



Webinar transcript: Asthma—Key messages people need to hear

Presented by Dr. Ben Francisco. Recorded January 17, 2018. This document was last updated January 29, 2018. Please contact the Montana Asthma Control Program at asthmainfo@mt.gov for more information.

Dr. Ben Francisco: Our expert guidelines remind us that at every asthma encounter we should be delivering key messages, and yet I found through the years that we're not so great at keeping track of which messages have been delivered. So, as we go through these slides I think the background thought is how do people with asthma get this information today? Are we delivering it in a clinic visit, or does this happen with one on one asthma education in some setting? I think there's implications for our electronic medical records; do we have a dashboard where we have evidence that on a certain date we delivered a certain message? To kind of finish that thought, here in Missouri we're working to videotape these key messages, which are on average less than two minutes, and videotape real clinicians delivering these messages to real patients with a mix of clinicians doing that and a mix of patients, so that maybe we can move towards standardizing this. Then it will be easier to have a dashboard and know that a patient has only heard four out of twenty key messages or whatever. But anyway, it's an administrative challenge behind the content challenge.

So, if I'm a person that has been diagnosed with asthma, what do I really need to know, what are the messages I really need to hear, that's been the background question for us today. Earlier I had Dr. Tammy Rood, who is a pediatric nurse practitioner and certified asthma educator and a lead trainer for schools here in Missouri, and also Dr. Jessica Lubring, who's a pediatric resident with her eye on becoming a pulmonologist and has a special interest in asthma, they are doing a research project with us. The three of us, we went through these messages, made some changes, added some messages, and so this is kind of an iterative process. We don't have it all together, but we think if you bring together people who are passionate about asthma, passionate about education, that we could do this really well and it can be a standardized approach that folks would benefit from.

So, we kind of want to start in the beginning. People are born with a risk of developing asthma. That may be a small risk or a high risk, but perhaps as many as 30 to 35 percent of people have a genetic trait that would lend towards the development of asthma, and some of those people seem to have multiple genetic traits that put them at higher risk. But, clearly it takes environmental exposures to decide whether someone's actually going to become sick, and quotes meaning that someone would recognize that they actually have asthma. So, that's pretty important because it means that I could have the genetics for a lot of asthma but never express it, or I could have the genetics for a little bit of asthma and have a terrible environmental exposure path, sort of the perfect storm of all the wrong things, and the rate would be high. So, we look across the world and there are places like Australia where the rate of asthma is as high as 30 or 35%, and there are places where the rate of asthma is quite low, maybe 2 or 3%. So, it really does emphasize importance of these environmental exposures. The message is that viral infections and airborne irritants, as well as allergens, directly impact the airway, and they can turn



on the genetic risk for inflammation. These changes occur over months or years but are often only recognized when breathing problems begin to interfere with daily activities. Foods, physical activity, and emotions clearly influence this expression of asthma.

You must measure airflow to know how much asthma is limiting your breathing, like you would check blood sugar or A1C to assess diabetes or blood pressure to assess hypertension. You really have to assess breathing, and unfortunately, we don't have great techniques today in clinical practice for young children less than five years of age. Those are on the horizon, there's at least a half dozen different methods, which are not better than spirometry, but that may allow us earlier assessment of airflow patterns so that we can more accurately diagnose asthma in the very young child. Spirometry just means really airflow measurement. We typically think of spirometry as the big test that costs a lot of money and requires some skill to interpret, and for that particular test the expert guidelines, National Heart Lung and Blood Institute guidelines for managing asthma which I'm going to just call EPR-3, expert panel report number three that came out in 2007, recommends that spirometry be obtained every one to two years.

Lots of folks have been diagnosed with asthma and have never had the test or it's been many years, and that's kind of a frightening thought. What we need to know is that spirometry doesn't always involve the full test with all of its various measures, that we can also do what's called "spirometry light" which is where we're measuring airflow but we're not getting all of those numbers using that more complicated and complete test that has come to be known as spirometry. So, at every encounter we should assess airflow. We have wonderful handheld devices to do that, I should tell you that I'm not funded by a device company, I'm not funded by pharmaceutical companies, I don't intend to talk about off-label use of any of these things, so I don't have any disclosures to tell you. But, I have a strong belief, and many people around the country agree, that we have not been as diligent at objective measure of airflow as we should and that's a problem that we can fix. It would be like trying to treat diabetes but not keeping up with blood sugar or A1C.

So, there's been some confusion around peak flow meters. Are they useful or not? The answer to that is if you have abnormal airflow, if your peak flow is abnormal, there's clearly benefit of doing so. When we document that a person has been to the emergency room or been admitted with very low lung numbers, then a home peak flow meter makes sense. People with mild or moderate disease, peak flow is often, isn't sensitive to—it's not going to pick up changes would be like measuring urine sugar on the diabetic, so it's not sensitive enough for the sort of fine-tuning of control that we're interested in.

The most effective medications for asthma are in a family of medicines called inhaled corticosteroids and we're going to shorten that just say ICS. ICS closely resemble naturally occurring hormones called glucocorticoid steroids. When inhaled deeply into the lungs, ICS suppress inflammation and they allow healing of the lungs. It's interesting when you use that word, healing of the lungs, some people are a little taken aback, but I think it's a great way to describe what has to happen when we're treating chronic inflammation of the airways. So, when I say healing of the lungs, I mean that cilia that were lost regrow, that eosinophils that have come in large numbers from the bloodstream into the airways go



away, and that the build-up of chemicals like histamine, leukotrienes, bradykinin, and other things actually goes down, so that buildup is reversed. All of those things are associated with inflammation.

This slide is one of our favorite slides. We've duplicated it and we use it as a teaching point in clinic and schools and lots of places, and I think many of you probably have seen it. It was published first in the Journal of Allergy and Clinical Immunology many years ago. On the right is a normal cross section of the epithelium, and on the top of that right-hand image you see cilia, that's that sort of fuzzy surface. An amazing, wonderful thing about our lungs is that cilia propel this contiguous mucus blanket up and out of the airways. That mucus blanket is a trap for things that don't belong in our lungs and that includes viruses, allergens, irritants, so it's like an escalator slowly moving mucus and all the debris up and out of the lungs. In a sense, it's our first line of defense. Below the cilia you see some tall, what we call columnar cells, and beneath that is it says BM on the slide, that's the basement membrane area, and you'll see a few dark spots. There are macrophages and maybe an eosinophil or two floating around.

On the left is the asthmatic airway and you'll notice, someone's used the word hamburger, sort of disorganized, inflamed mess that correlates with untreated asthma, or at least the allergic or atopic type of asthma. You'll notice the cilia are not there, so our escalator moving mucus and debris out of the lungs is not working. The basement membrane is thickened and the columnar cells, that healthy structure of cells, is missing, and in its place is an army of eosinophils or white blood cells that have invaded or infiltrated the airway, coming from the bloodstream. So, pretty dramatic. I guess the real message here is on the left, that's asthma untreated. On the right, that's asthma treated, and it takes about 60 to 90 days for this healing to take place. You can imagine if RSV or influenza or rhinovirus or some other viral infection or even bacterial infection or agent was invading the lungs that the lungs on the left, the airway on the left, would have trouble clearing that infectious agent. So, the goal is to get you back to the slide on the right.

What most people are never told straight up is you have to consume an ICS medication for about 90 days to realize the full benefit, and it's because of this slow healing process that needs to take place. I'm in a pediatric practice setting and we use metered dose inhaler forms of ICS, and it's a twice a day regimen and it's 90 days, and then we see the lung function recover to normal and we see people who are very symptomatic no longer being symptomatic. It's just quite spectacular what this 90 days can do for folks.

Unfortunately, very few people actually use enough of their ICS to experience this benefit. In a large study, only 5% of Medicaid children actually had access to enough ICS to have taken it daily for three months. Pharmacy records showed that most families were picking up only a fraction of the amount of medicine that you would have to have on hand, therefore they never experienced this 90-day healing process, and that's the reason why EPR-3 urges we review adherence for all visits. If that's picking up the phone and calling a pharmacy you need to do it. If you have electronic records online, which we do in Missouri where we can see every medication that Medicaid paid for regardless of who prescribed it or which pharmacy dispensed it, and I think this is where the healthcare system is moving. We have to know if a patient has had access to medication. We make a lot of mistakes when we don't know that.



I actually think people with asthma deserve to know that there are six asthma therapy steps, that higher therapy steps are needed for more severe asthma, and that you should know which therapy step you're on. Most families are happy when they move from step five down to step three or step two, and they're most happy if they get to step one, which is albuterol only. All the other therapy steps require ICS and perhaps additional medications. If you're on a higher therapy step you should know that that puts you at risk for more side effects, but those side effects are generally much less than the risk of uncontrolled asthma, so we have to balance that risk and benefit over time. With good adherence and good inhalation technique most people require lower and lower therapy steps to maintain asthma control.

The older I get, the longer I'm in this business, the more I believe that many people go into remission, and you don't hear that word used much in the asthma world, but that means inflammation is quiet and it will stay quiet even if inhaled corticosteroids are reduced and discontinued. Not much has been done in the way of studying this, but it's certainly a pattern that we see, and remember that the EPR-3 guidelines say if you're well controlled for three months step down. So, if you were on step five and then four then three then two, eventually you do get to step one, and in a pediatric practice I'm going to say seventy to eighty percent of our patients reach step one, therefore in my mind their asthma, the inflammation of asthma, is in remission and they no longer need an ICS. I think the secret to getting there is that 90-day treatment period and really good inhalation technique.

Remember, spirometry is required for ages five and older to adjust therapy steps. So, the ACT or other symptom based assessments are useful but not sufficient to give you good evidence to change therapy steps. Since adherence is such a problem, we've learned a few ways that you can improve adherence. Probably the most important one is to think in an open-minded way about what a family can couple or attach the taking of ICS to. You want to look for an established behavior, which you may end up with eating, like that's the only thing we can attach it to, we eat in the morning and we eat at night, and you might attach taking ICS before you eat in the morning and eat at night. But, many people do have habits that you can attach ICS to, so find out what they're already doing twice a day, or if they're on a once a day ICS what do they do faithfully every day. It might be tooth brushing, for some people it's keyboard time or gaming, other people it's brushing their hair, or again eating, or perhaps contact lens or glasses care. We need to be creative here, but what we don't want to do is put the ICS in a drawer or behind a door like a closet. It should be in the middle of the routine and literally couple to or attach to something that's habitual.

Families can also monitor the use of ICS. They don't do this generally, you really have to say, gee, can you put a reminder in your cell phone to periodically check the dose counter? Fortunately, most, but not all, of our ICS medications have a dose counter. That means we should have a conversation about how long this ICS inhaler should last, and I've sort of moved to the using the term consume. You have to consume three of these ICS inhalers over a 90-day period before we're going to expect your asthma to be under control, with normal lung function and very low of any symptoms. So, we'll use an example.

Many of our ICS MDIs have 120 usable doses after you spray off the first four priming doses. If the plan calls for two puffs twice a day, that's four per day, therefore that's a 30-day supply and the counter



should be at zero in 30 days. But, rather than waiting 30 days we often recommend that you put a little note in your cell phone or on your calendar that says, in 15 days the counters should read 60 puffs remaining. If instead there are 95 puffs when that 15-day reminder comes, then that means there's 35 puffs that were missed. So, this has been a helpful way that families can kind of improve their own adherence and make corrections before it's the six-month return appointment or the four-month return appointment, they haven't picked up any of their ICS for that whole time period.

Another really strong recommendation is that caregivers, now that may be a spouse or a parent, but they should observe and coach every dose of ICS taken for children twelve, less than 12, and at least weekly for use in adults. My wife has asthma, and she actually calls me and says watch me take my medicine. So, I tell kids, your parents not the police, the cop, your parent is your coach, and with a coach we will do better at breathing medicine into our lungs. So, we worked really hard to simplify this approach so that parents can in fact feel confident as coaches.

Basically, we're going to do these three things. We're going to coach the person who's getting ready to take their ICS medication to blow out all their old air, old air out, that means gently and completely exhaling your air. If they do so they can exhale about four times as much air as a normal breath, or so called tidal breath. The next thing is we really want to open the airway. It's kind of like the ABCs. Don't forget to open the airway, and that means aiming up a bit, and a way that I've learned to simplify this for children is you want to create a downhill path for the medicine. So, if you think of where the MDI is attached to a chamber, that path should be downhill all the way, which means you've lifted your chin, which is opening the airway. Finally, you should fill up your lungs in a target time. I know this may be an unfamiliar concept for some folks. At the top of this slide I provided a link, this is to the asthma educator website "ask the expert" and this is a more detailed explanation of how to, in simple language, explain this process.

So, why do we say target time? We say target time because EPR 3 specifies that the flow rate and the flow time for inhalers, and these are really two main classes, metered dose inhalers, which have very low resistance and our aerosol droplets that travel easily, so it takes low flow to pick these medicines up from the chamber and carry them to the lungs. 30 liters per minute turns out from the impactor studies to be the ideal flow rate. The best way to do this is time-based. If you don't know lung capacity and can't set the time pace, the guidelines say on page 250 then it would be for an average of 3 to 5 seconds. Unfortunately, we have lots of people whose time should be more around 8 or even 10 seconds, so I think the calculation is important. Dry powder inhalers offer more resistance, require faster flow rates, and therefore the time for inhaling those medications is about half of those. So, we've spent quite a bit of time in our patient education process making this clear and helping people understand what their target time is. It's FEV1 times 2, so if your FEV1 is 2 liters your target becomes 4. If it's 3 liters your target time is 6. Then, we actually measure it using a device which we will look at it in just second to make sure that we are in fact getting that 30 liters of flow or that 60 liters of flow that's recommended.

Another key message is that without a valved holding chamber most MDI medication is swallowed, and the same can be said of DPI. I'm going to illustrate MDI because we have good science behind that. So,



there's this misconception that this is a pediatric problem, that children need spacers but adults don't. The fact is neither adults nor children are capable of avoiding swallowing most of their MDI medication unless a valved holding chamber is used. I like in the literature the use of the term "naked inhaler," that's when you spray the medicine from the MDI right into your mouth. So, this is an image called a scintillograph, and it's a low radiation image taken of medication that's been labeled. This is pretty old data, we don't have new data on all the new inhaled medications. This was flunisolide, or aerobid, that was being inhaled by an adult male and it was being inhaled directly into the mouth. What you can see from this image is there's a lot of medicine in the mouth; there's a plug in the back of the throat, you can see the esophagus and you can see it entering the stomach, and, to a much, much lesser degree, you can see it in the lungs. What's happening here is the medicine's emerging from the MDI at high speed, it's a plume of medicine that's traveling very fast, and if you stick it in your mouth it's going to hit your tongue and your cheeks and the roof of your mouth, and yes, some of it will go to the lungs, but really not so much, not very much.

What's the consequence? Under the best of circumstances, we calculate that only about one-fifth or 20% of the medicine that's intended for the lungs actually ends up there, but with poor technique, naked inhaler technique, or breathing in much too fast or much too slow, even with a chamber, you can end up with as little as 5% of the targeted medicine in the lungs. The other 95% is swallowed. So, it's absorbed from the GI tract. Most of it passes through the liver and eventually ends up in the systemic circuit and your blood stream going everywhere, and perhaps causing more side effects than you would ordinarily experience.

This is the same approach, radio labeled flunisolide, a picture taken to see where the medicine went when we insert between the MDI and the mouth a valved holding chamber, which means that there's a one-way flow of air from the spacer or chamber into the person who can't blow the air and the medicine back out through the chamber. The striking thing is you don't see it in the mouth, you don't see it in the throat, you really can't see the stomach, but wow, lots of medicine in the lungs. So, today there's no evidence that would offset or contradict the fact that when we use a valved holding chamber we dramatically increase the deposition of inhaled medicines in the lungs and we radically reduce the oral and GI absorption of the medication. I think until there's better evidence this is what we're going to do, this is best practice for our patients.

Another key thing that we've learned through the years is that when we say take two puffs or three puffs of a medicine, some people think that means spray all three puffs into the chamber first and then take one breath. That has been called "stacking," when you put more than one puff in the chamber. So, it's really important, a key message is, I need to know that I should only put one puff of medicine into a valved holding chamber or spacer at a time, and if you put all or more than one you will not get same amount of medicine in the lungs that you would get from the one puff, one breath approach.

You know, I think that it's hard to talk about side effects when we're trying to convince people to take medicines that we believe is going to help with a chronic disease, but it's a mistake not to. So, you can have side effects or unwanted results from taking asthma medications, and I'm going to list them in



order of occurrence, what I believe is the actual rate of occurrence, of side effects. Side effects are most common with three asthma medicines: montelukast, or singulair, which is a pill that's swallowed or chewed, albuterol, and inhaled corticosteroids.

The side effects of montelukast were not well understood when this medicine came to market. The FDA required the manufacturer to add in the package insert for adults for youths and adults that it might cause suicidal ideation. About a year later, the FDA came back and said, you have to revise package inserts for children because of reports of sleep disturbance and mood and behavior change. Today I think most of us know that the rate of side effects for this medication is pretty high, and it's terribly important for families to be aware of the potential. That doesn't mean everyone has side effects, but it means it's a pretty common problem, it's not a rare event. These side effects are night terrors, restless sleep, aggression, anger, inattention, depression, and thoughts of hurting yourself or others. Most of the evidence suggests this is because the drug may interfere with REM sleep, so we don't get the deep resting sleep that resets our brain and makes us nice people the next morning, so we may be agitated or a little hostile and that may spill over for children into aggression and inattention in their school and social time. If this happens, talk to your health care provider, but in general we stop this medication and the symptoms go away.

Albuterol, we love albuterol in the asthma world. It is terribly important, but can have stimulant-like side effects and that can interfere with sleep or movement. There are definitely some people who are just sensitive, maybe they're also sensitive to coffee or caffeine in any form, but we need to let people know that if they can't fall asleep for hours after taking this medicine, or if they shake so much they can't write or do the things they need to do in their everyday life, there is an alternative, levalbuterol. Even with levalbuterol, which is half the dose of standard racemic albuterol, people still have side effects, so it's very important to think about and talk about. What is not very often mentioned is that when you swallow albuterol, remember it's a muscle relaxer, it actually relaxes the muscle at the bottom of the esophagus, and so people who take a lot of albuterol may experience a worsening of gastroesophageal reflux. The mechanism here has been well-studied and recently published again with a little more detail than we previously had that there's a direct effect of increasing consumption of albuterol and a lower tone for that muscle, the lower esophageal sphincter, so we should be mindful that that's a side effect.

Inhaled corticosteroids, we've had a lot to say about ICS medications and they're a wonderful medicine for suppressing inflammation, but they can act just like oral steroids, which are a much more likely cause of side effects than inhaled steroids. They can slow the rate that children grow taller, cause the face to look puffy, or cause an accumulation of tissue at the base of the neck. All of these are steroidal, or what's called cushingoid, changes. Most of the risk of the side effect interestingly from ICS medications comes from lung absorption. So, several of the newer so-called second-generation inhaled steroids have a very high first-pass clearance rate, so when the drug is swallowed up to 95% is destroyed by the liver and doesn't enter the systemic circuit. But, the target organ is the lung. Remember that when the lungs are inflamed we know that even high doses of inhaled steroids are usually well-tolerated. However, once the lungs heal and lung function recovers, the guidelines tell us we should step down. The reason



is, in large part, because the healthy lungs are a great surface area, about the size of a tennis court, through which inhaled steroids can be absorbed into the bloodstream and you can see systemic side effects. I would say that most of the side effects of inhaled corticosteroids come from failure to step down the dose once the lungs have healed. We want to always think about, is it time to step down?

I think another thing, that's shocking a key message many, many people really don't hear, haven't heard, is that the emergency dose of albuterol is up to six puffs, and that you can repeat that dose in 20 minutes if needed. That's a pretty important thing to document on someone with asthma, that we've told them that if you're away from health care facilities, you're at home or you're out somewhere remote, that you may need to take more puffs for severe asthma attacks. Whereas the usual dose is two puffs if you're managing a little cough or wheeze or shortness of breath, during a severe asthma exacerbation a larger dose might be required. The rationale behind this is if you work with folks who are having asthma exacerbations, I know I had a child in clinic last week and his baseline FEV1 was 35% of his personal best, so he was breathing about one third of the air that he is able to breathe on a good day. We would be misguided to expect that two puffs of albuterol on a day like that was delivering as much medicine deep in the lungs as on a good day when he was at 100% for his FEV1. The paradox here is that you have to use your breath to carry the medicine in your lungs and the more difficulty you have breathing the less medication that we're going to be delivering, and that goes for ICS and albuterol. We have step plans to increase the number of puffs of ICS during asthma flares, too. The national guidelines tell us we may need up to six puffs that can be repeated in 20 minutes if you're in a healthcare setting that dose is eight puffs every 20 minutes, and these are the doses required to get enough albuterol into the lungs to really begin to bronchodilate.

Remember, this is not something you do repeatedly at home. This is a one-time event, and you're going to always get urgent care when this happens, even if you're feeling better. Take those six puffs, but the guidelines also say you should use a valved holding chamber, you should seek emergency care if not improving after that first six puffs, you should always call your clinician and report the event, you can take that extra six puffs in twenty minutes if you're still struggling to breathe and you're not in a healthcare setting where you're getting expert care, but always remember make an appointment so you can talk about why this happened, and focus particularly on improving the ICS adherence to prevent an asthma attack in the future. Focus on improving your inhalation techniques so the medicine you take actually ends up in the lungs and has its effect. And, remember sometimes we do have to step up to a higher therapy step because people have exposures that are stirring up their asthma.

All through the years it's been interesting to follow the debate on the best way to breathe medicines into the lungs and the pendulum has been swinging through the years towards and away from the use of nebulizers. But, I think as a person with asthma you have a right to know that a nebulizer is much less expensive today than most inhalers. So, when our pharmacy here in the, on the site where I practice, you can buy a nebulizer for \$30 with no insurance, and if you go through your insurance company you're going to have a copay of somewhere between \$25 and \$55, it's what we see. Why would you do that? Well, we talked about the value of ipratropium. Ipratropium as an MDI would cost somewhere in the



vicinity of \$200 to \$300 each, so a one-time expense of a \$30 nebulizer would allow you to access ipratropium as a nebule, which is on the \$4 list at several pharmacy chains. Suddenly a nebulizer actually is a more cost-efficient way to at least get quick relief medicines like albuterol and ipratropium, and that is very important for folks who are experiencing more severe asthma symptoms.

Remember, ipratropium is an important medicine in the asthma world. It may be required in addition to albuterol for quick relief from asthma symptoms. This is especially true for young children with viral upper respiratory infections, but also in the guidelines, we're told ipratropium is indicated for people with gastro esophageal reflux and for people who have known exposure to airborne chemicals that are often used in farming or forestry. These are organophosphates that can cause the parasympathetic nervous system to close down the lungs, and albuterol is much less effective for that than ipratropium. So, we are told in the expert guidelines that severe asthma exacerbation should be initially treated with both albuterol and ipratropium. Of course, these medicines can be purchased together. One vial of medicines with 2.5 milligrams of albuterol and 500 micrograms of ipratropium, that's both branded and generic now and fairly inexpensive. But, not as inexpensive as taking a vial of albuterol and adding a vial of ipratropium when you're obtaining those at \$4 each. Using this combination reduces the likelihood that emergency or inpatient care will be required, and this is well studied, it's been published again within the last two years as a systematic review of the literature, so no question about this.

People who are using these medicines in combination also need to know when it's time to call for help. If you're using these medicines at home for more than five days, it's time to ask for help. If you're using these medicines and you're still in the low yellow or red zone on your peak flow, it's time to call for help. There's a point at which bronchodilators are not adequate to handle the mounting inflammation that goes along with some asthma attacks.

Next key message: coughing, wheezing, and shortness of breath, and particularly chest tightness, are not always asthma. These symptoms are associated with other conditions and so if we always interpret these symptoms as asthma we may end up over treating asthma, and, more importantly, our patient doesn't get better. We have to pay attention to the fact that nasal congestion and drainage often causes cough and can cause shortness of breath. Just physically blocking the nasal airway caused athletes to have marked decrease in their capacity in their sports, and these are published studies that ask the question, is nasal obstruction going to cause shortness of breath or decreased aerobic capacity?

Next, allergy to airborne triggers such as dust mites and many other things can cause these symptoms. So, either avoiding the allergen or at least anticipating that the allergen is present and taking some steps to clear it from the nose and the airways can be helpful.

Often in past years we underappreciated the fact that gastro esophageal reflux disease is a common cause for many of these complaints, including nasal congestion, cough, and chest tightness. People with uncontrolled asthma are very likely to have GERD. Again, this has been published in at least three systematic reviews that suggest the rate of GERD in uncontrolled asthma moves from 50% to 75%, so treating for GERD makes a lot of sense when the alternative is escalating the ICS dose or using oral



steroids. Over-the-counter ranitidine and other H2 blockers are an inexpensive, and usually effective, treatment in childhood, and of course we all know that you can use proton pump inhibitors, PPIs, like lansoprazole or omeprazole if H2 blockers are ineffective.

I think one of the great things we have to offer as asthma educators to our patients is the knowledge that clearing the nose with hypertonic or 3% salt water can relieve nasal congestion, and actually do much more to reduce the burden of not only allergy but also asthma. When you use a strong salt water solution, 3%, remember the body is less than 1, about .9%, saline fluid actually shifts from the turbinates. There's three on each side inside the nose. The fluid shifts out, I say to families, this is like going from a blocked nose, the turbinate deflates like a flat tire, opening the passage so that people who could not breathe through their nose and they were mouth breathing and perhaps drawing grass, pollen, or other allergens and irritants directly into the lung can again begin to breathe through their nose. I like to talk to kids about your nose is your air conditioner, it's your filter, your air is supposed to go through the nose most of the time. Strong salt water also increases mucociliary clearance, so we're using this for some conditions deep in the lungs to improve the clearance of pathogens or irritants from the lungs. But, it certainly helps to clear for the nose sinus passages. Strong salt water also just mechanically washes away viruses, and there's some bacteriostatic, viral static, effect from 3% saltwater, so it helps the nose, the sinuses win the war against pathogens. It also mechanically removes allergens and irritants from the nose.

Sometimes the turbinates are so large that it's hard to use the rinses or the washes where you would use something like the neti pot or the squeeze bottle, so a spray is needed to initially open the nose. We have three percent saltwater sprays now available. You have to use that spray maybe two or three times on the side of your nose that's completely blocked. Remember there's three turbinates. The first spray gets the inferior turbinate, and then successive sprays, these are more likely to get back to the middle and superior turbinate and actually open the nose and rinse out the debris. But, unquestionably, rinses are more effective because you're using a larger volume with salt water and, done properly, the path of the water is in one side of the nose out the other side, so all six turbinates get a rinse over and the ability to remove things from the nose is much enhanced.

Another really important message for people with asthma is there are tiny particles floating around in the air everywhere. In our indoor environments it's pretty important to minimize the number of these particles because they can make asthma worse and they can even lead to death. The particles that are in the air that are too small to be seen are in the 2.5- to 5-micron size range. You might see a few of these in a sunbeam that's coming through your window, but generally we don't see them, we don't think about them. But, if you were to turn on a special meter you would find that in a healthy indoor environment a particle count of about 400 is normal. Counts have been recorded in excess of 10,000 and this was the case in the suffocation and death of two toddlers who were living in a blighted house with decayed carpet, mold ridden and crumbling sheetrock, and several adult smokers. Remember that our toddlers are crawling around on the floor where the density the concentration of these particles is



highest, and literally two children died before attention was drawn to the fact that this was blighted housing that was not fit for anyone to live in.

This is the gizmo that we're using here in Missouri that gets us the count of particles and it's become a standard for our Medicaid program that allows clinicians to dispatch someone to the home to do an indoor air assessment. This would be a room-to-room check on the humidity, the temperature, the CO, the CO2, and the particle count.

So, how do I keep particle counts down? You should avoid tobacco smoke, you should avoid using commercial air fresheners, incense, gas stoves emit these particles, and dryers that are vented indoors. Each of these can be sources that add to the load of airborne particles that contribute to your asthma. Keeping your house free of these particles, as well as chemical fumes like paint, chlorine, ammonia, and solvents, these are all part of a good trigger avoidance program.

Real quickly, I have to tell you that our lead environmental scientist has pointed out to us that he can walk in a room where there's a coat hanging on the wall from a smoker who's been outdoors, thank God, to smoke a cigarette, hold the counter next to the coat and tap the coat and the particle counter begins to chatter as it picks up particles from the tobacco that had adhered to the coat, but they can be dislodged into the room air.

So, actually that's the last slide I have and I appreciate your attention.

Montana Asthma Control Program host: Thank you so much, Dr. Francisco! That was wonderful. I do already have a question here, but real quick before I get to that I just want to remind everybody that tomorrow at some point I will send a brief evaluation, a link for you to follow to take an evaluation, and then a certificate will be sent to your inbox, and so be sure to check your spam folder for that. If anybody is watching the webinar in a group of people, so one person used their email to log on and everybody else was just viewing, then you'll need to email me separately, because I won't have your email address when I download the information from this webinar. I will also be posting the recording in about a week to our website.

Let's see, we do have a question here. Dr. Francisco, do you know anything about electronic cigarettes aerosol? Have you had patients with poor interactions with eCigs, either as a user or from aerosol exposure?

Dr. Francisco: Yeah, I'm not an expert on this, I know there's several folks now that that are studying this and trying to get us better data. The original consensus, or thought, was the assumption that it's better than tobacco smoke, and we don't know, I don't really have a lot to offer, I don't know that much evidence yet as to whether it's better or worse or the risk is lower or higher. I think moving whatever you're doing, whether it's tobacco or eCigs, out of the house is the most important step.

MACP: Great, thank you. If anybody else has a question, feel free to type it into the chat box, I'll see it there. You can also feel free to unmute yourself and ask it. I have a question while we're waiting to see



if anybody else does. Dr. Francisco, what about the technique where using a valved holding chamber a person inhales and exhales five times instead of one continuous three to five second inhale? Have you heard of that technique, and would you recommend it for people who don't necessarily have maybe the in-check dial to check their flow rate?

Dr. Francisco: That's a good question so I would not recommend it and I'm going to illustrate the answer by sharing with you our protocol for choosing a valved holding chamber type for young children and older children as they approach school-age. When you're trying to deliver metered dose inhaler medications to an infant or a toddler, the best we can do is discharge the medicine into a chamber with a face mask and hope for five or six breaths, and these are going to be normal breaths, they're tidal breaths. They have low volume compared to the lung capacity and the air is going to move into the top part of the airways. We're not going to see inhaled corticosteroids going deep in the lungs with that technique. Even that said, some of the medicine does make it deep in the lungs and we find that it's an effective way to deliver ICS medications in young children. 90% of kids in our practice used metered dose inhaler form of ICS with a chamber in a facemask. But, once that child reaches three or four years of age the technique changes and we ask the child to blow out their old air, and when they do that you should see the nose valve leaned forward for a longer period of time, two or three seconds, and then we discharge the medicine into the chamber and we use the words, breathe in, breathe in, breathe in! Hold it, hold it, hold it! And we have many 3- and 4-year olds that do great breathing technique not taking the traditional five breaths from the chamber and mask but using this special blow old air out take a deep breath approach. So, this is not a tidal breath, this is exhaling two to four times as much air, so that the first air coming out of the chamber with medication goes deep in the lungs. With that approach, most of our kids are on a one puff, twice daily, regimen of a medium dose ICS most of the year.

Now, what happens when you turn 5 or 6? When you turn 5 or 6, especially if you can do spirometry, you can follow instructions well enough to take the biggest breath ever blow hard and fast for four to six seconds, you're certainly ready to transition to a standard chamber, which will go in your mouth, for which the technique is one long deep breath. We're back to the blow the old air out, aim up, fill up your lungs in a measured amount of time that is expected to get your FEV1 in at 30 meters to flow.

Remember when you exhale, all of these devices that have a valve will vent the air away from the chamber so you can take five breaths without blowing away the medicine, but these are relatively shallow breaths, and they're not optimal for getting inhaled medications deep in the lungs. We all know asthma is primarily a disease of the small airways, so we're very interested in getting it as deep into the lungs as possible.

MACP: Great, thank you for that answer! I've got another question here. Someone asks, what do you tell people who ask if they can outgrow their asthma? She says that she's 50 years old and still hasn't outgrown her asthma, so what do you tell patients?

Dr. Francisco: Yeah, that's a great question. It's an important thing to talk about because many, many people in the back of their minds are thinking exactly that. I'm going to outgrow this. So, the first thing I



would say is at age 2 there are twice as many boys in the emergency room with asthma. At age 20 it has flipped and it's almost 2 to 1 females. So, there's this natural history of asthma, it happens independent of medication, independent of health care, so we'd be kind of silly to say that boys don't as a group get better. It's better to admit that and to say we are looking for the opportunity to reduce your medication. Remember, we do that at intervals of about three months, and when you're well controlled we go down a step. Probably 80% of the boys in my clinical practice by age 18 are off of inhaled corticosteroids.

The odd thing about asthma is that early in life it looks like a male disease, right? Two to one males. But, when you look at asthma across the lifespan women are more affected with all of the measurements: prevalence, attack rate, current asthma, and so forth. In the first slide, we talked about how you may have genetic potential for asthma, but it doesn't mean you're going to express it, and there's these other things that interact with you to make your asthma better or worse. So, food, the types of foods you eat, the level of aerobic activity, the exposure to indoor triggers and outdoor allergens and triggers, all of these things really matter.

So, when you think about, can I outgrow asthma? Yes, you can. Males, testosterone is your enemy in the first two years of life in terms of asthma because it augments bronchospasm. Testosterone that's high in little boys is going to make the bronchospasm more intense and last longer. But, at age 14 that same testosterone promotes rapid linear growth. You get taller faster than girls, the airways become larger than the airways in girls, the testosterone promotes a higher lean body mass to fat composition, whereas in adolescence females are going to have an increased deposition of body fat, it's just part of maturation, and that's a pro-inflammatory transition when you're laying down body fat or when you are gaining weight, that is pro-inflammatory, so lipids have a role in inflammation.

I hope that helps. I think anybody at any age can outgrow the need for asthma medications in an ideal environment, and that includes both external environment and internal environment. Having terrible uncontrolled gastro esophageal reflux is going to promote a continuance of your asthma or perhaps a worsening, just as an example.

MACP: Awesome, thank you for that, Dr. Francisco! We're right at 1 o'clock and I don't want to keep anybody. I'll just go ahead and send out a little reminder here that you will be receiving an email tomorrow, if you logged in using your email address, with a link for you to follow to take an evaluation. We are waiting on confirmation from the boards of continuing education credit, but the applications were submitted quite some time ago so I'm confident that they will arrive shortly. We really appreciate everybody's time, and Dr. Francisco, thank you so much for tuning in and sharing all of this information with us, we really appreciate it.

Dr. Francisco: You're very welcome. Have a nice day, everybody!