that online collaborations provided flexibility, and convenience through avoiding travel and the associated costs. Alongside recognising barriers and enablers to online collaborative learning, investigation should also determine the student satisfaction levels in using technology platforms to promote IPE and cultural awareness. In the study by Leadbeater *et al*[4], 78% of students agreed that the online format to the session allowed them to meet the desired learning outcomes, and that it provided an interactive method for discussing clinical cases. But the literature on satisfaction of using online platforms to aid collaborative healthcare education remains sparse.

There is limited reported evidence describing and evaluating educational events which focus on both IPE and cultural awareness training hosted through technology platforms, demonstrating a need for further research in this area.

## Objectives

This study aimed to outline a collaborative e-learning activity which focuses on both GHE and IPE.

The primary objective was to analyse the learning experiences of a health science student group participating in an international collaborative activity on professional development, interprofessional understanding and cultural awareness.

The secondary objective was to analyse the suitability of the technology platform used to host the activity.

## Methodology

### Participants

A total of 23 students participated in this educational activity: 13 year-three reading Physiotherapy (international) at Universidad CEU San Pablo, Madrid, Spain, and 10 year two and three (60% and 40% respectively) reading Healthcare Science (Respiratory) at Swansea University, Wales, United Kingdom. Students from the following countries took part in this activity; Egypt, England, France, Libya, Mexico, Norway, Spain, and Wales.

### Equipment and Materials

Case template
Access to patient cases
Internet-based videocall software (Microsoft Teams was used for this activity)
Post-event questionnaire (see appendix 1)

### Research Design

This educational activity consisted of one preparatory session, in person, and two online sessions.

*Preparatory session*

This session was held face-to-face in September 2022 with Healthcare Science (Respiratory) students only. This session lasted 1 hour.

Preparatory session objectives:

- Explain the task ahead
- Divide students into mixed-year groups and allocate categories
- Discuss the rationale and purpose of this teaching activity

Healthcare Science students were put in mixed-year pairs or threes. Students picked a respiratory category from a pre-defined list and were instructed, whilst on their upcoming clinical placement, to find a patient case in their chosen category. The categories were; chronic obstructive pulmonary disease (COPD), pulmonary fibrosis, thoracic surgery, paediatric and neuromuscular.

Students were given a basic case template to help them collect relevant and consistent levels of

information. This included information relating to: patient demographics and background, presenting complaint/history of diagnosis and diagnostic test results. Students used Zoom, face-to-face discussions, and text message services to liaise with their partner on the progress of their case.

*Session one*
This was held in October 2022 and lasted one hour.

Session one objectives:
- Break down barriers and reduce anxiety surrounding session two.
- Learn about healthcare systems in different countries (student's home country).

This session was run on Microsoft Teams and consisted of a short introduction and rationale of the activity (led by course tutors). The physiotherapy students were divided into pairs and threes and assigned a case to review, forming a multidisciplinary working-group with the respiratory physiology students that collected the case. An ice-breaker challenge was carried out, giving an opportunity for the students to network, discussing and comparing the healthcare systems of different countries (Egypt, England, France, Libya, Mexico, Norway, Spain, and Wales). During this session the Healthcare Science (Respiratory) students uploaded their case details to Microsoft Teams.

Between sessions one and two, both sets of students were instructed to view the case assigned to their group and develop a presentation from their discipline's perspective. Healthcare Science students were told to explain the diagnostic test procedure and interpretation of the results. Physiotherapy students were told to explain what treatment options may be appropriate for the patient. Students from both courses needed to apply their knowledge in relation to the patient case. Students were given two weeks to compile their reports.

*Session two*
This session was held in November 2022 (two weeks after session one). Microsoft Teams was used to host the online session, which lasted two hours.

Session two objectives:
- Understand the role of the physiologist and the physiotherapist in patients with respiratory pathologies.
- Learn about physiotherapy techniques designed to benefit the patient with respiratory pathology.
- Learn about physiologist testing designed to identify and monitor patients with respiratory pathologies.
- Gain experience in presenting to, and communicating with colleagues from, other professions and other cultural backgrounds.

The five multi-disciplinary working groups, each with their respective case to present, were split into two breakout rooms alongside a staff member. Within each breakout room, each working group had 20 minutes to present their report on the case; 10 minutes from Healthcare Science on diagnostics + 10 minutes from Physiotherapy on treatment options.

Students were asked to upload their case reports to Microsoft Teams and a de-brief was completed recapping what had been learnt and highlighting the benefits of multi-disciplinary working.

Students were invited to complete an online feedback questionnaire at the end of this session. It consisted of nine Likert-type questions (five items from strongly agree to strongly disagree) and three open-ended questions.

*Analysis methods*

Quantitative analysis was completed using descriptive statistics. Microsoft Excel was used to create graphical displays of the data.

Qualitative analysis was completed using an inductive approach thematic analysis. Thematic analysis of the data obtained was completed independently by two authors, one from each institution. Both reached a consensus about the themes following a respective analysis of the data.

Ethical approval was obtained from the Medicine, Health and Life Science Research Ethics Committee, Swansea University. A participant consent form was included at the beginning of the anonymous online questionnaire.

## Results

A total of 23 students out of a possible 39 agreed to participate in the educational activity, with 14 students (61%) completing the final online feedback questionnaire. Table one shows the characteristics of the students.

### Descriptive statistics

#### *1. Understanding of healthcare systems of other countries*

All students (n=14), across both programmes, felt the activity improved their knowledge about healthcare systems of other countries throughout this teaching activity. All students thought it was interesting to learn about other country's healthcare systems.

When asked if students thought knowledge of other

Table 1. showing the number of students participating in this activity from each institution

| | Invited participants Year of study (n) | Attended participants Year of study (n) | Non-participation Year of study (n) - reason |
|---|---|---|---|
| Healthcare Science (Respiratory) students, Swansea University, Wales | Year 2 (6)<br>Year 3 (5) | Year 2 (6)<br>Year 3 (4) | Year 3 (1)<br>- Scheduling clash |
| Physiotherapy students, Universidad CEU San Pablo, Spain | Year 3 (28) | Year 3 (13) | Year 3 (15)<br>- Voluntarily declined |
| Total | 39 | 23 | 16 |

healthcare systems was relevant to them, a third (33%) of physiotherapy students considered this information irrelevant to their professional education.

### *2. Role of other healthcare professions*

96% of students felt their understanding of other roles in the patient pathway increased, with 91% feeling an improvement in their professional development.

### *3. Communication between different healthcare professionals*

Despite the sessions being held in English which is a non-native language to those studying Physiotherapy, the Physiotherapy students were not any more nervous about speaking than Healthcare Science.

### *4. Positive experiences*

Students were asked to give their opinion about what they liked about the experience.

Responses were linked to the following 5 themes: better understanding of the role of other healthcare professionals, learning new content, social interaction with new people, enjoying an international exchange with knowledge on other healthcare systems, and presenting in front of other students.

Students were asked to what extent they agreed or disagreed with the statement: "I would recommend the activity to my peers". All students (100%) either agreed, or strongly agreed, to this statement. In addition, 86% either disagreed or strongly disagreed

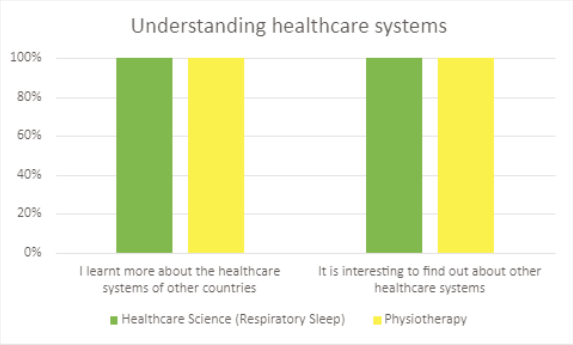


Figure 1. Feedback from students around knowledge of healthcare systems in different countries

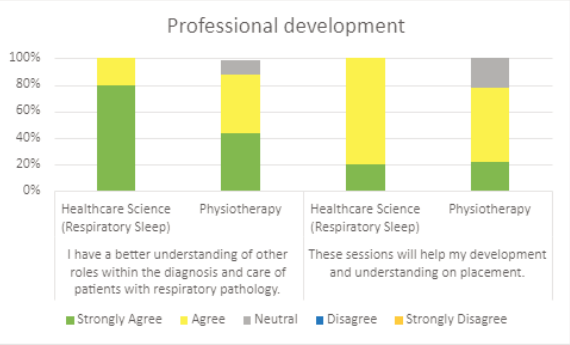


Figure 3. Professional learning and development that students feel has taken place as a result of this teaching activity.

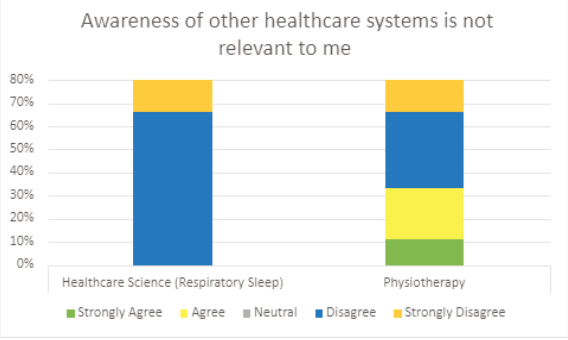


Figure 2. Student perception of whether knowledge of healthcare systems in other countries is relevant.

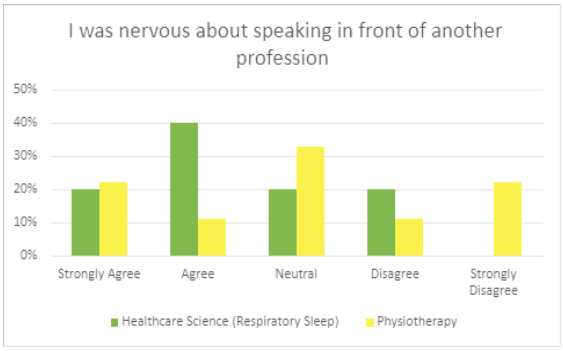


Figure 4. Degree of anxiety around speaking in front of students from other professions.

with the sentence "I would rather have not participated", with one student 'neutral' and one 'strongly agree'.

*5. Suboptimal aspects*

Reported 'unfavourable experiences' were analysed thematically.

The following themes were identified from the responses; technical problems related to the connection, lack of time to prepare and do the presentation, preference to completing the exchange in-person rather than online, and improvement in group organisation.

## Discussion

This study analysed the experience of a group of students during an international and inter-professional exchange. The analysis of the results is divided into three sections directly related to the objectives of this study.

### Interprofessional understanding and professional development

The results of this study show a positive perception of the participants regarding the improvement of professional skills. As shown in the study of Imafuku *et al*.[11], the knowledge of the role of professions, who are jointly involved in the patient's care, enriches the development of the activity itself. It allows the treatment and assessment of the patient to be approached from a broader and more contrasted point of view. But the work of the interdisciplinary team and communication with other professionals regarding the management of the patient involves changes in attitude: professionals must consider this experience as an opportunity to learn IPE and collective responsibility for patient care and better understanding of context[12].

The activity enabled the students to practice skills required for multidisciplinary working, such as interprofessional communication and patient centred care. The backbone of the process was the patient and not the professional, in the same way as was observed in the study by Smith[13].

The process of IPE incorporates interprofessional socialisation (IPS), where an understanding of the roles of other professions, the benefits of collaborating, the shared goals, breaking down barriers, and solidifying the identity of your own profession are promoted[14]. IPS helps individuals to understand and respect other professions and to identify overlaps in clinical practice[15]. Physio-therapists and Respiratory Healthcare Science professionals participate in the continuum of care for patients with respiratory diseases. Knowing each one's roles and skills is of benefit to the patient and the healthcare system.

Educational initiatives that promote the collaboration between healthcare professionals are necessary[2]. The implementation of these initiatives by educational providers will lead to the generation of an effective interprofessional exchange in the future. IPS allows the students to build trust with other healthcare professionals and help them to implement mechanisms for conflict resolution[16]. Furthermore, our results show that the students have a mutual interest in knowing the role of other professions at the very early stages of their studies. Therefore, educational leaders should translate this motivation into effective exchange programs throughout student degrees.

### Cultural awareness in healthcare professionals

The Higher Education students participating in this educational intervention were from eight different countries. Healthcare professionals are increasingly faced with intercultural exchanges whilst completing their professional duties. Cultural competency should be part of the basic education offered by the healthcare educational institutions[17]. Virtual intercultural exchange experiences have shown positive results in students' knowledge and perception of other cultures[18]. By simulating these exchanges, students are able to better understand and respect the singularities of different cultures and learn how to adapt their professional skills[17]. Respectful and rich exchanges with people from other cultures allow the healthcare professionals of the future to improve their professional skills.

The construction of a comprehensive vision of healthcare systems in different countries seems to be useful information for healthcare professionals. Whilst all students (100%) thought it was interesting to learn about other healthcare systems, and all students felt they learnt more about healthcare systems in other countries after completing this activity, 33% of students considered this learning irrelevant. All of these students were studying Physiotherapy (international degree) and had already experienced variance within healthcare systems as a result of completing clinical placements in a different country. It may be theorised that this result is due to a lack of student appreciation at this stage of their learning, as despite studying at a similar level, the physiotherapy students had completed considerably less clinical hours. It may otherwise be because the participating Physiotherapy students do not plan to clinically practice outside their country of study (Spain). Alternatively, it may be due to limitations of the questionnaire.

### Technology facilitators and barriers

Thematic analysis of this study revealed sub-optimal

experiences related to technological issues. New advances in technology simplifies the organisation of international educational exchanges, however finding a suitable platform is paramount. In a study conducted by Draxler-Weber *et al.*[19], responses of 369 students from three countries were analysed about the barriers to digital higher education learning. Lack of technical resources and insufficient internet connection were the most frequently stated barriers reported by the students. In addition, some students reported a lack of digital competency that could affect their learning experiences. Along a similar theme, results from this study showed students' concerns regarding connectivity and the malfunctioning of the online platform. Solving these technological problems reduced the time for students to complete their presentations, which was another issue raised. In addition, the use of one computer by groups of two or three students and the presence of different groups in the same classroom, seemed to further contribute to the negative experience reported (group organisation; point 5 of results). Future experiences should take into account these barriers. Thus, the choice of the most appropriate online platform and the separation of the students in different spaces seems to be crucial to reduce the technological and organisational barriers.

### Limitations

The data were obtained from a single experience with a limited number of participants; 9 out of the 23 students did not answer the questionnaire, perhaps influencing the findings.

The replication of the activity in another group of students would have enhanced the reliability of the study.

The questionnaire was written in English (the second language for almost all the Physiotherapy students) so it is possible that the understanding of the questionnaire could have been affected. However, all students were used to receiving lessons and completing assessments in English, so we do not consider this to be hugely limiting.

Within the questionnaire, there were three negatively worded questions i.e. 'strongly disagree' supports a positive experience. This was designed to ensure students read the questions carefully before answering, however, given some participants were answering in their second language, this could have led to a misunderstanding and generated answers that were not representative.

## Conclusion

- IPE allows interprofessional understanding, improving multidisciplinary working.
- Online international collaboration programmes seem to improve undergraduate health science students' perception of their professional development.
- Learning about healthcare systems of other countries may provide valuable information for undergraduate health science students, enhancing cultural awareness.
- Online platforms facilitate interprofessional and intercultural exchanges but there are barriers related to connectivity, functionality and management that should be considered.

## Recommendations

Students desired considerably more time to present their cases, so it is recommended that future collaboration events allow a minimum of 40 minutes per presentation (15 minutes per discipline, plus 10 minutes for discussion) to further enhance student learning and IPE opportunities.

The use of online technology facilitated this session however, student feedback suggested that face-to-face sessions, or the use of alternative software would have enabled a smoother transmission, therefore travel, or a blended approach, should be equally considered. Online software must have the capability to allow multiple 'rooms', with permission for all participants, regardless of their institution, to be able to share the screen. If using online software, it is recommended to have participants in individual rooms or homes to avoid background noise.

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## Appendix 1- post completion questionnaire

11. Following the two online sessions between CEU San Pablo and Swansea University, how much do you agree with the below statements?

Please read the statements carefully. *

| | Strongly Agree | Agree | Netural | Disagree | Strongly Disagree |
|---|---|---|---|---|---|
| I learnt more about the healthcare systems of other countries | ○ | ○ | ○ | ○ | ○ |
| Awareness of other healthcare systems is not relevant to me | ○ | ○ | ○ | ○ | ○ |
| It is interesting to find out about other healthcare systems | ○ | ○ | ○ | ○ | ○ |
| I have a better understandin g of other roles within the diagnosis and care of patients with respiratory pathology. | ○ | ○ | ○ | ○ | ○ |
| My knowledge about the role of other professionals in patients with a respiratory pathology has not improved. | ○ | ○ | ○ | ○ | ○ |
| These sessions will help my development and understandin g on placement. | ○ | ○ | ○ | ○ | ○ |
| I was nervous about speaking in front of the other profession. | ○ | ○ | ○ | ○ | ○ |
| I would rather have not participated. | ○ | ○ | ○ | ○ | ○ |
| I would recommend this activity to my peers. | ○ | ○ | ○ | ○ | ○ |

12. I liked...

13. I disliked...

14. To improve...

# Asthma Diagnosis in Paediatrics

**Natalie Blyth**

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It is likely you know of someone who has asthma. Despite affecting between a quarter and a third of a billion people globally (5.4 million in the UK), there is no universally accepted definition for asthma[3,13]. In the 20th century, researchers thought asthma to be a result of hypersensitivity causing smooth muscle contraction in the airway. By the 1980's, airway inflammation was argued to be the key feature; with the Global Initiative for Asthma most recently defining it as a 'heterogenous disease, usually characterised by chronic airway inflammation[12,15]. Despite arguable ambiguity over the definition, the symptoms of asthma are well documented to be a wheeze, cough or breathlessness with variable / reversible airflow obstruction ± evidence of allergic inflammation[18,19].

If you have watched a certain Hugh Laurie television drama, you may recall a light-hearted take on asthma. A patient attends the clinic with concerns regarding her asthma. Dr House then discovers she has, in fact, been spraying her inhaler like your favourite bottle of Chanel, directly onto the neck! But in fact, asthma is no laughing matter. In 2019, there were around 461,000 asthma-related deaths worldwide[8]. It costs the NHS alone £1.1 billion every year[2] and there's a further £6 billion indirect cost to society from time off from work/school because of asthma[2].

What about in the younger humans of society? Around 1.1 million children suffer from asthma; that's around 3 in every classroom[3]. The UK has one of highest asthma-related mortality rates in young people (Figure 1). Case studies released by Asthma and Lung UK highlight some of the children behind these numbers; Tamara Mills who died a day before her 14th birthday and Michael Uriely who died aged 9 [4]. There are various reports that have explored the failings of asthma care in the UK, but one piece of data suggests a place for healthcare scientists in the fight against asthma.

In children, asthma is underdiagnosed in 24-50% of cases and over diagnosed in 10-54% of cases [9,10, 17, 24]. As healthcare scientists, we may not have the definitive answer for diagnosing asthma, but we do have a good tool kit at our disposal to lend a helping hand to clinicians. Maybe it starts with any respiratory physiologists 'bread and butter', spirometry with bronchodilator response (BDR). If you're lucky enough to be able to support the community in asthma diagnostics, a spirometry BDR (with FeNO) is probably a good place to start. With the current recruitment issues, I'm not suggesting physiologists offer to perform a spirometry BDR on every child who has a cough, but there may be an opportunity to support other practitioners in the community to become qualified in spirometry. For example, in Leicester, our paediatrics spirometry course has attendees from a range of primary and secondary care practitioners.

Great! Step one, a spirometry BDR (with FeNO). But, with a low sensitivity (0.35-0.36) and a high specificity (0.90–0.98), it's not going to be a one-stop shop for an asthma diagnosis[22]. In our own experience, we have found 20-30% of patients have a positive BDR, leaving the other 70-80% still without an answer. NICE (2017) guidelines pretty much stop here for paediatrics and suggest investigating alternative diagnoses at this point[18]. But have we really done all we can?

Time to put down the ARTP Part One and dig out Part Two – bronchial challenge testing. ATS guidelines (2013) provide guidance on indirect challenge testing in paediatrics in the form of an exercise challenge test[20]. In Leicester, we perform exercise challenge tests with hundreds of children a year, and we are not alone in that. However, studies suggest that somewhere between 40-90% of children with asthma will have a positive EIB test[10,11,16]. So there is still some diagnosis hunting to do.

Now, we get onto the really fun part – Methacholine challenge testing. Methacholine challenge testing is often used in adults where there is diagnostic uncertainty[14]. ERS (2017) guidelines provide great evidence-based guidelines for performing various challenge testing using Methacholine[7], although, it doesn't specifically give tailored advice to performing these in children. Moreso, to my understanding, there are very few paediatric centres in the UK performing these. Nevertheless, various studies, such as Bhatia and DiLullo (2021) and Healy *et al*. (2019), demonstrated they were of use in paediatrics[5,14].

At Leicester Children's Respiratory Physiology, we use the Vyntus APS for Methacholine PD20 bronchial challenge testing. Children must pass stringent exclusion criteria and they need to have good spirometry technique; this may rule out a proportion of our target population. However, by the time a child gets to a PD20 test, they have likely performed spirometry a few times. We also need them to stay co-operative and engaged for the full testing session. But in paediatrics, that's half the fun of the job!

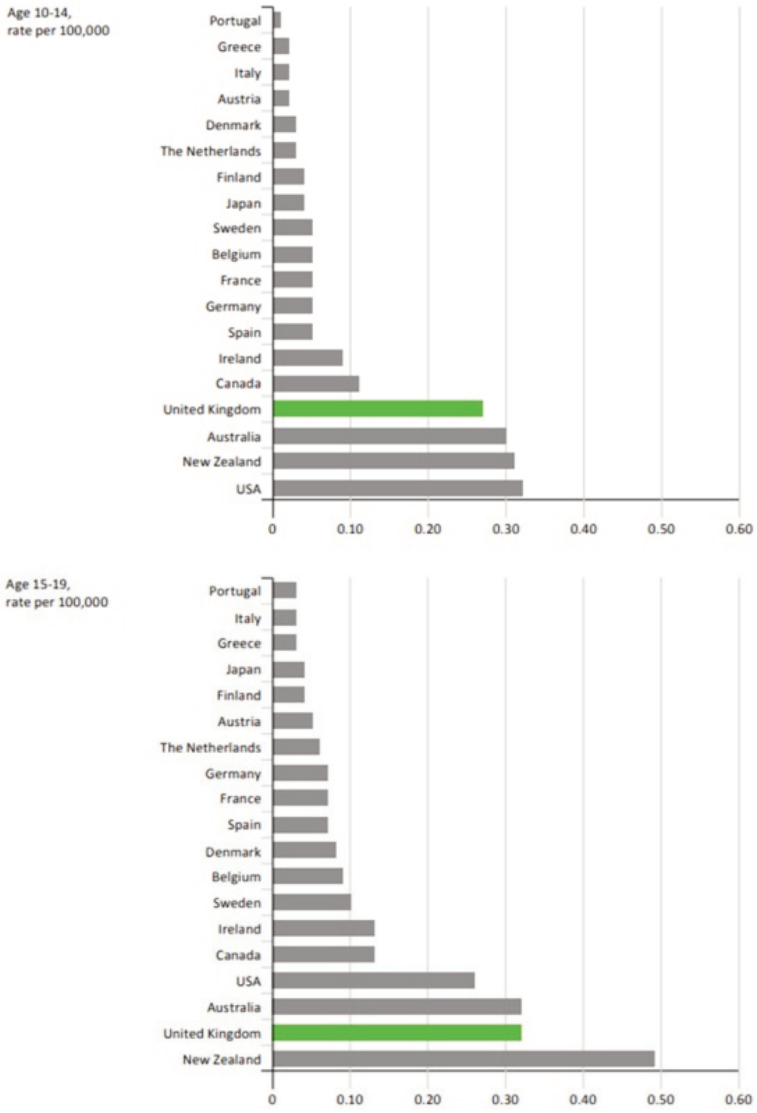


Figure 1. Comparison of asthma mortality rates for young people per 100,000 age specific population, 2016 [21]

98% of our PD20s are successful. The small percentage that haven't been successful were as a result of variable spirometry results; but this is similar to our experience in exercise challenge tests. In our opinion, the tidal breathing method on the Vyntus APS has proven very achievable in paediatrics. Similar to working with FOT (forced oscillation technique) over the years, we have found this part of the test to be relatively easy for children[10]. Moreso, it is very quick to perform, which helps with patient co-operation. The most challenging part of the test in some cases has been the requirement for the parent/carer to stand outside of the room and observe from a window.

We have had a mixed bag of outcomes. Some children have had negative spirometry BDRs and exercise tests but have shown a PD20 of <0.010 mg (severe airway hyperresponsiveness as per ERS guidelines)[7], whereas there is a small group of patients who have had a negative PD20 result, despite thinking they had asthma for years. Clearly, the benefit of diagnosing asthma is that clinicians can confidently treat the patient. However, what happens when a PD20 is negative?

In one case, a patient had been treated for asthma based on symptoms of variable shortness of breath. This patient was now leaving school and wanted to apply to be in the armed forces. With an improvement in fitness levels, they felt that they no longer required their inhalers. The patient was concerned that having an 'asthma' diagnosis on their medical files would affect her application into the armed forces. After a negative spirometry BDR result, a negative exercise challenge test and a negative bronchial challenge test, clinicians were then happy to write that a diagnosis of asthma was highly unlikely and stop all related medication formally.

More general cases have seen clinicians use evidence from challenge reports to support decisions to wean medications. Arguably, this is a tiny step towards identifying some of those 10-54% of cases where asthma has been over diagnosed[6,10,17,24]. Not only could this reduce the treatment burden on patients and families, but it could save the NHS a little bit of money too! Additionally, it could be a small step to reducing the carbon footprint inhaled therapy has. Inhalers cannot be recycled; they tend to end up in landfill with the rest of household waste[1]. Not to mention that metered-dose inhalers (MDIs) utilise greenhouse gas propellants; which account for approximately 13% of the NHS's care-related foot-print[23].

So, what am I trying to say? It's not always easy to diagnose asthma in children and clinicians don't always get it right! But maybe as healthcare scientists we have the tools to aid a more accurate diagnosis in paediatrics.

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# Lab in the Limelight

Dawn-Marie Shackell
*Lead Physiologist*

## Respiratory Medicine Norfolk and Norwich University Hospital


The department of Respiratory Medicine, known then as the "chest clinic", opened at the West Norwich Hospital in the 1970s, mainly to treat TB. As it was an isolation hospital, the wards were separate buildings, with the laboratory occupying a room the size of a bedroom, with two homemade workbenches either side, before eventually moving to a room more suitable. In 1978 Dr Brian Harrison was appointed and set up the laboratory properly with PK Morgan equipment (dry rolling seal spirometer to measure volumes by He dilution, and the gas transfer system). At that time there were only 2 consultants, 2 registrars, a handful of house officers, and a part-time technician (as we were called back then). In 1983 Andrew Wilkes was employed full-time, and was the only technician for 12 years, with the exception of a few short-term appointments for research or trials.

In the 90s, the ward where the laboratory was located closed, so it was moved to the Norfolk & Norwich Hospital on St Stephens Street where acute care was being delivered. Sleep studies were carried out on the ward using a device called respitrace (respiratory inductance plethysmograph), eventually being replaced with the Stowood Visilab-system. Around this time (1995), the department also purchased the Jaeger "Masterlab" PFT/Body box system and recruited another technician.

In November 2001 the newly-built Norfolk and Norwich University Hospital (NNUH) opened and replaced the former Norfolk and Norwich and West Norwich hospitals. This allowed for more tests to be performed including field exercise tests, hypoxic challenge, bronchial reactivity and provocation tests. Patients were no longer admitted for sleep studies as the management would not allow it on the wards, therefore domiciliary oximetry was the only option. At this time Cardio-pulmonary exercise testing (CPET) was a long term aim due to lack of staff, and no funding or support from the trust. This eventually changed over the years, the trust recruited physiologists (name change), Cardiology funded the equipment, and with the increase in demand, by 2017 CPET was a stand-alone service.

The lung function lab now consists of three rooms, housing all new equipment supplied by Vyaire in 2020, a team of 6 people, as well as 14 consultants, 8 registrars and 2 nurse consultants.

The current services offered at NNUH are full lung function tests, respiratory muscle strength, field exercise tests, methacholine challenge, CPET, hypoxic challenge, FeNO, Impulse Oscillometry (IOS), bronchial reactivity studies, and overnight oximetry.

## Lab in the Limelight continued

### Lead Physiologist background & career

My name is Dawn, I am the Lead Respiratory Physiologist, and have worked at the NNUH for 18 years. Upon graduating from my degree in BSc Sport and Exercise Science, I was keen to pursue a career in physiology. I began working at the NNUH in 2005, gaining experience before embarking on my second degree in Clinical Physiology, whilst working full time. Within this time, I also completed ARTP part one and part two. In 2009 I was appointed Senior Respiratory Physiologist. Over the years, I have attended numerous courses, particularly CPET, as that was my main interest, where I felt I could combine my knowledge from both degrees, which led to me being appointed Lead of the CPET service in 2017.

In 2021 I took on the role as Lead Respiratory Physiologist, which oversees the whole respiratory physiology service. This was an interim post, which I was successfully appointed into this summer. Within this time, I completed the Clinical Educator Course provided by UEA, and the NHS EoE Diagnostic Workforce Leaders' Development Programme. As part of the Physiology Diagnostic Working Group for Norfolk and Waveney, I have also been involved in planning for community diagnostic centres (CDCs,) working on pathways and ways to improve delivery of respiratory diagnostic assessments, improving patient care, and reducing waiting times. I am also a training provider for Spirometry, and ARTP Spirometry assessor.

Last year I received the 'NNUH PRIDE award- Highly commended' for service development, outstanding commitment to the service, and leadership.

### The Team

*Left to right. Sofiya, Alicia, Dawn, Elisa*

We have built a very good team in the last 2 years; we recruited 2 trainee Clinical Physiologists (Sofiya and Alicia) who are now in the final stages of completing their ARTP professional examinations. In 2022 we became an STP-accredited centre, currently hosting our first student (Elisa). This year we recruited another trainee Clinical Physiologist (Kieran), who is currently completing the one-year graduate diploma in Respiratory and Sleep at Sheffield Hallam University. We also have Charlotte, our Assistant Practitioner who has worked at the trust since 2017, currently on maternity leave. This year we were nominated and won the Healthcare Scientist Team of the Year Award, which was nice to get the recognition we deserve.

### Future departmental aspirations

In the future we would like to develop the sleep service, so that we can undertake and analyse more complex sleep studies. With the development of the CDCs, we will be providing certain lung function tests in the community, reducing the footfall into an acute setting. Paediatrics are keen for us to provide a service, performing all their lung function tests, conversations are currently taking place. To fulfil the above, we will also be looking to expand the workforce. An ultimate goal would be to gain IQIPS accreditation for the department


*The team receiving their award.*


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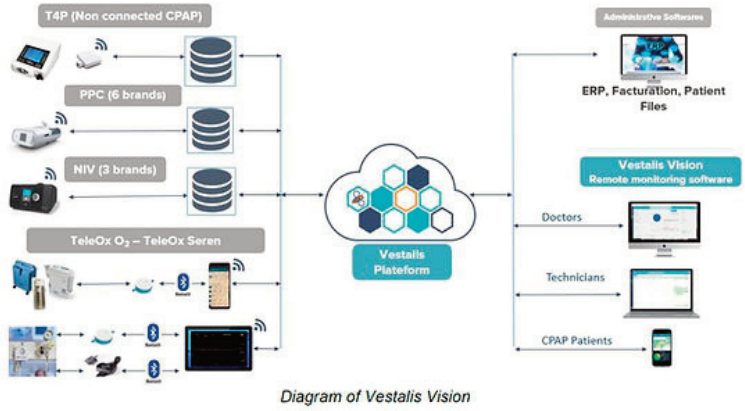
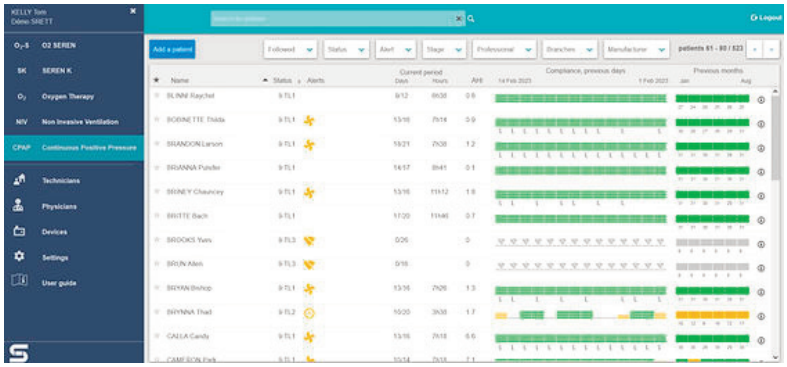



*Diagram of Vestalis Vision*



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TOP FORUM

# BEST OF THE ARTP FORUM

**Summarising the most popular ARTP Forum topics since the previous *INSPIRE*.**

## Title: Bronchodilator responsiveness (BDR) – when to test?

**Question**: A physiologist was keen to hear the forum's thoughts on whether to do BDR testing in patients who do not have airflow obstruction. Her SOP was not to do it, but this had raised questions from consultants as they had specifically asked for it to be performed.

**Replies**: This generated lots of discussion around BDR testing. There was mixture of replies with the majority noting that they would still do BDR even with a normal baseline. It also brought up some discussion around spirometry guidelines and whether we should be asking people to withhold their inhalers prior to testing. It was suggested that this would depend on the reason for testing: if it is part of a diagnostic question, we should test off inhalers; if it is follow-up and monitoring, then tests should be done with the patient taking their regular inhalers. One physiologist posted some interesting data from a quick audit of their testing showing that 6% of their patients with normal baseline spirometry and 28% with baseline obstruction showed significant BDR.

## Title: Provision of hypoxic challenge testing (HCT) in Wales

**Question**: A lead physiologist from Bristol asked if anyone knew if there was any service provision for HCT in Wales as he had received several emails from nurses in Wales asking for the test. He also wondered whether it was due to a Nitrogen shortage or other diagnostic tests were taking priority.

**Replies**: The consensus was that this was due to other diagnostic tests taking priority rather than an issue with supply of nitrogen. A representative of ARTP Wales replied to say it had been discussed at one of their meetings recently as very few health boards were offering the test. It had been offered privately in Cardiff, but this had been stopped. Cwm Taf Morgannwg University Health Board and some hospitals in North Wales are currently offering the test. One of our prominent ARTP members shared a link with a HCT map that he had developed for the UK but noted it may be out of date with respect to Wales – judging by some of the responses. The thread finished with the sharing of images of their nitrogen regulator that could be ordered to perform the test after someone had asked a question regarding this.

## Title: Quality control for PFT systems

**Question**: It was asked if outliers should be removed from physiological QC data if there had been a fault in the equipment at the time. The same person also asked what would be an acceptable level of agreement for residual volume between helium dilution and body plethysmography methods.

**Replies**: It was noted that the outliers should be removed from the data if there was a known fault. The same member also said that it wasn't appropriate to compare He dilution and body plethysmography as they were different technologies. One of our clinical specialists from industry also replied and put a link to the new ERS technical standard on static lung volumes. He noted that the new guideline suggests the use of monthly non-biological controls, like a body plethysmograph calibrator.

## Title: How long to wait before doing spirometry post-surgery

**Question**: It was asked if anyone had a comprehensive list of surgical procedures and recommended wait time prior to doing spirometry with angioplasty being mentioned specifically.

**Replies**: The author of the 2010 Thorax paper on contraindications pointed out that most contraindications to spirometry are relative and it's about weighing up the risk versus benefit. He noted that most surgeries would require a 4–6-week recovery period. However, for angioplasty it could be less as it is a fairly minimal procedure. He also finished by saying that further research is needed in this area.

## Title: Spirometry and upper airway obstruction

**Question**: It was asked if anyone knew of any interesting papers or had examples of where spirometry can be used as an early indicator of upper airway obstruction.

**Replies**: One of the manufacturers posted a response from Professor John Stradling. He noted that spirometry can be useful to diagnose upper airway obstruction by looking at the shape of the flow volume loop and he pointed towards the Empey index – FEV1(mls)/Peak Flow (L/min), which if it is over 10 then would be classed as significant. Another member posted two nice examples of results and flow volume loops from patients with an oesophageal tumour and an internal goitre. Finally, someone posted a link to a recent publication in the ERS journal 'Breathe' which is titled: Multidisciplinary management of inducible laryngeal obstruction and breathing pattern disorder.

## Title: Ethnic-specific reference values online calculator

**Question**: Someone's consultant had listened to a GLI podcast and had asked their physiologist if there were any online calculators available to generate ethnic-specific reference values.

**Replies**: It was pointed out that the GLI has published ethnic-specific reference ranges for spirometry only, and not for static lung volumes or transfer factor. There is a GLI online calculator on the ERS website which can be used, and link was provided to this. One of the GLI team pointed out that there had been a recent publication from the GLI which uses "race-neutral" reference values for spirometry and that the GLI is currently pursuing further data/equations for other key tests.


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