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Diane: Hello, I am Dr Diane Cottle, a clinical editor at BMJ Learning. Welcome to the first of a series of five modules on common problems in childhood. In this first episode, we discuss conditions related to the respiratory tract. Here to talk to us is Doctor Ian Wacogne, consultant in general paediatrics at Birmingham Children’s Hospital, and Deputy Editor of the journal 'Archives of Disease and Childhood'.

Hello Ian, thanks for joining us.

Ian: Hello.

Diane: So to start off with, let’s talk about cough and wheeze. How would you approach children who present with cough and wheeze?
Ian: I think I would probably just start by thinking of cough and wheeze as being divided as upper respiratory tract problems and lower respiratory tract problems, and also in terms of bacterial or viral infections.

Diane: So can we differentiate between the different noises that children make?

Ian: There are lots of different words we use about things when we are describing respiratory tract problems, and I think they are worth dividing up. I think everybody knows what a cough is; paroxysmal cough is like a seizure of coughs. The child is obviously not having a seizure, but it is literally being stuck in a cycle of coughs. So the child will go cough, cough, cough, cough, cough, cough, cough, cough (breath), cough, cough, cough, cough.

So that is an important help in making a diagnosis of the aetiology, the underlying cause of that cough. I think it is just worth also differentiating between wheeze, so wheeze is something that comes from your lower respiratory tract. That is something that I find quite difficult to do an impression of, because I haven’t got control over my lower respiratory tract, I can’t tighten that on demand. Stridor by comparison is a sound in your upper respiratory tract, so you can do an impression of that with your vocal chords, so you can go “Upph, Urrgh.” That is inspiratory and expiratory stridor.

Then stertor is… I won’t do that on mic because it sounds rather disgusting, but basically if you have ever shared a room with someone who snores you will know what stertor sounds like. It is a snorting sound from the upper respiratory tract.
Diane: So what are the common causes of cough and wheeze?

Ian: That is quite a broad section. So I guess if you were seeing a very small child, then certainly at the time of year we are recording this, we are just about to go into autumn, the main cause of cough and wheeze in a 3 month old child would be something like bronchiolitis, which is a coryzal illness with respiratory difficulties, difficulties feeding and apneas, wheezing, crackles etc, etc.

At any age you can have a pneumonia, obviously there are a variety of different presentations with that. So that would be fever, generally a cough, also potentially chest pain, and usually more focal findings when you examine the child.

There are things like whooping cough, or pertussis, things like croup which is an inflammation of the upper airway, as I was explaining earlier. We can talk about acute asthma, and viral induced wheeze, they are all on this sort of spectrum with the bronchiolitis, but generally if you present with an acute wheeze, secondary to a respiratory infection above one and a half years old you would probably call that viral induced wheeze rather than calling it bronchiolitis.

Diane: So let’s take a look at a case example: a 3 year old child presents with a three day history of coryzal symptoms, cough and wheeze. What would be your approach to this child?

Ian: What I am mostly trying to work out is whether this child has got sepsis or not, respiratory sepsis. So that is the difference
between having bacteria and viruses. So on that basis, I am looking to see whether they look unwell: is this child hot, are they very short of breath, do they look like they have shut down? Do they look like they are really going for it, fighting an infection, or are they just full of snot? Anybody who has worked with children for more than about five minutes will be familiar with the candles coming from the nose, a child with lots of coryza, watery eyes etc. etc.

So that would be my first thing, is to try and figure if that is going on. I think to stick with the division I made earlier, I am expecting that this is going to be either upper or lower respiratory as well. So I would be looking at whether this child has got features that they’ve got a problem in their lower respiratory tract or their upper respiratory tract.

Diane: So if this child was 3 weeks old?

Ian: If they are three weeks old, then I would be thinking much more along the lines of has this child either got a serious pneumonia, or again depending on the time of year, much more likely to have something like a bronchiolitis, a virus infection like a bronchiolitis.

Diane: Okay, so on examination, what are the things that GPs should be specifically looking for assessing these children?

Ian: Mostly it is around the features of respiratory distress. So basically it is around, is the child coping with what is going on? So it’s around features of respiratory distress. For example, a
neonate who is very distressed will have the features… For example, they will have recession, so that can be intercostal recession, subcostal recession, sternal recession. They might have a tracheal tug, and that is because children are more rubbery. Their chests are softer, so they tend to change shape when you create a negative pressure inside their chest. That makes their breathing a little bit more inefficient.

Signs of a severe distress might include grunting, or a colour change. So for example, babies who are really working hard, and for example pause breathing, have an apnea that is a problem. Obviously if they are looking blue, then that is obviously a severe problem. When I was assessing that child, I would be interested in just general signs of their good or ill health. So for example do they look toxic? Do they look terribly hot?

So for example, a child who is very hot, temperature above 38.5 is unlikely to have a bronchiolitis, they have probably got some sort of super added infection. I would be interested in things that would tell me that that child had something outside of the norm. So, for example, if I could hear focal findings, which personally I find quite difficult to detect on a very small chest because you’ve got a big diaphragm to your stethoscope, you hear nearly the entire chest. But if I could hear something very different on the left side than the right side, that would concern me. I would think about needing to image and manage that child further.

It is also important to sort of get a feel for the context of the child, so presumably one has taken a careful history at this point, and one should know if the child has got congenital heart disease, or some sort of congenital lung disease. But you might, when you examine the child, the penny might only just drop that that is happening. So I think working out what is going on there as well.
Diane: So after you have assessed the child, what investigations if any should you be thinking about doing?

Ian: Well in primary care, hardly any. So most of these illnesses are self limiting illnesses, or illnesses that will limit if you regard that the child is toxic and has a bacterial pneumonia then you might want to treat with antibiotics. But, you wouldn’t ordinarily need to do any blood tests, and you wouldn’t ordinarily need to do any chest x rays. In fact, in hospital medicine and during the bronchiolitis epidemic, I spend most of my time giving junior doctors a hard time for doing investigations unnecessarily on children with bronchiolitis. Basically it is about supportive therapy, not doing unnecessary investigations and starting unnecessary therapies.

Diane: So what are the general principles of managing children with cough and wheeze?

Ian: So I think the general principles are an accurate assessment, and not basing your assessment on what you found with your investigations. So again back into secondary care, it is easy to diagnose a pneumonia after you have done an x ray. But actually, if you are concerned about the child has got a pneumonia, you may have to make the decision that they looking toxic; you think they have got a bacterial infection. Therefore you are going to start them on antibiotics and use the chest x ray as a supportive investigation to diagnose their pneumonia. You don’t use it as an investigation to make the diagnosis in the first place.
So obviously safety first, careful assessment of the child, and then careful safety netting if you decide that you are not going to do anything. So for example if you have got a child who you have assessed with bronchiolitis, and you have said, “Yes your child has got bronchiolitis, but they are feeding okay and they don’t seem to be in too much respiratory distress.” You could say, “But it is day two of the illness, it usually gets worse over the first four days. So if your baby gets worse, then under those circumstances do this. The things to look out for are poor feeding, or colour change, those sorts of things.”

Okay, so people get quite hung up on the difference between asthma and viral induced wheeze, and the point is that in actual clinical practice, probably one evolves into the other. So if I were to see a 15 months old, I am much more likely to describe a child who is having viral induced wheeze. Then if I am seeing a three year old who has multiple episodes of wheeze, I would probably describe that as asthma. Now the questions are really about I think in primary care, about when to use steroids. By which I would imagine we mean when to use a dose of oral steroids like prednisolone.

The short answer is you don’t. So, there is good, randomised controlled trial evidence that in the context of viral induced wheeze, or asthma, the use of acute steroids orally is not necessary. With regard to the use of inhalers, this is very well covered by the British Thoracic Society guidelines. I think all the listeners would be familiar with the step up and step down techniques. The things that a lot of people do which probably isn’t necessary is increasing and decreasing the dose of the inhaled steroids around the time of acute respiratory infections. That is almost certainly not necessary, given that the steroids take a week or two to work into the system. So almost by
definition, the respiratory infection will be over by the time the steroids have kicked in.

Just a couple of words about the management of bronchiolitis, and there is a lot of questions about whether you give inhalers, especially in primary care, and especially to the under 1s, which of course would define children with bronchiolitis. I wouldn’t diagnose a child as over 1 as having bronchiolitis. The long and the short of it is that there are masses of evidence that show that it doesn’t make any particular difference.

So there are good Cochrane reviews on the use of inhaled steroids, the use of inhaled bronchodilators, the use of oral steroids - pretty much anything that you care to look at, there is no good evidence that is makes any difference.

There are some trials and some meta-analyses that suggest that perhaps nebulised hypertonic saline might have a positive affect. But that is in the context usually of office paediatrics in North America, rather than in the context of the sort of medicine that perhaps we would be practicing in the UK. So the long and the short of it is that you shouldn’t use inhalers in children with bronchiolitis.

Diane: Okay, so moving onto another case example. A mother brings in her 5 year old daughter, and she says she was apparently well with early signs of a cold. She awoke in the middle of the night with a barking cough, what would you be suspecting here?

Ian: Okay, so in 2012 in the UK the diagnosis is croup. So stridor is a sound from the upper respiratory tract, and the barking cough is absolutely classic. So if you wander through and emergency department at the right time of night, or a ward where a child has
been admitted, you can tell that there is a child in there with croup. Because you think there is a seal been brought into the department, there is an, “Arph, Arph” sort of noise.

Anybody who has been around children for a period of time will be able to recognise that sound. Obviously the importance historically, and outside of the UK, is making sure the difference between that and other acute causes of stridor. The other acute causes of stridor are things like epiglottitis, acute epiglottitis, which is an absolute medical emergency. Then other things that are obstructing the upper airway, so things like bacterial tracheitis, or a foreign body, or things like that.

Now there could be children who look a good deal sicker than a child who has simply stridor secondary to their croup. That is not to say the children who have croup can’t get really sick, it is to say that they tend to look more well. To pardon the pun, children with croup, usually the bark is worse than the bite.

Diane: Is there anything that GPs should be looking for in the history?

Ian: There is the obvious stuff, like for example history of a foreign object. So a child comes with an acute history of stridor, and they were chewing some Lego beforehand, that obviously implies a story of a foreign body. But I think the important thing to emphasise is the emergency nature of an acute epiglottitis presentation. So if you have a toxic child in front of you who has stridor, then that is an emergency and we need to do something about it. You don’t look down the throat, you don’t do anything to the child. In fact, you do what you can to not distress the child, and it is one of those situations where you have to be as calm as possible, while you are desperately worried about the child.
Certainly in a hospital setting, if I thought I had a child with an acute epiglottitis I would be phoning an anaesthetist and an END surgeon, because I am worried that I am going to lose that airway in the next few minutes.

So let’s presume that we are not in a situation with acute epiglottitis, because of course that makes me nervous as a paediatrician, I don’t want to give you advice about poking around a child who is in that situation. So in terms of the history, usually it is a relatively sudden onset. These are children that might have had a minor coryzal illness, if they go to bed and they do wake up precisely with the situation that you described, with this barking cough in the middle of the night. The family bring them into the emergency department or to primary care, and there really isn’t usually anything else in the history.

Obviously the important thing is if there is an important past medical history, which might suggest somewhat chronic aetiology to their stridor. So, for example, if they are an ex pre-term baby, and they had a lot of ventilation, then you might be thinking of other abnormalities like a laryngeal web or stenosis, or some other abnormality. But other than that, there is not a great deal more in the history. Then on the examination, you are really interested in how the child is coping with their problem.

A lot of the textbooks go into the difference between inspiratory and expiratory stridor. My personal practice would be that if there is inspiratory and expiratory stridor, it is the summation of the both that worries you, and if they have just got a bit of inspiratory stridor and a bit of expiratory stridor then that is less of a problem.

The main thing to emphasise about this…So I don’t want to give you too vivid an image, but if you imagine that a stridor is like being pressed on the neck, not quite as unpleasant, but it is a
limitation of breathing like that, and it is terrifying. It terrifies the child and it terrifies the family. So what you have to do is, if you are one of these people who can only examine a child on a couch from the left, exactly like we were taught in medical school, then you are going to make the situation worse. The main thing is to keep everybody calm, so that the baby can breathe more calmly through the airway that they have got, because they have got some tightness of their airway, then that is the main and important thing.

Diane: So apart from situations where you think the child has acute epiglottitis, when should you be referring children to hospital with stridor?

Ian: I think definitely with bi-phasic stridor, meaning both on the in and the out. When the child looks like they really have got a large amount of work for the stridor. So for example they have got intercostal recession, subcostal recession. So you would have a look at their chest and see if they are really bending their chest whilst moving. Obviously if there has been any colour change, obviously what you need to think is that if the child is going blue with a stridor, then that is the equivalent of going blue whilst being strangled. It is not the same as being blue having lost one of your lungs, like in asthma or pneumonia; it is a very significant situation.

Diane: So how do we manage children with stridor?
Ian: So as I was saying it is about calm, especially if the child is distressed. There is a lot of old wives’ tales, folklore about using steam, steam baths and the like. The long and the short of it is it makes no difference. The management of croup has been much improved by the use of dexamethasone, which is equivalent to using nebulized budesonide. I don’t know if this is widely given in primary care, but I would imagine that it is completely safe and reasonable to give in primary care.

It may wear off over the next 12 or 24 hours, in which case, for example if we were discharging a child home from an emergency department, we might consider giving a second dose for that to happen, for that circumstance. So if the child begins to have significant stridor. The important thing is to give good safety netting advice. So, for example, I would be very interested in having a child in hospital if they have got stridor at rest, certainly if they have got biphasic stridor, meaning both in inspiratory and expiratory stridor. If they have just got a barking cough which sounds horrible but actually between the coughs they are fine, I don’t think they need to be in hospital.

Certainly, if you do a saturation, if you have that available to you. If you did saturations on a child with croup, you get a good trace and they are desaturating, then that is a very urgent situation and they need to be in hospital.

Diane: Okay, so we have been focusing on children with cough and wheeze and upper respiratory track symptoms. What about the child who presents with a fever, with no respiratory symptoms, what would be your general approach in that situation?
Ian: Well fever takes us in quite a different direction, and there is some very good NICE guidance on feverish illness in children, and that focuses a lot on how you would approach a child with a fever in the absence of any specific symptoms that tell you precisely what the aetiology of that fever is. I actually find it is very helpful guidance; it gives you a number of red flag signs and it gives you a quite easy red, amber, green approach to how to assess that child and how to escalate your concerns.

The aetiology of fever in a child is an entire textbook of paediatrics, so it would range from anything, from something pretty benign like upper respiratory tract infection that we have been talking about, all the way through to meningo coxemia, all the way through to the chorionic fevers. These, along with the longstanding fevers like tuberculosis or Kawasaki disease, are obviously simply massively outside the scope of what we have got to talk about today.

Diane: So what are the most common causes of fever in children?

Ian: I guess numerically the most common cause is virus infections. So there is a whole bunch of non-specific virus infections. I seem to spend most of my time recovering from some sort of upper respiratory tract infection or another. Very common ones that you would see in primary care would be things like tonsillitis, or otitis media. There are the other varieties, by which I would mean chickenpox and others.

Obviously we see a lot less of measles and rubella in the immunisation age, although there is a resurgence of measles at the moment. There is a lot of the seasonal stuff around flu, which obviously has been covered a lot. Then there is the more
bacterial end of the spectrum, so there are things like urinary tract infection, pneumonia, and significant blood infections like sepsis and meningitis. Then there are the non-infectious causes of fever. So things like after having had an immunisation, or sometimes after surgery.

We would also think about the causes of longstanding fever, or fever that comes and goes over days, weeks, months. So things like deep-seated infections, secondary to abscesses, secondary to infections of the joints, or aseptic arthritis infections of the bone, or osteomyelitis. I feel like I am reeling off a textbook list, but it really is like that, and you wouldn’t think of all of those in the first time that you assessed someone with fever.

Diane: So let’s take a look at a typical case scenario. A 4 year old boy arrives at the surgery and his mum is worried because he has had a fever on and off for the past few days. What would you be asking about in history?

Ian: I would want a few more clues, so I would really just be taking a general history of what is actually going on. Do we really know that he has got a fever, is this just mum’s perception that he has a temperature, or is it actually he genuinely has a fever? Although, parents are pretty good in that they can tell you that their child has been hot; I think we are past the age where we insist that all parents have a mercury thermometer in their house.

I would be interested in other symptoms, like has he got some earache, has he got some cough, has he got any abdominal symptoms, and urinary symptoms, has he got any muscular
skeletal symptoms? It is kind of like: do everything, think everything, and then narrow it down.

Diane: So you mentioned asking about abdominal symptoms, respiratory symptoms, what are you looking for specifically in the examination?

Ian: When I was a very young doctor, I had a quite simple classification of trying to decide whether a child was well or unwell, not unwell, or somewhere in the middle. What is quite interesting is BMJ has just published a paper that talks about that aspect of gut feeling about children in a number of Belgian doctors, in a number of patient interactions. It shows that of all the things that we do clinically, our gut feeling about children probably trumps all of the tests and investigations and other examination findings. It is whether you actually think the child is unwell.

So I place a lot of store by, “The child is unwell, and therefore I now need to look a lot harder for what is going on.” The child comes into the room and is wrecking the place and smiling and laughing, then obviously I am much more relaxed.

During further examination, obviously I am going to be looking for the cause of the temperature, so I am going to be looking for features of meningism, which I hope would be fairly obvious. If I began to look at the child, I would be looking for how they are generally interacting with me, and then I would do a full cardiovascular, respiratory, and abdominal examination.

Areas that I have a slight blind spot for, I would do a little bit more. So have a proper look at the genitals in boys, and a proper examination of the joints, make sure there is good, full
movement of the joints. But we are sort of down to the small print there, by the time I have got there, hopefully I have got what the cause of the fever is. So I think the other thing is to be really proficient in being able to use an otoscope, you have got to be able to look in the ears of distressed children. It is a skill that you can’t get too good at.

Diane: So we spoke about investigations in children with respiratory symptoms, that rarely you need to do them, but in children with fever, without any respiratory symptoms, what investigations should GPs be doing?

Ian: In primary care almost none I would have said. I am sorry if that sounds arrogant, it is not intended to, but I think that there is a real risk of non-helpful investigations. In fact, potentially counter productive. So say for example you see a child who has got an upper respiratory tract infection and you decide that you are going to do a full blood count and an ESR and a CRP, the ESR is going to be 30, and the CRP is going to be 30, and then what are you going to do? You are going to have to re-bleed the to say that the ear cell has gone back to normal, or are you going to say, “Well Mrs Baggins, it turns out that was abnormal, but I am pretty sure it is normal now.”

So actually in primary care, almost none. If you have got a very small child, or if you have got a suspicion, then you might consider collecting some urine, and dipping that urine to see if they have anything that would suggest a urinary tract infection. But on that basis, I think you have got to be quite careful that you collect the urine well, i.e. not the old fashioned bag collections or cotton wool buds in a nappy.
Diane: So how would you manage acute fever in children?

Ian: Well, primarily it is about making the diagnosis about what the aetiology is, and deciding whether or not you are going to start oral antibiotics or intravenous antibiotics, or whether you determine that you are pretty sure that it is a virus aetiology and you are going to allow it to run its course. I think the other issue about this is management or control of the fever itself. Certainly in the past, a lot of emphasis has been placed on cooling measures, which are pretty old fashioned now.

So, for example, I used to be taught that you would do tepid sponging, and you would strip the child off and you would put a fan on them and so on and so forth. But actually there is good Cochrane evidence that those are no good, and in fact potentially positively harmful. If you imagine for example the last time you had flu, and I gave you two options, you can be stripped down and put under a fan with cold sponges over you, or you can curl up under your duvet, I know which one you are going to choose. Therefore I think it is pretty unkind if we put that child under a fan.

There is also no evidence that it really alters the course of the illness. So for example, obviously when you are assessing the child you are going to ask whether the parents have given an antipyretic in the preceding few hours. But, that is not necessarily going to abolish a serious fever; it is not going to fog your diagnosis if you have meningo coxemia, it is not going to stop you making that diagnosis. But it is also not necessarily going to stop the thing that most parents are worried about, which is a febrile compulsion. Again, good randomised control
trial evidence that you probably can’t prevent a febrile compulsion.

Most parents will want to give their child an antipyretic, and that is fine, I have absolutely no problem with that, as long as it is done sensibly along with the standard dosing regime. But I think the important thing is that we don’t give the impression to parents that they are bad parents. If they perceive that they could have got the antipyretic in sooner, and then therefore prevented their child going on and getting febrile compulsion.

So we have talked about temperatures, and use of antipyretics, the trouble is that you can’t infer the aetiology of a temperature from its response to the antipyretics. So if you have a child who has got a very serious bacterial infection, their temperature is just as likely or just as unlikely to come down with an antipyretic as a child with a fairly trivial virus infection. What you won’t do with the antipyretic is treat the underlying condition. So if you give an antipyretic, and the temperature comes down, and the child still has bacterial meningitis, then that child is still going to be sick, they are just not going to be hot and sick.

So the message is, it is absolutely reasonable to use antipyretics, it won’t distort your diagnosis. The best thing to do is to be kind to the child, and you can treat with antipyretics, but you shouldn’t take any specific reassurance from the temperature coming down after treatment with an antipyretic. You should actually take reassurance from the fact that the child is potentially a bit better.

Diane: Any final comments or tips on the care of children with respiratory tract symptoms and or fever?
Ian: Well I think my three bottom lines would be number one: trust your gut. So once you have seen a few children, if you think that a child is sick, then they are sick and you need to do something about it. There is good evidence that that is helpful now. Number two is around the treatment of high temperatures. Sure we can treat them, and parents will want to treat them, but we shouldn’t make people feel bad for the things that happen, even if we have treated them. The third thing would be around the difference between virus infections versus bacterial infections, and upper versus lower respiratory tract infections. The important message is if it is an upper respiratory tract restriction of your airway, then that is potentially life threatening, it is a bit like somebody strangling you.

Diane: Many thanks to Dr Ian Wacogne, for other episodes in this series, and further useful resources, follow the links on the next page.

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