

## OSA Alliance Membership



### Coping strategies for a sleep and ventilation service for COVID and beyond

Link to recording : <https://www.sleepsociety.org.uk/osa-alliance-virtual-roundtable/>

#### Summary of Roundtable Discussion – 5th June 2020

Welcome to the OSA Alliance<sup>1</sup> virtual roundtable discussion.

*The event was introduced by co-chair Tim Quinnell, Consultant Respiratory and Sleep Disorders Physician, Royal Papworth Hospital, who provided an overview of the impact of COVID on sleep services and patient access.*

This discussion is about sharing experiences of how COVID has affected us and our patients, and how things are changing as a result.

*Co-chair Joerg Steier, Professor of Respiratory and Sleep Medicine, Guy's & St Thomas' NHS Foundation Trust introduced the first speaker, Martin Allen.*

Martin is consultant physician for respiratory services and lead in sleep services at the University Hospitals of the North Midlands NHS Trust, GIRFT and NHSEI, and he has been involved significantly with the BTS and ARTP.

#### **Martin Allen : Restoration of services, both in diagnostics and treatment, and what happens next.**

Pre-COVID we realise that sleep medicine was severely under-resourced and we have a huge backlog of patients, for both treatment and diagnostics. One of the major issues, as identified by our GIRFT visits, is staffing infrastructure. We need more resources to deliver what is a massive service, with a rising demand.

This was pre-COVID! The redeployment of specialist respiratory staff has added additional pressure and the backlog has grown massively as a result!

We normally do 8-12,000 sleep studies and diagnostic studies every month but these have stopped! So with a backlog already building, there is going to be difficulty in addressing this.

In addition, there is a need for a fast-tracked service for those who have a vigilance critical occupation, such as HGV drivers. GIRFT's work has highlighted that that this is not always possible, but it is a service that we should be able to offer on a national scale.

Now we are over the COVID peak, with admissions and deaths decreasing, the Government has decided we need to start restoring services. There will be documentation from PHE and NHSEI on how we do this. Looking at diagnostics first, we're going to need to provide a sleep study in the patient's home and to agree whether the kit is couriered to the patient, or collected by them (if this can be achieved safely). However, there is also the question of cleaning the kit, or potentially making some elements disposable, which needs to

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<sup>1</sup> OSA Alliance was formed in 2016 to work with the DVLA to review and revise the EU Directive wording on OSA to make it effective for patients and clinicians in the UK.

be decided. Options may be to consider using a third party and again making some equipment disposable. There is a lot to consider.

When it comes to doing a PSG there are questions around being in close proximity to a patient and cleaning the room afterwards. Moving onto restoration of treatment, there have been some encouraging signs of centres using virtual clinics, and a widespread move to remote and virtual monitoring of patients which look set to stay. Feedback suggests a good response from patients, many of whom are appreciative, and also find it more convenient not to have to travel.

When it comes to CPAP initiations, there is a considerable backlog so we need to work out how to restore this service. One option is to do a mask fit without turning on the machine and then guiding them through the initiation process remotely. It will be important to evaluate all options, or long-term adherence will fail.

The final area is CPAP follow-up where we have already made progress. Many organisations are doing some technology-enabled care through remote-monitoring and assessing compliance, adherence and mask leaks and then having a conversation with the patient. We're seeing previous Information Governance issues being resolved under COVID but we don't have enough CPAP machines with remote technology to enable a full remote service. There are lots of questions that remain, but discussions are being held at a senior level within Government to agree whether we buy additional equipment or adjust the tariff and redesign the services to ensure there is appropriate remuneration.

There are some positives coming out of these conversations, and technology-enabled care is being held up as a beacon of what we can do when pioneering practice is enabled.

So what of the future? COVID isn't going away so we need to work out how to deal with any surges. For example, how do we deal with HCWs who are believed to be asymptomatic and how do we prevent them passing the virus to patients? This is of particular concern for post-operative and cancer patients. There have been some trials in the North of England that indicate the patients who isolate for 14 days before surgery and test virus negative have been able to go ahead with surgery. But how many patients would be willing to do this and how practical is it?

We have anti-body tests that have 85-90% sensitivity and specificity but we don't know yet whether having antibodies actually protects.

What about a vaccine? There are over 50 clinical trials worldwide but we don't know when something will appear.

Finally, there is a national request for evidence of good practice (see embedded document in the appendix – your responses to this would be appreciated.). The Government needs this information to understand what changes need to be made and what works.

*Joerg introduced Brendan Cooper, Consultant Clinical Scientist at the University Hospitals Birmingham, President of the Academy for Healthcare Scientist and a long-standing chair and later president of the ARTP.*

### **Brendan Cooper, Information overload, Infection control, Innovation, Inspiration (summary)**

There are four 'i's which will be covered here. that are relevant to the discussion.

There is a lot of *information* around so ARTP has worked on accurate, clear and correct guidance (see link in appendix). These guidelines include moving from normal services to operating virtual clinics and remote monitoring. We had imagined that this kind of service in the future but COVID has been a catalyst to this change the way we practise.

*Infection control* has dictated what we've been able to do and what we're going to be able to do in the future. There are many services, including sleep and NIV, where certain activities are restricted by availability of PPE

and it is this infection control that is determining when we open up our outpatient departments, and how we run them. This raises many questions such as how do we manage the patient experience if it's in a non-vented environment and how do we keep patients safe if they come into the hospital?

We need to be *innovative* and work differently, partly because COVID is forcing us to do it but partly because we were heading down this route anyway. The days of people coming into hospital for a simple or complex diagnostic is limited. But it's important to consider that it's not about off-loading these services, but relocating them, and the staff responsible, to deliver the service in the community. One of the things that COVID has shown is that the NHS can adapt and that we can work together in a new way to deliver our services.

The final 'i' is the *inspirational* way that we've operated and repurposed how we and our teams work with patients. Adapting to using the phone or video conferencing has meant that many people have developed new skills. Our departments and the staff within it are thinking differently, as are our patients, whose expectations have been changed by pandemic. They seem to accept that they don't always have to come into hospital to get help. They can be informed by video links, YouTube, etc, even elderly patients for the most part. So we should encourage patients to use these different ways of interacting and getting information. We can send equipment out either ourselves by courier or a 'click and collect' service, or by working with manufacturers to deliver directly to patients.

So there has been a dramatic shift in the way that we provide our services now and in the future.

*Tim introduced the final talk from panellists Sophie West, Annabel Nickol and Sonya Craig, who lead the sleep and ventilation services in Newcastle, Oxford and Liverpool respectively.*

### **Sophie West, Annabel Nickol, Sonya Craig – Adapting services without compromising quality**

#### ***New patient assessment and sleep studies (Sophie) :***

Our team's experience has been that telephone consultations have been an efficient way to deal with many of our new patients and has avoided the need for them to come into the hospital. This doesn't work for everyone and sometimes we need to see a patient face-to-face, e.g. if they need an interpreter or are having difficulties. On a practical level, it means the patient has an appointment time and is in the right mindset for the conversation.

In terms of tools to assist the consultation, these will often be the same as those used in the sleep clinic. In Newcastle, we have a proforma to use and we find it is good to keep close to the face-to-face clinic structure. The cues are slightly different over the telephone but it's important to ensure that we're doing a full assessment and I believe that this should be carried out by a skilled sleep professional with experience and training. We've found it helpful to send out a questionnaire when booking the appointment and this helps the patient to focus on the conversation – this includes an ESS which we ask them to complete before the call to help make the process as smooth as possible. There is information which we can't measure or access in clinic, i.e. BMI, neck size, oximetry and blood tests. The patient may know their neck size from buying shirts, the GP's letter may include the BMI and the GP practice may also be able to do blood tests. If this isn't available at the time of the appointment, it should be flagged in the GP letter as we don't want to miss anything such as someone who might have thyroid dysfunction or abnormal venous bicarbonate levels.

In terms of prioritisation, we feel there are two groups i) sleep vocational drivers and ii) those at risk of hypercapnic respiratory failure, such as those patients with likely obesity hypoventilation syndrome.

Sleep studies : In our Trust we've been given access to couriers via our pharmacy courier service. We'll see how successful this is but it's operational in other areas. We've also used postal services for equipment like oximeters and Oxford has a drive-through service during lockdown (which obviously requires space and staff in PPE). You need very clear instructions for the patient doing a home sleep study (see appendix). We've also made full use of YouTube films for patient access (links to which are provided in the appendix)

The turnaround is slower and you'll ideally need extra kit. We've found that in those people where there is a high pre-test probability of OSA, (those with obesity, sleepiness and a classic history), oximetry is usually adequate so that multi-channel respiratory polygraphy can be saved for those patients for whom the diagnosis is in question.

Cleaning has already been discussed but we have disposable nasal components, use Clinell wipes for the hard bits and Actichlor for the banks.

Our rules in Newcastle on in-patients (which will vary by Trust) is the patient needs to self-isolate for two weeks before admission and then a swab 72 hours before the procedure. It's a big commitment but for those who need polysomnography, they need to commit to the process and we need to commit give these patients beds.

Bed limitations are probably common. Ours are limited and there is a prioritisation process which we're still working on but something to flag – if you have an alternative option, that may be preferable.

### ***Setting up CPAP as an outpatient (Annabel):***

Before COVID we were setting up 28 patients per week on CPAP, which included support from a nurse and a CSW to help with mask fit. This comprised a four patient group educational session, often including a friend or family member, followed by 1: 1 support to fit and try CPAP. During COVID this process was strictly a no-go and our numbers dropped to just six urgents. These involved one-to-one with the staff member wearing level 2 PPE. After an aerosol generating procedure, six air changes are required which, for us, means 60 minutes before the room can be used again. We've also undertaken a small number of drive-through CPAP set ups where the patients come to the car park to collect their CPAP in a non-contact process, then patient education materials (links provided in the appendix) are made available to help the patient set up the equipment at home.

So what are we going to do post peak? In Oxford, we have over 300 patients waiting for CPAP set-up and 390 patients waiting for a sleep study. It's a tremendous concern. What we are proposing is to bring in four patients at a time, who have already had their consultations by telephone. We'll seat them at a social distance with a staff member in level 1 PPE to run group education sessions, without the machine being switched on until the patients are safely back in their own homes. If we do this Monday to Thursday, three times each day and Friday and Saturday twice a day, we might have a chance of catching up! But it's impersonal and a huge strain on staff, plus this method is not yet tried and tested, which will be imperative before it is brought into standard clinical practice.

While we can probably get away with posting out CPAP with a video consultation, it's unlikely to work for NIV and cough assist where the patient is likely to need to work with a therapist whilst settings are titrated.

### ***Follow ups (Sonya):***

On a positive note, COVID has allowed us to review and to change our pathway at Aintree, something that we've wanted to do for a while.

Prior to COVID, our pathway was the standard face-to-face CPAP set up and a six-week compliance follow up (although this has been creeping up in the past 18 months). We had a backlog of over 2000 patients pre-COVID with an average wait time of a year for a first appointment. We've been trying to move to a more virtual pathway for a while but had some resistance to making the change.

During the COVID period, we've set up a telephone centre (using available staff and secretaries) to clear the backlog and by early June, we'd spoken to 1,163 patients who had been waiting for a follow-up appointment and we've triaged them on how well they feel they are getting on. It's important to mention that we have remote monitoring for all of our patients so that has made a difference.

Of those that we've called, about 23% feel they're doing well on CPAP and don't appear to have any issues with their ESS score or symptoms, and a third needed consumables (which highlighted that we need a more pro-active way of getting equipment to these patients).

We've now moved to a new pathway where patients will be called at 48 hours, a week and then six weeks.

The compliance for the first cohort on the new pathway is 58% vs 49% using the old method. The set-up is without the machine turned on for the mask fit but this doesn't seem to have had an impact on compliance, or how well the patients are doing. We'll continue with this new model moving forward and results from our call centre show that as long there is access to parts/new masks then compliance remains high.

Pre-COVID we undertook an assessment of 6317 AirView enabled devices, looking at data from 2015 for some of our older patients. This showed that 50% of patients are fully compliant by the end of week four and then remain fully compliant. It also showed that the non-compliant, stayed non-compliant and that there is a group in-between who seem to lose interest at around around 18-24 months. They start by not putting mask on during night, then number of days drops, then give up altogether. This may be impacted by old, poorly fitting masks which is why we feel that it is important to contact patients regularly and give them access to replacement masks and other items. We believe this last group, those who are trying but struggling, should be the focus of telephone calls and extra help, while the non-compliant patients are those that may benefit from a face-to-face appointment.

We feel this is a better pathway so I hope that this gives some reassurance that a remote monitored virtual pathway can work.

We have also been using a leaflet developed with our psychology team to help patients adjust to using a mask which we can share (see appendix).

### ***Measurement and evaluation (Annabel)***

It's important that we don't assume that remote consultations are equivalent but actually demonstrate that they work by evaluating the quality of new post-COVID methods vs traditional methods, and steering a path that combines the best of both for our patients. We have a short window to undertake this work so it is something that the OSA Alliance is moving forwards as a UK Service Evaluation, in partnership with the BTS.

## Questions and Answers from Roundtable Event (and participants comments)

### 1. Vicky Cooper, Principal Clinical Scientist, Salford

What is the general view regarding use of CPAP/NIV in inpatients with no clinical evidence of C-19 and negative swabs, particularly if lack of use is detrimental to recovery – what precautions, if any, should be used (ie treat as normal or acute circuit, side room and full PPE as per C-19 patients).

Moving forward what are the best strategies around mask fitting in an outpatient setting? Will it ever be safe to stick a mask on a patient in a clinic room and check it fits with the machine turned on (mask fit function) as we have always done without PPE and full IPC measures in the room – ie cleaning down room and 6xair changes before next patient. This would have a massive impact on our drop-in clinic which for a large majority is used for issues with mask fit. We may see 30 patients between 2 staff in 2.5 hours and 8-10 of these each would have involved a mask fit. Obviously, we cannot have drop-in in any case until social distancing is no longer needed due to having to restrict numbers in the waiting area.

**Response:** *The team has endeavoured to answer your questions in their talks. The ARTP Guidance also provides recommendations on fitting a CPAP mask. (Link to this paper in the appendix).*

What are the general views on machine servicing / face-to-face reviews. Are we generally happy to move to all remote reviews with telephone consultations year on year without at least seeing machines regularly to check they are being suitably maintained?

**Response:** *As Sonya discusses in her talk, services will need to adapt the patient, their compliance to treatment and circumstances. The post COVID pathway provides more options but the OSA Alliance believes that it is important to survey the new post COVID methods vs traditional methods early on in order to ensure that patient care isn't compromised. We plan to undertake a survey as a matter of urgency.*

To overcome the lack of modem issue, we have been sending out SAE and questionnaires and asking patients to send us their memory card, we send out a spare memory card to put back in their machine, we do a telephone call and then send out the new supplies. If patients have not sent back their cards/questionnaires we still call but don't send out supplies until we have received card (as an incentive to send it back). This is working reasonably well so far (we have done this since lock down so have not cancelled any annual review clinics). The contact rate is probably higher than our clinic attendance rate.

### 2. Dr Sandrine Launois-Rollinat, Centre du Sommeil CEREVES, Jean Jaures Hospital, Paris

I have a question for the panel: the French sleep society and the French respiratory have issued proposals for sleep medicine activities during the COVID pandemic, which I coordinated. We proposed, at the end of the lockdown in France in early May, to postpone in lab CPAP titration studies. As circulation of the virus is thankfully diminishing in our country, on what grounds could we lift this recommendation? IgG positive detection? Absence of symptoms for more than 48 hrs?

**Annabel response:** *It would not seem prudent to electively admit a patient to hospital for an aerosol generating intervention of several hours duration that could be effectively replaced by an alternative. My recommendation is to use the well tried and tested method of the Stradling algorithm to select the patient's optimal CPAP pressure (see slide from the West-Nickol-Craig presentation - attached).*

### 3. David Baker, The Rotherham NHS Foundation Trust

When initiating CPAP therapy with patients who have no symptoms of COVID-19 but may nevertheless be positive, what would you recommend is done in terms of 'turning the machine on' when fitting a CPAP mask? The procedure is classed as an AGP if the machine is turned on which would therefore require level 3 PPE and may require extra ventilation time for the room. However without 'turning the machine on' the patient may not know what to expect from the treatment and may be more likely to struggle with or even reject treatment.

**Response:** *Annabel discusses this in her talk and the ARTP Guidance also provides recommendations on fitting a CPAP mask. (Link to this paper in the appendix).*

### 4. Liverpool University Hospitals NHS Foundation Trust

Can the panel comment on the perioperative management of patients on CPAP? Can patients use their machines post op, in recovery, on the ward? And what is the case in areas like orthopaedics where patients maybe on a super clean ward with all staff and patients regularly swabbed etc? Despite the swabbing, our surgical team are suggesting not allowing patients to use their CPAP which raises concerns.

**Annabel response:** *COVID-19 is still at large in the community, and likely to be so over the next year. Many patients are asymptomatic carriers, and the false negative rate of testing is @30%. Therefore all patients using CPAP in hospital should be in a single room with the door closed, and switched to a circuit with a non-vented mask, then bacterial/ viral filter then expiratory port, as illustrated in the BTS guidance document. It is acknowledged that many of our hospitals have insufficient side-rooms, and it is essential that this risk is escalated to Hospital Trusts through their Governance process. It is essential the patient switches back to their usual circuit on discharge.*

### 5. Elise Buchan, The Royal Hospital. For Children, Queen Elizabeth University Hospitals, Glasgow

Does anyone do NIV establishments at home in Paediatrics? If so, is it working well? If not, any thoughts on how to establish younger patients in hospital given that we have to wear full PPE?

**Response BPSS:** There are a few that have attempted NIV establishments at home with mixed reviews. Video calls have been used to help with mask fits etc.

There is a 'play team' at the Royal Brompton who are help reduced anxiety with toys, talking and a lot of singing and have managed to establish a few very difficult and younger children on NIV with their help. The use of full PPE has not helped but in many cases, this has been overcome. The Brompton always aims for a 2-3 night hospital admission to establish NIV. Patients go into an isolated room to get their COVID swab, the ventilator is then only used if the swab comes back negative.

Does anyone have a way to retrieve data from the patient's home without having to physically return the monitoring devices? For example, if we establishing a patient at home and we wanted to see their sats and CO2 data after the 1st night, does anyone know of a way to do this?

**Response:** *there are cloud based systems available which allow you to access data remotely, e.g. ResMed. AirView.*

Our infection control team are happy for us to wipe down with detergent wipes then 70% alcohol wipes and said there's no need to wait before using again.

**Annabel response:** *I agree. Staff opening packages should do so on a clear wipeable surface, wearing gloves and a disposable apron. All soft fabric straps should be disposed or washed at high temperature (with prior agreement of the manufacturer and Trust). Hard surfaces should be wiped down, e.g. with Clinell wipes or equivalent, and moisture allowed to evaporate. The kit is then immediately ready for use. There is certainly no need to allow kit to sit idle for three days to passively decontaminate; most sleep*

services wouldn't have sufficient kit to do this, and this is not our practice for ward obs machines, phones or door handles.

*Response from Sue Watts - University Hospitals Coventry & Warwickshire have some excellent videos - I used their ideas for doing our own - if you google 'UHCW sleep videos' you should find them - but I'm sure there's loads out there now on YouTube. [Link provided in appendix]*

## **6. Chris Rogers**

Do patients who have had COVID have post infection immunity from their own antibodies?

**Response from Martin**, the answer I think simplistically is yes. The evidence behind it is quite limited. The best evidence is for places such as Korea and in China, where people were exposed to the virus and subsequently as lockdown has opened up, it appears that re-emergence of infection has not happened. There was a slight concern in Korea where fifty patients who had had coronavirus and got Covid were said to be re-infected, but that paper was subsequently withdrawn. So it looks, on the evidence, that if you've had it, you are probably immune. The difficulty is, those individuals who've known they've got it, had antibodies, would have to directly expose themselves to see if they are immune. And the problem we've got, and it's the same as any antibody, we have no idea about the duration of that. I would remind people that the coronavirus is the same as the common cold, we get lots of antibodies to the common cold and unfortunately, we continue to get the common cold. So we just don't know about the protective effect of these antibodies, and as I said, we don't even know whether it will mean that you do not get ill, but you then become a super-spreader. So there's a lot of information we don't know about the utility, and that is one thing that's been pursued as more people are given antibody tests, and the potential for these people to get COVID will allow us to answer some of those questions. And as you realise, this is a very rapidly moving field.

**Response from Joerg**: May I just add also my own experience that the course of events is of course you first contract the virus, some of the strains seem to replicate more in the pharyngeal area, some more in the lungs, so depending on where you take the sample from, sputum or pharyngeal swabs, you might, might not get positive tests at that stage. A journal article last week, actually says this error conversion from IgM and IgG is roughly around the same time within two to four weeks. But that doesn't indicate necessarily that the virus has cleared by then, particularly if there is pre-existing lung disease, some patients might not have cleared by the time of this error conversion of the virus and, and there are case series reported where actually people have the virus... the PCR is still positive for four weeks easily. So at what stage is this getting into the kind of phase where we say the patient has cleared the disease and is not infectious anymore and has got immunity? We do not know this all yet.

**Additional response from Martin**: Just to respond, of course as, as I've said, the difficulty we've got is, the PCR is very sensitive and it will continue to pick up viral particles for several days, up to 40 odd days subsequently. So I think the difficulty we've got is, is that recurrence of infection, is it continued infection, or is it just viral particles that are hanging around? And it seems a really simple question and a really simple answer, and we can't do it, and that's why we've got some variation in discussions about lockdown. When you've had it, you isolate for fourteen days, ten days, people are saying is it now five or seven days. And that unfortunately I think produces the confusion, because we don't have the evidence, despite what we're said to be following.

What about drugs to minimise the virus effect?

**Response from Panel**: Currently Remdesivir is the only drug licensed for COVID-19 but it only reduces the course of the disease. It does not prevent infection. It is, however, now available on the NHS.



As obesity is the main driver of the increase in demand for sleep apnoea treatment, is it not about time we made tackling obesity a campaign with the same resources and efforts as the "stop smoking" campaign, thereby reducing what can be for many, an avoidable affliction?

**Response from Annabel:** *I think tackling obesity we would say is a priority in healthcare. And resource needs to be put into that. And I think that really comes into a we mustn't compromise the service we're giving to people by having adapted to the remote one. And in my phone consultations this week I've been trying to assess people's obesity level over the phone, which is not ideal. And I think it does mean we will not be giving then the same information or access to information to lose weight that we were previously. So I think that is an area that could suffer. And it means we need to link in with the GPs and weight loss services more broadly. But this is an under-resourced area – obesity is increasing, absolutely it needs more work on it. But I'm concerned that will be pushed to one side for a while now because of Covid 19.*

**Joerg response:** *Following the pandemic lockdown and actually lifestyle changes, more sedentary work, less activity, less leaving the house will have further contributed to exactly that problem. And I completely agree with what has been said. Maybe similar to the action that was taken for smoking cessation, we need to come up with a strategy to tackle this more up front. It's very difficult to do, of course, and it's not an easy or quick success that can be promised. But that doesn't mean that it's not successful to address obesity and in the long term the outcomes are certainly beneficial, considering that high blood pressure, diabetes, potentially sleep apnoea is potentially reversible if you address the obesity problem.*

**Chris Rogers response:** *The SATA leaflet, Living with Your CPAP, answers to FAQs for those new to CPAP treatment is now being widely used and answers many of the questions covered in follow up today. It is free, sponsored by the ARTP and delivered directly to Sleep Clinics in boxes of 100.*

## **7. Claudia Maldonado**

How feasible is it to perform a PSG set up in a full PPE? It is such a delicate task.

**Adrian response:** *OK - so I have never done this in full PPE.*

*Is it delicate – I'm not so sure from the days when I used to do full PSG set-ups. The 10-20 system with limited electrode placements should be OK, OK parting hair can be a problem, rubbing the skin surface is not, placing the electrode – well possibly, gluing it – just fun and we used to use an air dryer to dry the glue. Around eyes, under the chin and behind the ears is probably easier. The rest should not be so delicate that it cannot be done in full PPE. I guess the only other issue is that it will depend on what type of facemask you are using. This may lead to communication issues if you are wearing a respiratory type system.*

*I have spoken to the two experts in our department who do PSG set-ups and they both use gloves as standard when setting up PSG's – this was before COVID-19 and see no obvious issues with wearing appropriate PPE. The one change we are in the process of trying to sort out is the calibration of the signals. In our lab the bedrooms are a few meters from the night office. We are setting up a 2-way intercom system to reduce the need for coming in and out of the bedroom and hence reduce the need for lots of PPE changes.*

*The important point here is about protection of the staff from close contact with the patient. The patient's "personal cloud" of aerosol generated particles varies from patient to patient. This cloud consists of obvious particles with some arbitrarily divided into small and large – total rubbish. It's the fine <5 um aerosol particles you need to think about as these are potentially way more of an issue than > 5um or > 10 um. Breathing normally and talking normally produce an observable cloud of exhaled particles distributed approximately log normally with no obvious two size modes from < 1um upwards. Language components also increase aerosol generation. Normally, under non-COVID-19 situations, this would not present any problems. As COVID-19 is a potent respirable virus and can easily be transported from viral laden small size aerosols, erring on the side of caution and protecting yourself is essential.*

## 8. Richard Komarasinha

What is the turnaround time for the sleep testing equipment?

**Response from Martin:** *I think this will vary because as we know, the virus will live, or is reproduceable on different surfaces at different times, so that's part of the difficulty we've got. We're generally saying that we started off isolating all of our equipment for a couple of weeks, and the reality is that's just not achievable. So when equipment comes in, we're wiping it down with appropriate virucide solutions as much as we can, and then we're isolating it for three days, before we are then attempting to consider it, posting out. I think if we are able to leave it longer, we will do, but as we start to get that turnover, we need to think about that minimum time.*

## 9. Adrian Williams

Martin- agree wholeheartedly virtual clinics work + no DNAs, and oximetry underused!  
But perhaps more home testing even near-PSG equivalent eg WatchPAT for some questions eg sleep state misperception, SWADs?

**Response from Martin:** *When we put the guidelines document together, we recognise that this is an evolving area, and I think, I did mention that we've got some equipment, such as the watch pack, which is disposable. So, I think the environment in which we work is changing and that may be one option. I'm slightly old fashioned, I've used oximetry for many years, and I think in a skilled individual who's used to interpreting it, there is a great utility for certainly identifying those at high risk who need to be seen. I guess if we start to go down the PSG route and for home PSG, then we do have problems about failure rate, and then we still need to look at the appropriate cleaning and sterilisation of the equipment afterwards. But our real pressure I think is around the number of people with sleep apnoea and those in the vigilance critical occupations that actually have got the issue, "Can I drive? Can I go back to work? Can I do all the appropriate things?" And that's really quite difficult I think to how we get those through the system.*

## 10. Ceri Sutherland

How are other services prioritising their backlog of patients?

**Response from Martin:** *Well we could spend the rest of the afternoon talking about how different specialities perceive that their backlog is more important than everybody else's. Where we are I think is a real difficulty, because many services are going back to, as I said, the fourteen days isolation. So we're starting to re-establish that, I think that is important because regrettably, if individuals are both peri- and post-operative who develop Covid, their outcome is really quite poor. So there is an increased morbidity and mortality of acquiring nosocomial Covid post-operatively. If we start to look at some of the other services, they are thinking along similar lines, but they aren't in such a worse position as ourselves, because their staff have not generally been deployed so much to front line. And as we said at the outset and it became highlighted, such a lot of our physiological staff have been supporting CPAP on the wards, and that's not been perhaps such an issue for other areas. There is a lot of work going on in the Royal College of Physicians and within the Department of Health around the restoration and the prioritisation of different areas. The final point I would make is, for respiratory medicine and to a certain extent cardiology, we have a real issue about how we reinstate radiography and this is true for CT scanning. And as we appreciate, I perhaps consider it as a double whammy, we've got a real difficulty about instituting respiratory physiology because of the AGP that that is, and we've got the problems about the dramatic reduction in CT scan capacity. So we have a backlog of patients, we have a whole cohort of post-Covid patients that need to be followed up, many of whom will need a CT scan, at the time our CT capacity is at best a third of what it was beforehand. But I think the NHS has got some real issues; we are trying to address those, there's issues about increasing the number of scanners and trying to put scanners in clean areas to enable that to happen, but this isn't an easy solution, and as we've said, in the light of endemic Covid, this is going to remain with us for several more months to years.*

We are prioritising sleepy professional drivers but it can be hard to pick up from sleep referral letters.

**Reply from the panel:** Agreed, that prioritisation is important.

**Reply from Julia Chapman-Brown**

*We use severity (AHI or equivalent), professional (vigilance including heavy machinery) and co-morbidities.*

Our Trust requires a QIA form to be submitted before restarting services and the Sleep service is not being prioritised. How do I encourage our managers to understand how important a Sleep service is?

**Sophie response:** *We had a similar scenario that we needed to complete forms if you want face-to-face encounters to happen. But by remodelling your service as a remote service, we really had a green light to carry on. And so, for us, that has been the solution, so I think we need to assess whether our remote clinic appointments, remote sleep studies going out, we're offering people an option of remote CPAP – it arrives in a box with instructions, versus face-to-face CPAP, and then remote follow up. Potentially there are some people we will never meet, and there are concerns about that, as you've highlighted, Joerg and Annabel, about the complexities that you don't pick up. But I think for some patients, maybe the working age population, or people with disabilities, that they can't get to hospital easily or they're at risk, they're shielding, that represents a really good option to stay away from hospital and have that access. So for us, by planning a remote service, we've got the green light very quickly. But it's much slower having approval for face-to-face. And you have to, certainly in our trust, you have to say that you'll be socially distanced, the room has to be cleaned between patients, so the numbers you can see in an afternoon are very different to the clinics we were doing beforehand. And I think, in terms of restarting, you probably just need to bite the bullet and get going with different strands, starting some phone clinics, starting some remote sleep studies and starting some remote/optional face-to-face CPAP.*

**Adrian Response:** *I just want to echo what Sophie said. We actually effectively have not done any face-to-face clinics. I've been doing all telephone clinics. We're about to go over to video conferencing clinics now we've got all the equipment. And in terms of NIV, I think we've done one or two set ups, where we dedicated a room specifically because we have poor ventilation, so it's not used for three hours afterwards. And that again has been no problems. But for NIV there are certainly a small number of patients absolutely who do need to come in and be set up. We've done remote CPAP set ups of the box as Sophie describes. And just to pick up on one other point that the three excellent speakers made – one of the things that we've done for years is to have an email address, which we encourage all our patients to use. So if they need new masks, they can email in. If they've got any question, we advise them that no question is stupid. And we do get a lot of email traffic in that way, which we can filter out; either the physiologists filter out or it comes up to the consultant practitioners to advise the physiologists on. And that actually has worked very, very well for the majority of patients.*

**Sonya Response:** *Just picking up from Adrian's last point. Yes, we do have an email address as well, but what we find is that if you leave it up to patients to decide when they need a new mask, they don't always realise that their mask is failing. And that seems to lead to poor compliance. I'm sure everyone else has better structure than we did, but that you do need that structured phone call asking, "How are you getting on? Any problems?" Actually asking about leaks. Because patients often struggle and do this kind of thing through the night. And you can see that on the remote monitoring that the multiple times of moving the mask or waking episodes, when they start to give up and it's usually about eighteen months, because they haven't actually asked for a new mask. So you would assume the patient would ask for a new mask, but they don't. They're not always proactive, so if you leave it up to patients to email, it doesn't work, as we've discovered. So I'm sure, as I say, other people have better follow up than we did, but we noticed that that really is a problem. But yes, in terms of restarting, we continued CPAP, urgent CPAP through the period and as Sophie's already said, just trying to make everything as remote as possible, basically seems to be the way forward.*

**Tim Response:** *I think there's so much about OSA diagnostically and treatment-wise that lends itself to remote follow up. And also, our instinct is to solve problems, compromise, accommodate, to try to make things work. And I think sometimes that can work against us. Certainly when we've been so ready to free*

*up space for others, and just get things to work, we go off the radar for management and so on, and we lose even more of our footprint in terms of face-to-face capacity. And I think it sort of feeds a perception that our patients, our condition and our need for face-to-face resources when we need them are not so great as others. So I think there is a risk there as well which we've got to be careful of. Certainly echo the thoughts of Joerg and Annabel about that face-to-face value. So there's still a balance to find, isn't there?*

Adrian – do you start on CPAP on the basis of oximetry alone?

**Adrian response:** *We have always primarily used Pulse Oximetry to direct our decision for CPAP. If we have a 3% diprate > 15 or > 30 then we have moderate and severe SBD and we recommend to patients they try CPAP. I also use the median SpO<sub>2</sub>, the % of the time < 90% (if > 30% then possibly OHS) and the Delta 12 index of > 0.6 to guide me.*

*If we have a patient whose 3% diprate is > 10/hr and they have clear-cut symptoms I would try CPAP as well in the upper mild group. Between 5 – 10, and with symptoms I'd currently try and undertake a semi-poly study in-lab to confirm. Anything < 5/hr then unless they have symptoms, I'd discharge. If they have symptoms then depending on the case history I'd probably proceed to a full poly and I'd be looking at PLMS etc. I do use the 6 bpm HR rate and if this is way higher than the 3% diprate, again I'd go for full poly then see what we get as this indicates unexplainable arousals.*

*We do not currently have home-based polygraphy but are looking to potential use more complex pulse oximetry to provide a better screening tool as the complex mathematical algorithms allow scoring of sleep, etc.*

*Finally, and importantly – we always undertake 2 nights of pulse oximetry and about 10% more patients have a positive response using 2 nights than just one.*

*We have worked like this since 1988, so have a wealth of experience in using this methodology and in my case I just have a really good gut for the patient's likelihood of having SBD.*

Thanks Sophie, we also remodelled as remote but the directorate lead has not submitted the QIA s and is questioning how we prioritise the patients we see. There is definitely a sense that Covid is being used to possibly reduce a service

Our directorate lead is not sleep trained and seems to be deciding which services are being prioritised to restart-tricky as it feels as if we need to justify our continued existence. We are now on block contracts so every incentive for Trust to reduce services to bare minimum as long as giving semblance of a service to CCG.

We work with the SWMS (specialist weight management service) who refer all their patients to us. We will now be asking all GP s to consider referring all SWMS referrals to sleep services as well as our pathway changes. This may highlight the issue more to GPs.

Adrian and others -could you make available your CPAP cleaning techniques both pre and post Covid?

**Adrian response:** Our Pre-COVID SOP for cleaning procedure for CPAP devices is included in the appendix.

*Post COVID we ensure machines are double bagged and quarantined for 5 days minimum prior to cleaning with Clinell wipes and then 70% alcohol wipes, with staff wearing gloves, apron and surgical masks.*

## **11. Lizzie Hill**

How do we trade off the immediate infection control benefits of disposable equipment against the environmental impact in the longer term?

**Sophie response:** *That's a really hard question to answer! Clearly we need to be aware of the increased environmental impact the use of single use plastic being used for infection control will have. Ideally*

*manufacturers could try and address this in their production methods with the least impactful materials but there presumably will be a consequence from this – it needs data collection to understand what and how much in order to address it.*

## **12. DWM Jones**

Given the backlog of patients for sleep diagnostics, have you changed the way you categorise respiratory sleep study urgency differently from pre-COVID times and do you initiate CPAP on patients without diagnostics in any particular groups eg HGV drivers?

**Adrian response:** *I do the majority of the triaging for our department, the only thing that I've learnt this week is that priests are classified as co-workers, key workers, and therefore should be classified as urgent. We, yeah, I didn't know that either. So we do categorise people who drive for a living and we certainly had some new people who have become van drivers so they can deliver food to people who we have put through as urgent cases. We have not set up anybody without screening oximetry, which we always do as standard in our department, we're still doing that, and we are still able to more or less turn people round in about a two week, to three-week period. We try to aim for two weeks ideally, it's got a little bit longer and that's not because the team can't cope, that's actually more about the postal services and the courier services. And I have to say, to some extent, patients thinking it was okay to keep hold of the diagnostic equipment and somehow trying to work out how we were going to be able to analyse it whilst they've still got it. So, there's been a few teething problems, but I think the only group of people that I've not classified as urgent is the odd airline pilot who is currently not working. Other than that we're setting up CPAP trials, we are sending equipment out, we have an excellent team of physiologists who are talking to the patients, talking them through the set ups. And we seem to be having, with our, our app related CPAP machines, generally great success except in those not very tech savvy patients that seem to be unable to understand the concept of Bluetooth. But I would say that's a small minority of patients.*

With even more reliance on remote CPAP monitoring now and in the future, how reliable/useful are CPAP machine calculated data (AHI etc) when measuring treatment efficacy especially in the presence of variable mask leak and different mask types (which ideally you would have optimised face to face pre-covid)? Is the data comparable to results from eg oximetry/watchPat?

**Joerg response:** *The flow derived algorithms are very helpful but do not measure directly the accurate AHI. There was an ATS task force on this topic a few years back and, if I remember correctly, the bottom line was that this is, yes, a ballpark number but still inaccurate. Technology is permanently improving and these data are helpful, but I would always prefer the physiological recording of a trace on the patient to determine either AHI or ODI over indirect measurements.*

**Tim response:** *There will be a range of views and practices, but we now use AHI download alone in new starters if they have no issues. While agree only ballpark and not as good as sleep study, if they indicate OSA control with satisfactory symptom response then we are arguably there. Exceptions include baseline overlap syndromes and anyone else with more complex issues.*

## **13. John O'Reilly**

Should we run a trial to evaluate efficacy of remote video/internet CPAP set up and compliance assessment, to support data (Isetta et al.) showing good results for AHI, leak and compliance outcomes?

**Brendan response:** *I think that from a pragmatic point of view, the technology seems to work. In the early days people were more obsessed about, "Oh if I use remote do I save staff time and work load ...?" Whereas where we've been now is, "Am I getting to see to my patient and keeping them on their treatment adequately?" And it's a much more light touch, because the danger is, you can end up using just as much time as you would on a face-to-face and I think we need to actually use it to cut things down, so we get through this huge backlog that Martin's mentioned, we really have to be light on our feet with this I think.*

Should we advise discontinuation of routine nebulizer use as it was not superior to MDI and spacer in the Cochrane review, and considered by some national guidelines (eg Canada) to be potentially aerosol generating, partly due to promoting cough? This risk was not excluded by the 2 papers on which WHO (and government) advice relies.

**Adrian response:** OK – you might guess this – its highly controversial.

*I am currently reviewing this precise topic for the COVID-19 ARTP group.*

*It depends on whose evidence you base your decision on and whether or not you include data from the aerosol literature. Tran states it is not considered an AGP. Others indicate it is. New South Wales (Australia) basically said you should not use nebulisers to treat asthmatics as they are probably an AGP. O'Neil et al (2017) indicates that nebulizers are AGP. New data from modelling indicates that it is highly likely to be an AGP. Thinking about it – the nebulizer produces an aerosol – this is not defined as an AGP as the person is not the aerosol generator – OK I can buy that. The patient breathes in aerosol from the nebulizer and then breathes the inhaled drug aerosol and their air out into the atmosphere. This exhaled air will include the inhaled drug aerosol and the exhaled aerosol from the patient's airway – this could potentially be significantly contaminated with virus laden aerosol and this will be transmitted to anyone in the vicinity. This is what you need to worry about. This aerosol generation from the human airways has been assessed using computational fluid-particle dynamics (CFPD) – basically clever mathematical modelling to look at particle sizes and particle size distribution. The aerosols exhaled are classified in some very recent literature as "fugitive emissions" and it is these emissions that are the problem. Is a nebuliser an AGP – probably if you look at the whole process and not just the device. My view is that it is an AGP based on the science and understanding the basic processes of respiration during normal resting breathing. Make it complicated by adding coughing and sneezing and the fact that some patients will be potentially super-emitters – its an AGP!*

*Yes of course you can replace a nebuliser with an MDI + spacer device. The argument depending on your infection control teams views on reusability of course is that nebulized drugs and disposable chambers are really cheap and an MDI + Spacer is more expensive. Even more expensive, just as good as MDI + spacer and more environmentally friendly is a DPI (see NICE 2019 on this precise topic!)*

#### **14. Maria Pickford**

Can I clarify where the advice re: the cleaning and isolation of the equipment? Our infection control has advised that a thorough clean with our hospital cleaner is sufficient and no isolation of equipment is required.

**Brendan response:** *I've done so much reading on epidemiology and infection control, I've kind of, think beginning to get a different picture of things, my understanding is that all the early evidence came out from PHE that, you know, on different materials it lasted for twenty, twenty hours, seventy-two hours, or whatever it was, stainless steel, plastics, and all those things. I think that, if we look at that in detail again, all that means is there is traces of the RNA of the virus there, not necessarily that it is actually going to infect people. And infection control people are always sort of... one of the, one of the reactions I got, and I got into a bit of a spat on social media with some, was, "Look you lung function and sleep people, you're getting all het up about this, why didn't you worry about this six months ago, six years ago, sixteen years ago, you know, it, just because it's this virus and we don't have a vaccine and any good medication, suddenly you've, you've changed your own antibodies to infection control and you're wanting to actually, you know, have all these barriers in place, when it may not be totally relevant... not relevant but, but required." But I think, as Martin said, you know, it's early days, we're learning about this virus, we're learning, you know, some viruses wipe out within ten, fifteen minutes. They've got these times for this now, but you know, who does the infectivity tests and actually check that if I go and touch that table, I get the virus if I scratch my eye or whatever. It's a tricky area.*

**Adrian response:** *No, I echo very much as to what Brendan says. I, I think that it is probably better, whilst we are still learning about what this virus is all about and what it can do to us, to marginally err on the side of caution. That's been my approach and I think that should be the approach that we should be taking.*

*Once we get more evidence that is sound scientific evidence, then we can begin to move forward. And I think it's getting that evidence so that we as a group of practitioners feel confident that what we are moving towards actually is safe, not only for our patients, but also for the staff that handle that equipment when it comes back from the patient. So, I err on the side of caution, but let's get the evidence.*

Can I ask what the software and app is called for the NIV?

*Reply from Carla Paradela, for ResMed machines is the same as CPAP. MyAir is the app – software is AirView.*

**15. Sue Watts**

Our IPC team are also happy with cleaning our equipment with hypochlorite solution as per manufacture guidelines and then re-use without quarantine - be careful using 70% alcohol as it can harden any flexible parts. We have also looked into using disposable wrist straps.

**16. Carla Paradela**

We are calling patients 72hrs before their appointment, we do a screen questionnaire and check their temperature on day of appointment.

**17. Slavka Chudovska**

Martin Allen-appreciate as you said we have the machines with remote modes - but licence to remotely monitor patients for free is very limited and runs off than the cost application is huge for each individual! - allowing monitoring patient only for short term unfortunately.

**18. Lee Radforth**

What is the rationale behind the 72 hour isolation of equipment? If an oximeter / home polygraphy equipment is wiped down with alcohol wipes, why can it not be re-issued that day?

**Annabel response:** *Infection control does not advocate quarantine of kit for passive decontamination.*

**19. Alex Perkins**

Hi Brendan - Do we need to reconsider the competencies for Sleep HCS practitioner/scientist trainees (and others) given the shift to telehealth models? (use of VC/phone/remote monitoring etc)?

**Adrian Response:** *I think the answer is that yes, that probably does need to be part of the process. The training that goes on with healthcare scientists in day to day practice, I think the centres that are doing things like Attend Anywhere, which we're about to move over to, so that may solve some of our visual issues, with not being able to see the larger patient. And how we manage this and the remote monitoring aspects of this – this will all come in to the routine day to day practice as we move forward. I think it can be part of the syllabus that is taught to the apprentices and to the STPs who are working in these fields as they develop their skills. That's more about hands-on than it is so much about the theory behind it. But I think it would be important to show the difference between what is an ideal face-to-face consultation and what happens with either Attend Anywhere or its equivalent or just telephone consultations. I think the downside... and it will be the same with medical students and junior doctors who don't come into clinics now because we're not doing face-to-face, we're going to have to find some clever ways of almost creating a fake patient by using perhaps the larger members of staff in hospitals, who may or may not be our patients anyway, and creating teaching videos. And I think that would... it's not the same – I totally accept that, but it's probably what we need to do over the coming months to the next year to two years.*

### **Alain Fildes**

Are services conducting overnight PSG, with patients on CPAP/NIV, swapping patient's usual mask/tubing combo for a non-vented, filtered version, potentially impacting patients comfort but reducing risk of excess viral spreading?

**Annabel response:** *there would need to be a very strong clinical indication for PSG on CPAP/ NIV in hospital whilst COVID is still at large in the community.*

### **20. James Oliver/Karen Lewis-Jones**

Very difficult when trust executive teams have a very different opinion about levels of PPE/AGP procedures. They do not agree with position statements from ARTP/ERS etc and therefore getting the required level of PPE is very difficult.

**Annabel response:** *It is essential the ARTP/ ERS stands united on this. We must keep our staff face, who have the potential to be exposed to AGPs day-in day-out.*

### **21. Sapphira Flavell**

We have a handful of patients on NIV and AirView has been a really great tool for checking their data and adjusting pressures etc. with telephone consultations.

### **22. Asad Khan**

One of the things we aren't able to pick up through remote consultation are the subset of patients who have grade 3 or 4 tonsils who may benefit from their removal if BMI<35 and those with mechanical nasal obstruction where its correction may improve CPAP compliance. Any thoughts?

**Sophie response:** *there have been a couple on other things we're not assessing remotely, which is tonsils, pharyngeal shape, jaw shape for which people would do better with mandibular advancement devices. And it's really just to highlight that I agree with those questions: thanks for bringing it up. We've made huge progress in recent times about recognising the importance of non-CPAP therapies for OSA, and we mustn't lose that ground we've made. And I think that's a key area that we should be just bearing in mind that we don't want to go back to a CPAP one-size-fits-all, when these other therapies may well be more suitable.*

### **23. John Stradling**

What do you think will happen when a patient on CPAP comes in acutely to hospital with a heart attack, for example, when they need CPAP?

**Annabel response:** *If the patient were admitted to Oxford and they needed cardiac intervention, they would be fantastically lucky, because the cardiologists have a wonderful, swanky, all-singing, all-dancing new building with single rooms. So it would be quite easy for this patient to be able to have their non-vented mask in hospital and the staff would need to use level 2 PPE if they attended the patient in the night. And that should be the standard of care wherever they are in the hospital. I think the difficulty is that if the patient is in an area which is the commonest set up for wards in the UK, they'd be in an open bay. And in this, with the current prevalence of COVID 19 in the community, we have to think that that puts patients at risk and that should not be the standard of care until the rates have gone right down.*



#### **24. Sue Watts**

Can I ask how you get over confidentiality issues with multiple patient set ups - do they have to consent to taking part?

**Annabel response:** *Thank you for raising this question. Patients have a 1: 1 confidential consultation with the doctor/ nurse practitioner, which traditionally would have been in a clinic room and now is by phone/ video. They then have a group educational session in which they are shown how to use CPAP, how to look after their kit, contact the centre/ get replacement parts and generic advice re safe driving. They do not need to reveal their names, or any personal clinical information in this session. The CPAP trial/ mask fit is once again a 1: 1 consultation with the nurse/ physiologist.*

#### **25. Alison McMillan**

Although considerable smaller service we are almost ready to start routine diagnostics as soon as next week. Referral service open throughout, we normally triage based on clinical criteria, all referrals vetted by a sleep consultant and allocated appropriate appointment. We continued to see urgent patient face to face with full PPE to initiate treatment. We moved all follow-up to telephone and virtual and use remote CPAP monitoring anyhow. We have started virtual consultant clinics, although interestingly my experience hasn't been as good with only a small number of patients able to use the virtual platform and then we have to resort to the telephone (auditing). Regarding routine diagnostic we have moved to a locker pick up system based at a "clean site." We standardly pre-covid asked all patients to complete a series of questionnaires ESS/RLS/HADS and standard proform. As of today referral back to normal levels.

Agree Sonia, when I looked at our compliance on Airview was surprised majority of patient excellence compliance by 15days and then there were outliers who you could spot from the beginning of treatment.

Agree with Annabel, would really like to look at compliance comparing "gold standard set up" with pick up machine and go.

#### **26. Cedri Roberts**

How are you finding the 'drive through'? And are you screening those at risk of hypercapnic respiratory failure for example performing capillary blood gases?

**Annabel response:** *Thank you for flagging this important question. If significant hypercapnia is likely from the referral, we would bring the patient up for a face-to-face appointment and do a capillary blood gas. If the patient is stable and not known to be hypercapnic, we'd do a sleep study in the usual way; mean sats in the mid to high 90s enable significant hypercapnia to be excluded; re-saturation to the mid to high 90s after each apnoea in OSA means that nocturnal hypoventilation should resolve with provision of CPAP. We plan to purchase a portable capillary blood gas machine so that we can offer our long-term NIV patients drive-through capillary blood gases.*

#### **27. Charlie Oulton**

Sonya, I loved your honest data. Non-compliant patients are always awkward. Would you prefer to outsource them to a specialist?

**Sonya response:** *I presume you mean a third party, or another company, I don't know. So obviously other companies can take over your, follow up your patients and take that burden away from your sleep lab. I think we prefer to follow up our own patients. I don't know what other centres do, but what we found is the physiologist who is doing the new pathway, found it really nice that she was phoning the patient that she had set up, rather than six weeks later getting patients in who she hadn't set up the CPAP. So you're speaking to the patient you had set up and following them through the pathway. Which just gave that*

*personal touch. And also feedback from the physiologists whether what they've done is a good set up and whether they chose the right mask. And in terms of training, I think that's really important for our physiologists that they're getting that feedback from the patient that you chose the right mask, got the right setting. Or, no actually it was far too low for me or whatever. So I think although we've got this backlog and we have this huge problem in sleep labs, I think it's nice that we're following up our own patients and getting that feedback. And for training purposes it's really important.*

## **28. Samantha Briscoe**

I have to say my hospital have been fantastic with PPE and are very happy to be led by our thoughts on PPE/AGPs and how to adapt services.

We've discussed disinfecting diagnostic oximetry/screening devices. What about CPAPs on trial in the patient's home for 2-3 weeks, how do we clean these?

**Adrian response:** *So what we have done is any CPAP machine, or indeed any NIV machine that comes back, is effectively quarantined for, I think it's five days before we will clean it. So there is a delay. We re-process CPAP machines normally, pre-COVID, we have an area which the machines are bagged, I think double bagged, held in for a period of about five days. Then they go into proper cleaning, as guided by our infection control team. And then they are re-released back into usage. And I don't think there's any issues in following that procedure. The five days allows for all the deterioration of the COVID on the various surfaces to probably have been cleared away.*

Adrian - do you use filters?

**Adrian response:** I'm not sure which filters you are referring to. The devices we use come with dust filters so we provide these. We do not normally provide pollen filters – there are the occasion patient who probably does need these.

If you are referring to bacterial filters placed between the device and the tube – absolutely not. I see absolutely no justification for this waste of money, it does not improve the lot of the patient and is not really there to reduce cross infection. If we were to follow our NIV team stance, they use yellow filters on humidified NIV systems (changed daily) and clear filters (changed weekly) on non-humidified systems. They have a total of about 750 NIV patients, and about 1/3<sup>rd</sup> have the yellow filters. If we had to undertake the same process as NIV we would need to find > £1,000,000 per annum to just provide this for our 10,000+ patients on CPAP, which includes about 3000 patients with heated humidification. There is no strong scientific evidence to support the filters and that they actually reduce the risk of chest infections etc in CPAP users.

## **29. Nicky Baker**

We are using Attend Anywhere video conferencing at Derriford hospital in Plymouth for sleep clinics which means you can still see the patient with the advantage that they are in their own home with their family. I think this will also be valuable for CPAP follow up appts. We also have telephone clinics.

## **30. Ian Stone**

Are the tele-clinics people are planning to employ mainly utilising telephone or video conferencing? The latter would be preferable especially in relation to considering the utility of MADs and would also allow assessment of ankle swelling etc.

**Annabel response:** *Agree, so long as the technology is workable by the clinician and patient (without having to spend too long helping the patient to work the video). It is ESSENTIAL we evaluate telephone and video consultations compared to traditional methods BEFORE they are brought into routine clinical practice.*

### 31. Biswajit Chakrabarti

Does the panel think there's a role for clinical decision support systems to help with patient assessment?

**Joerg response:** *If I have understood the question correctly, yes but I would add that we have this in place with the current operational mode. I guess that what is meant here, digital / AI support? Again, yes, this could be helpful, but, no, the decision-making process would be better guided by someone with experience - computers make yes/no decisions that typically have little to do with real life.*

### 32. Matthew Baker

Are other methods being explored to drive up patient compliance, such as user support groups, user provided Q+A vids (as non-compliant people might listen more to successful patients) or a moderated Reddit sub for UK CPAP?

**Annabel response:** *Support groups are very valuable. E.g. see the SATA leaflet 'living with my CPAP'.*

**Sonya response:** *we're using just a simple guide from a psychologist, clinical psychologist who was working with us. I'm sure other centres are using this already, but again, just how to get used to your CPAP. So it's just really how to get used to your CPAP masks, to improve adherence, just the usual guidance that we would say: put on when you're watching TV, that type of thing. Just a little bit of mindfulness and psychology behind it. So we have got that already available, if anyone wants to use that.*

### 33. Asia Woroszyl Chrusciel

How do we advise patient who had COVID and used PAP during this time to disinfect their equipment after they recover? Thanks

**Response:** *There are some guidelines on this in the ARTP document.*

### 34. Anonymous

Our infection control has advised us to not use any nasal cannulas due to the risk with our dx equipment so I think it's imperative that we're cautious.

**Annabel response:** *we will be continuing to use disposable nasal cannulae to evaluate nasal flow.*

### 35. Various

Reddit is an information sharing site with user forums. These can be used for users to share info, or to post information.

<https://www.reddit.com/subreddits/> - for education.

**Appendix : Reference links and additional info:**



27<sup>th</sup> May 2020

Dear NCDs/NSAs/Nursing leads/Medical leads/Chief Professional Officers/CRG  
Chairs and GIRFT clinical leads,

**Reference: Capturing clinical innovations**

COVID-19 has changed healthcare delivery in the UK and in response new and innovative ways of working have been rapidly developed across the NHS. As we move into the next phase of NHS recovery, NHSEI wants to ensure beneficial changes to care are captured and embedded in our services so that future patients benefit over the next 12 months and beyond. The first phase detailed below is the beginning of a process in which we will seek to support the sharing and implementation of positive changes and innovations over the remainder of 20/21.

We want to hear from clinicians across the country, so improvements and innovations to clinical pathways which have improved services can be identified and retained in the longer term. We also want any innovations to be subject to continual improvement, ongoing learning and evaluation.

We want to hear from clinicians, clinical leaders, Royal Colleges, professional bodies and other interested stakeholders over the next 4-5 weeks to identify, beneficial changes and innovations in a systematic way. This will directly inform both the light touch planning guidance coming out in June as well as longer term planning over the rest of the financial year. We would ask that you, in your roles, act as the route to reach these networks and bodies by cascading this link to the survey as soon as possible and encouraging people to participate:

<https://forms.office.com/Pages/ResponsePage.aspx?id=kp4VA8Zyl0umSq9Q55Ctv-zG7vHjmaZJg9s6K87uGnpUMIzVEhLTiY2VIZGU0RlV1BJQjZGMFZNUSQIQCN0PWcu>

The survey asks the following four questions:

1. What beneficial innovations/changes have occurred in your specialty and within patient pathways?
2. Please describe the impact of these innovations/ changes (e.g. population health outcome, patient outcome, safety, wider system, efficiency, productivity). How did you measure the benefit?

**ARTP Guide: Sleep Services During Endemic COVID-19**

<https://www.artp.org.uk/News/artp-guidance-respiratory-function-testing-and-sleep-services-during-endemic-covid-19>

**Patient Education Materials:**

Oxford patient education materials <https://oxpap.com/>

University Hospitals Coventry and Warwickshire  
<https://www.uhcv.nhs.uk/caring-for-you/coronavirus/advice/speciality-information/sleep-studies/>

Newcastle Upon Tyne Hospitals NHS Foundation Trust

YouTube links provided to patients:

Fitting and looking after your  
mask: <https://www.youtube.com/watch?v=3pMTNSxB6yE&list=PLKhWMRQA-UQjdTBDMTY9MNqjuys9hXXqF&index=5&t=0s>

Setting up and using your CPAP: <https://www.youtube.com/watch?v=gOGkJvSPhsM>

## CPAP letter for patients – Newcastle Upon Tyne Hospitals NHS Foundation Trust

Dear

Your CPAP machine and mask are being sent to you by Courier. Your machine is ready for you to use.

### **Instructions**

Written instructions are attached. The manuals for both your machine and mask will be included in your delivery. Alongside these to assist you in fitting your mask and additional information on your device / using this therapy please watch the short videos below:

Fitting and looking after your mask: <https://www.youtube.com/watch?v=3pMTNSxB6yE&list=PLKhWMRQA-UQjdTBDMTY9MNgjuys9hXXqF&index=5&t=0s>

Setting up and using your CPAP: <https://www.youtube.com/watch?v=gOGkVSPhsM>

### **Humidifier**

The humidifier attachment and climate line tubing shown in the second video is not included as standard for everyone at first. Although some patients may find CPAP dries the nose and mouth at first, many find an improvement in the first month of using CPAP without this. If there is persistent dryness after this causing discomfort or disturbed sleep then a humidifier may help.

### **Remote Monitoring**

Your CPAP machine is enabled for remote monitoring. This allows for evaluation of your CPAP treatment and changes to be made to your prescription if required. All data is stored by an external company (ResMed). ResMed have no access to your data but the Newcastle Hospital's Sleep Department can access this data at any time to support you in using this therapy. Your machine will need to be connected to the power supply for one hour after use to allow the transfer of this information. Unless you contact us we will assume that you are happy to consent to the use of remote monitoring. If you have any concerns or would like to discuss this with a member of staff please contact us using the email or telephone number below.

### **CPAP Review**

After you have used CPAP for a short period we will review your progress. This will be undertaken by telephone. We will assess your response to treatment and aim to resolve any difficulties. As part of this review we will ask you to complete the Epworth Sleepiness Questionnaire to reflect how you feel with CPAP. This can be accessed here: <https://www.blf.org.uk/support-for-you/obstructive-sleep-apnoea-osa/diagnosis/epworth-sleepiness-scale> Please complete on the day of your review based on how you feel using CPAP and give your clinician the score.

### **Advice and Support**

Advice and support with CPAP is available from our experienced Sleep Team by email [newcastle.sleep@nhs.net](mailto:newcastle.sleep@nhs.net) or telephoning 0191 2137780 (Monday to Thursday 08:30 – 17:00 and Friday 08:30-16:00).

Yours Sincerely

Newcastle Regional Sleep Team

## Liverpool University Hospitals Patient Guide



***Guide to getting used to using your CPAP machine at home***

***Handy hints and tips***

**Ensure that your mask is fitted well.**

- ☐ You may wish to use a mirror to start with.
- ☐ Hold the mask in place on your face with one hand and with the other place the straps behind your head.
- ☐ Secure the mask with the clips or magnets and then adjust the straps so that they fit snugly against your face.
- ☐ If you have a nasal mask remember to keep your mouth closed breathing in and out through your nose. If you have difficulty with this a chin strap can be provided.
- ☐ Ensure the mask fits without air leaking around the mask cushion.
- ☐ Try not to overtighten the straps as this can be uncomfortable; it can also cause marks and sore areas on your face.

**Desensitising strategies**

- ☐ Repetition is the key to becoming used to CPAP; practicing using it will help you to become more familiar with it.
- ☐ Be patient; try not to get discouraged if it does not feel comfortable initially.
- ☐ Try to breathe as normal as able slowly inhale and exhale, try counting to ten to distract the mind.
- ☐ Wear the machine whilst awake and use during free periods during the day. Try reading a book, watch TV or listen to music.



## Reference in response to question 2

Respiratory Medicine (2004) 98, 152–154



$$\begin{aligned} &\text{CPAP pressure in cmH}_2\text{O} \\ &= (0.048 \times 4\% \text{ ODI}) + (0.128 \times \text{neck size in cm}) + 0.21 \end{aligned}$$

# Relative accuracy of algorithm-based prescription of nasal CPAP in OSA

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### KEYWORDS

Nasal continuous positive airway pressure;  
Sleep apnea

**Summary Background:** Patients with OSA on nasal continuous positive airway pressure (CPAP) have considerable night-to-night variation in their pressure requirements, suggesting that a one-night titration might not be very precise. This study investigates the likely error incurred using a one-night titration, and explores whether an algorithm-based approach to determine the pressure is as accurate.

**Methods:** Thirty patients with OSA used an autotitrating CPAP device for 28 nights and the average was regarded as the 'reference' pressure for that patient. Using estimates of precision and bias, this 'reference' pressure was compared with (1) an algorithm-derived pressure (based on neck circumference and OSA severity), (2) a one-night titration (using four alternative nights), and (3) a fixed pressure of 10 cmH<sub>2</sub>O.

**Results:** The mean 'reference' pressure for the group was 9.83 (sd 2.12) cmH<sub>2</sub>O. There was little bias from any of the alternatives. However, the precision varied between 1.65 and 2.45 cmH<sub>2</sub>O for the four one-night titrations, was 2.00 for the algorithm, and was 2.12 using a fixed pressure of 10 cmH<sub>2</sub>O.

**Conclusions:** Considerable night-to-night variation means that a one-night titration is not very precise and is subject to random variation. A one-night titration has a similar inaccuracy to that resulting from using an algorithm, based on OSA severity and neck circumference. Setting all patients with OSA at 10 cmH<sub>2</sub>O is little worse.

Clinical Standard Operating Procedure (SOP)

## MACHINE CLEANING

**SETTING** Sleep Unit

**FOR STAFF** Sleep Unit staff

### STANDARD OPERATING PROCEDURE

- Transfer machines to the allocated cleaning area
- Wear plastic apron and gloves
- Remove data card, if not already removed (should have been removed and data downloaded beforehand).
- Remove filter and dispose in clinical waste bin.
- Using Clinell wipes, clean machine and bag thoroughly
- Masks are processed as per infection control protocol according to mask specific instructions

*If machines are broken and no longer under 2 year warranty:*

- Once cleaned, put them in the scrap machines box on the top shelf of the equipment

*If machines are broken and under 2 year warranty:*

- Write what the fault is on a piece of paper, attach it to the machine with an elastic band.
- Place the machine on top shelf in repair box.

*If machines can be re-used:*

- Clear memory: Go to Set-Up – Press both buttons down till it beeps – Info – Reset Data –  
- Press both buttons down till it beeps.
- Place a RED sticker on base of machine, being careful not to obscure the manufacturers information, to indicate that it is a 'used' machine and therefore should not be charged for.
- Pack the bag including CPAP machine with a clean filter, blank SD card, electrical cable and Transformer, tubing and one spare filter.
- Complete a green Clinell 'equipment clean' label to make the equipment compliant with infection control protocol. Attach to CPAP bag.
- Put re-usable machines in the CPAP store room, ready to be re-used.