**Podcast Episode 6, Season 1 2020**

**Inhalation effort and why inhaler choice matters in COPD**

Richard (00:04):

This podcast is intended for healthcare professionals outside of the United Kingdom and the United States of America only.

Richard (00:11):

Welcome to the Medical Insider COPD by Boehringer Ingelheim, a podcast offering a breath of fresh air to clinicians treating COPD across the globe. My name is Dr Richard Russell. I'm a Consultant Chest Physician at Lymington New Forest Hospital in the UK, a Senior Clinical Researcher at the University of Oxford, the Respiratory Lead for Southeast of England, and the Editor-in-Chief of the International Journal of COPD.

Richard (00:43):

Today, I'm your moderating host for this season of the Medical Insider COPD podcast. I'm here to bring you news and insights in COPD right from the very source to you. So thank you for joining us today and please make sure you look at our other podcasts to make sure you do not miss any of the exciting podcasts in this series.

Richard (01:03):

Today we're going to delve in a publication we believe is very much worth reading. This is entitled Environmental Sensitization and Poor Clinical Outcomes in COPD Due to Funguses. We're also looking at emerging exciting topic from social media, again, particularly focusing on COPD and COVID and what social media is saying.

Richard (01:23):

But first, I'm delighted to be able to introduce you today my friend and guest, Dr Omar Usmani, who's going to be with us today to discuss the topic of inhalers and inhaler usage in COPD. Welcome Omar.

Omar (01:34):

Hello, Richard. Thanks very much for the invitation to talk. I'm Omar Usmani. I'm a Reader at Imperial College London and a consultant physician at the Brompton Hospital. I've had a real interest in inhaler devices. I did my PhD around inhaler devices a few years ago, and currently I am chair of the UK Inhaler Group and also head of Assembly 5: asthma COPD at the European Respiratory Society.

Richard (02:00):

Brilliant, thank you very much, Omar. And I've been working with Omar for many, many years, and he saw that there was a huge need to develop this whole field. And I'm delighted. It's partly due to him that actually inhalers and the inhaler techniques that we need to check for patients is now front and centre in many of the guidelines which we use. So Omar, thank you for all of your work.

Richard (02:20):

Let's start off by talking about device characteristics and making the right choice of inhalers for patients. So Omar, what do you consider are the significant characteristics that we see in inhalers?

Omar (02:33):

Richard, that's a great question. And I think what I want just to say to all our listeners is the key point here is every day you and I write a prescription, and in that prescription, there are two components. There's the drug, and we're always taught about the drug, but we're never taught about the device. And we need to recognize the device is as important as the drug. There are two components in respiratory prescribing. And so that's a really key message that I want to get across to our listeners along the lines of think about the device when we have the patient in front of us, and we've got to choose the right device for the right patient.

Omar (03:08):

So you asked about characteristics, and I think we can divide them very simply into those that are from the device and those that are from the patient. So with the device, we've got to think about the velocity – the whoosh. How fast does the aerosol come out? Is it too fast? The duration. How long is the duration? The particle size. Are they the right particle size to actually get the drug throughout the whole airway, the larger and smaller airways? And you and I know we see patients every day who are hyper-inflated, who have large lung fields on their chest radiographs. These are patients who have small airways disease. So we need to think about treating the whole airways.

Omar (03:42):

And then we've got the patient factors. Are they able to generate the inspiratory flows required from some devices? And their ability to engage with the device as well. And I think, Richard, these are the key things that I would look at when I'm thinking about what are the important device and what are the important patient factors to consider.

Richard (04:00):

So let's break that down a little bit. Every device varies. Every device is a little bit different. Can you, and I'll ask you a similar thing for the question about the patients in a moment, but how can you assess a device and actually break those things down? How do you go about that?

Omar (04:17):

So I think we need to know a little bit about the devices, the same way we know about the classes of drug, LABA and LAMA and ICS. And we're taught that. We need to know about the basic components of a device. So I'm looking at a device and I'm trying to work out, first of all, how fast does the spray come out? And that's important, and it's important because it has a very practical clinical tip. If the spray is coming out too fast, the patient may not have enough time to capture the aerosol, and a lot of that drug may go into the throat.

Omar (04:45):

The second point about the device for me would be, well, what about the particle size or the fine particle fraction? What do we mean by that? We mean the amount of fine particles that will bypass the throat, get to the large airways, but also give the opportunity of the aerosolised drug to reach the small airways.

Omar (05:02):

So those are the two key things that I actually look at when I think about the device. The other thing that we need to think about is a device's internal resistance. So dry powder inhaler devices have an internal resistance that works together with the inspiratory flow of the patient. And in some devices, patients actually need a high inspiratory flow, and we sometimes measure that with a peak inspiratory flow. So we've got to get that right. A lot of our patients may have a fast respiratory rate or they may have weak lung muscles. And we've actually got to choose the right device for our patient sitting in front of us in the clinic.

Richard (05:36):

Okay. Let's talk about patients, patient factors. You've mentioned the factors already. How should we consider those? And is there a way we can assess those for our patients?

Omar (05:45):

Yes, there is, and we did an algorithm in the UK. And for all of us, we're busy professionals, nurses, physiotherapists, pharmacists, clinicians, primary, secondary care. All for groups of people involved in inhaler management, we made an algorithm where in one minute you can work out which is the right device for your patient. So we have the patient in front of us and we ask them, "Can you inhale slowly, gently, comfortably, naturally, and deeply for four to five seconds? And if you can, then we'll think about giving you a soft mist inhaler or a metered-dose inhaler with a spacer." In contrast, if you have a patient and we ask them, "Can you suck deep and hard and inhale forcefully and quickly for three to five seconds?" Then if they're able to do that and we can see their neck muscles are tense, their intercostal muscles are tense, and their diaphragm rises for at least three seconds, that means that they have the energy in their lung muscles to engage with a dry powder inhaler device. And they will often use the dry powder inhaler device in that situation.

Richard (06:49):

And the other thing you very much mentioned, and something is where our patients get older, particularly with people with COPD. There may be issues with cognition and also with dexterity. How is the best way to assess that?

Omar (07:01):

So there are training tools that we can have in terms of the devices can come with adapters to actually help patients twist them or turn them. So certainly, we've got to think about that. We have patients who may not be able to actuate a meter dose inhaler, for example. So using a valve hole chamber or a spacer device may be helpful in that situation. And you're right. Cognition is important as well, and we need to train carers or parents as well in terms of how their family uses the device.

Richard (07:38):

You've mentioned a couple of times already in crossing over between the internal device resistance and the need for a patient to be able to generate an inspiratory flow. The inspiratory effort is absolutely critical for some devices. Could you explain how devices differ and which devices need high inspiratory flow and which devices need low inspiratory flow?

Omar (07:58):

Yeah. We need to make sure that our patients are able to generate sufficient inspiratory flow, Richard. Actually, and if I just go off track here, John Pritchard wrote a really nice article this year. And he actually said dry powder inhaler devices, to quote, "are contra-indicated in the very young, the very old, and the very ill” because they do not generate the inspiratory effort that's required in these situations, the necessary flows to be able to activate a dry powder inhaler device. So that's a really important point that we need to be cognizant of, that the very young, very old, and very ill may not be able to generate the inspiratory flows.

Omar (08:36):

And the point that I would make, Richard, is I've just developed this terminology over the last year or two. A soft mist inhaler is a device or a metered-dose inhaler, they're wet aerosols. They are devices where the device does all the work. All the patient needs to do is inhale gently, comfortably, slowly, naturally, and deeply for five seconds. In contrast, with a dry powder inhaler device, the patient needs to do the work to activate the device to get therapeutic effect. They need to go *– Omar inhales* *–* hard, fast, and quick in order to break the powder up in that device and get it into the lungs. So we need to know that our patients can generate sufficient inspiratory flows.

Omar (09:22):

And then you asked about the differences in the devices. It’s the same way that we learn the science of pharmacology, we need to know the science of the device in a very pragmatic way that's applicable to our patients. So there are dry powder inhaler devices that actually have a range of resistances, low, medium, and high, and they require different air flows. So we actually need to know for this dry powder inhaler device what is the optimal inspiratory effort and flow rate combination I need from my patient in order for them to be able to activate that device?

Omar (09:56):

So actually, when I change a patient from one dry powder inhaler device to another, I actually need to know the combination of inspiratory flow and flow rate for the new device. It may be quite different from the old dry powder inhaler device, and the patient may not get benefit. No matter how fantastic the drug is and blockbuster it is, the patient's just not going to be able to get it into their lungs if they have suboptimal flow and they're engaging with that dry powder inhaler device incorrectly.

Richard (10:26):

So Omar, how common is this problem with inadequate suboptimal inspiratory flow? Both I think in the chronic situation with COPD, but also please address it when people have exacerbations, when they have attacks.

Omar (10:40):

So there's been a lot of research coming out in the last couple of years. So there's really nice work by Richard Costello, and what he did was he actually put an electronic monitor onto a dry powder inhaler device. And then the patients were using their dry powder inhaler device in the community, and there were a variety of errors. It comes back to your point. There is no ideal device, but the number one error that he found with nearly 50%, it was about 48%, I think from recollection, was a low peak inspiratory flow of less than 35 litres per minute. So it was sub-optimal in order to be able to actually engage with that device. And actually, if you look at outpatients, and you're talking about chronic here, outpatients and inpatients and the prevalence of sub-optimal inspiratory effort, well, it actually ranges between a third to a half in a variety of studies that have now actually given us this information.

Omar (11:34):

So in the acute situation, Richard, when you and I are on the wards, we are faced with somebody who's got a high respiratory rate, who might have a viral exacerbation, who may have comorbidities. We spend three or four days trying to stabilize them, and then at the point of discharge, what do we do? We give them a device where actually their weakened lungs, already weakened by the viral exacerbation or whatever brought them in for the acute exacerbation hospital, their weakened lungs actually have to generate the energy to get active therapeutic benefit when we discharge them home. So I always actually now do a check on the peak inspiratory flow at the point of discharge to make sure that I've paired the patient up with the right inhaler. And if I feel that they're achieving suboptimal inspiratory effort, which by and large, they do, Richard, then what I do is I give them a device where the device does all the work, and then I'll review them again in four to six weeks' time when they're more stable and then decide on whether that device is the right device for them.

Richard (12:40):

And let's be practical for a moment. How do we do that assessment? How do you make that assessment of ability to provide an adequate inspiratory flow for a work needing device?

Omar (12:52):

Yeah, really important point, Richard. Visibly, if we can ask our patients, "Can you inhale forcefully and deeply for three to five seconds?" and you and I can see the changes in their accessory muscles of respiration and primary muscle of respiration, and they can hold their breath for that period of time, and the reason I stress that is it's not just about the inspiratory flow, but you need adequate inhaled volume to be able to get those broken up drug dry particles past the throat into the lungs. So you can do that and you can see if they've got the tensing of the muscles as I described, and then you can decide on whether you give them a powdered aerosol or a wet aerosol.

Richard (13:34):

So the patient has got to be able to practically use the inhaler, actually trigger it, they've got to have the coordination of their breath to actually take it at the right time. And then they've also got to be able to use the right force in breathing, whether it's a light, gentle force or a strong force to actually get the dose, then, into their lungs in the right place. It's not easy, is it?

Omar (13:54):

No, it isn't, Richard, but when you see it in practice, you see it in our patients, then one gets it. And one gets it why the patient may actually not be improving when they've got a really great pharmacologically acting drug, because they may not be able to generate the flows.

Richard (14:15):

So it's absolutely critical that we at every opportunity reinforce the correct technique for the patient, whether it's in the acute moment, in a chronic moment, in the clinic, wherever we are, I'm sure.

Omar (14:25):

Do you know, Richard, I'm going to say yes to that. And then obviously you expect me to say that, and I'd be biased, but Richard, it's not hard. Once we've got it, we've got the four or five things that we need to look. We need to just be the detectives. We're detectives every day when we're trying to work out what the problem with the breathlessness is, what the comorbidity is, the diagnosis of our respiratory patient. We just need to have those four or five key things to think about and be a detective when we're working out, "Is this the right inhaler for the patient? Why is my patient not benefiting? Is it because I actually got them on the wrong inhaler device?" The device is as important as the drug in my respiratory prescription and management of that patient.

Richard (15:02):

I think that's a fantastic way of putting it, framing it, being a detective about the device as much as the drug thing. That's great. Let's talk for one second about small airways and small particles. You mentioned distribution of particle size already. Is that important?

Omar (15:19):

Yes, it is, Richard. So clinically you and I see patients. They're hyper-inflated. They've got small areas damage. We see that on the chest radiograph. We see it on the CT scans that we do. We can see the link between the two. And we know from all the research that's been done on COPD it's a disease of small airways and also large. It's a disease of the whole airway tree. So, we actually need to get our drugs to treat the whole airway tree in order to actually get benefit for our patients. And how do we do that? Well, one way you said was particle size. Another way is to look at the fine particle fraction, the amount of drug that's in particles less than five microns. They will reach the deep lung. And also, the flow, the inhalation flow. The slower the aerosol velocity, the more the opportunity for that drug aerosol to actually get past the throat into the large airways and then also have the opportunity to be delivered to the distal small airways.

Richard (16:15):

Finally, we are becoming very aware of the environmental impact of what we do. And we obviously were aware of the issues with chlorofluorocarbons before, but actually now also in making inhalers, the plastic, the metal, all these things. Can you unpack a little bit of that for us?

Omar (16:31):

Yeah, I think we've just got to look at the whole picture here. So, we have the propellant and we have its effect certainly on the ozone layer. We have plastics and the plastics' effect on marine life and on the coral reef, and that's disappearing in front of our eyes, and many places now are banning plastic bags and straws. You and I see that and hear that every day. But we also have the opportunity to have propellant free devices and they are available to us to be able to prescribe, and they are environmentally friendly. So, we have an opportunity now to engage with our patients in a manner that will also help the environment by choosing the appropriate device.

Richard (17:19):

Brilliant. Thank you, Omar. So, let's finish this little section before I come on to the publication and the hot topic on social media. Give me your top tips for assessing, getting the right patient at the right time to use the right device.

Omar (17:35):

Okay. If we just all remember that the inhaler device is as important as the drug and the prescribing, I think that would be fantastic. If we can actually visualize that a wet aerosol, a soft mist inhaler, a metered-dose inhaler is where the device does all the work. All the patient needs to do is inhale gently, slowly, comfortably, naturally for four to five seconds. And I think the third key point here is to realize that actually we need to be cognizant of the inspiratory manoeuvre that is required to be able to activate a dry powder inhaler device, where the patient's lung muscles need to do the work to get therapeutic benefit.

Richard (18:14):

Omar, that's been really helpful and enlightening and reinforcing for me. Your expertise is wonderful. Thank you so much for unpacking that for us.

Omar (18:24):

Thank you very much, Richard.

Richard (18:30):

Before I move on to the social media hot topic, which is COVID and COPD: an update, I want to unpack for you briefly an interesting paper that's been published in European Respiratory Journal, 2020, volume 56, issue two. This work has been performed by a team from Singapore, Malaysia, and Hong Kong by Pei Yee Tiew and colleagues. It's entitled Environmental Fungal Sensitization Is Associated with Poor Clinical Outcomes In COPD. The question they wanted to ask was “does fungal sensitization particularly matter in COPD?” Because it clearly matters in asthma and in bronchiectasis. They took 446 patients with COPD, 51 normals, and compared them by looking at blood allergen panels as well as air sampling in their homes and in the streets outside where they live over several days. They analysed the air by looking with meta genomics to look for the actual allergens themselves.

Richard (19:25):

So what did they find? Well, a fungal sensitization is extremely common in COPD, with 56% of patients sensitized for fungus, 51% for house dust mite. Multi-variate analysis showed clearly that increased aspergillus sensitization was related to a doubling of risk of being a frequent exacerbator, moderate to severe exacerbations, at least two in the year prior to study. And they defined three clusters, a high cluster with high levels of sensitization and aspergillus, a low cluster with no evidence of very much, and a medium cluster with medium sensitization. The high cluster was strongly associated with having increased numbers of symptoms and also risk of exacerbation. This was not associated with blood eosinophils or the presence of ABPA. Looking at the fungal allergens in the air, there was a particular association with high levels of fungus and the exacerbation risk.

Richard (20:17):

So what does this mean? Well, maybe we can intervene in people's environment, in their home, but we more importantly need to look at other intervention, maybe antifungals, maybe anti-inflammatories, and other things which can intervene to actually reduce the risk of exacerbation as associated with high levels of fungal allergen sensitization and exposure. So, this is an area which you should watch and watch closely, because I think it will be an area of further research interests and also potential for treating our patients.

Richard (20:52):

So finally, today for our podcast, I'm going to unpack for you what is going on in the world of social media and COPD. Well, as you might guess, the hot topic is COVID. So, let me unpack a couple of areas for you. One of the things people are worried about is masks. Should they wear masks? And actually, there are issues on the pro side and on the con side. People are worried about constriction, about choice, and even wondering if they work. On the pro side, people think they're very effective and also sometimes think they look pretty good. People are also saying, "Do you know what? Wearing a mask show that we actually care. Wearing a mask to show we care about each other and they're taking care of ourselves and taking this serious."

Richard (21:29):

What about vulnerability? Do people with COPD feel vulnerable? Yes, that's what they're saying on social media. They have worries about what would happen to them if they do get COVID. But interestingly, people are definitely saying it's less than other chronic diseases, which is actually quite helpful, but they're certainly worried and sometimes scared. And also, on social media, people are talking about COPD and the silver linings that may come from COVID. The increase in flu vaccination, the increase in washing our hands, wearing masks, and also social distancing is leading to a reduction in the current winter flus that people are seeing, which is a good thing for our patients. Patients feel more involved sometimes in their care through remote working, and there has been a reduction in exacerbation rates throughout the whole of this period. But the downside. People with COPD are feeling isolated and deconditioned, and that's coming through in social media as well.

Richard (22:19):

So, we need to be aware for our patients and what we're saying to them. Be sensitive to them and listen to them but be excited about the potential for delivering care in new and different ways, but particularly involving them in that care.

Richard (22:33):

So, I hope you've enjoyed this episode of Medical Insider COPD podcast. I've really enjoyed sharing this with you, bringing you the highlights from social media, COVID and COPD. Talking about an important paper, the role of aspergillus sensitization in COPD. And of course, thank you to my special guest today, Dr Omar Usmani who unpacked the role of inhalers and inhaler devices, and how we use them in COPD. Remember, the device itself is as important as the drug. We need to give it significant attention. Please look out for future podcasts in the New Year.