ANTHONY ATALA: What I thought I would do today is really an overview of bedwetting. And the first thing is, just make sure you don't penalize the child for bedwetting. And make them feel good when they come to the office. Because obviously they are anxious, and you want to make sure that they feel like this is not something overwhelming. And I always like to let the children know that they are not alone. Bedwetting is very common. It can occur in up to one third of children-- at some stage of their lives-- starting at age four. So basically they're not alone. And if they look at their classmates, at least one of three had it at some point in their lives.

We do describe bedwetting as either primary or secondary. Primary being since birth. Or secondary, where you have a period of at least six months where you don't have bedwetting. When you have a dry span. That's what we call secondary nocturnal enuresis. It can also be monosymptomatic-- isolated to the bed wetting-- or can be associated with other symptoms like daytime urinary symptoms, urgency, frequency, and other things it may present with.

The incidence is actually usually resolved by age three and one half . That's the time when you see it mostly resolved, but actually can be present up to age seven with up to a 10% incidence at that age. They improve about 15% a year. And the main thing is to really-- if they do have bedwetting past age seven, it is best to initiate some sort of treatment-- or at least assessment-- to make sure that the symptoms do not persist into adulthood. Which of course, many of you have seen that. Patients who present as adults where bedwetting never really resolved.

As you know it's genetic, 90% penetrance of a autosomal dominant mode of transmission. Four loci have already been identified, so it's definitely genetic. Family history is very important. You always want to ask about that.

What are the causes of bed wetting? So I always tell the families four things that cause bed wetting. The first one it's increased urinary retention. We all retain fluid during the day. While we're active and walking, we're all retaining fluid. Because we needed it for our heart volume to be steady, and maintain us at an adequate heart rate. However when we lay down, the first thing that happens is we mobilize fluids. Anytime we lay down. So basically children-- the genetic defect is directly related to the fact that these children are retaining more fluid than they should. that's one of the major things. Of course there can also be reduced bladder capacity, a failure to arouse-- which is maybe common in some children, and usually does resolve by the time they're teenagers when their hormones start to kick in. They do sleep longer but their sleep is lighter. And it also could be due to overproduction of urine with things such as diabetes insipidus or just normal diabetes.

Now when we look at the causes of bedwetting, we really have to analyze the other causes that may also lead to bedwetting which are not genetic. So things that we look at-- snoring. That definitely should be part of your history. Because if they do, there's a good potential that you may be able to resolve this. Either by tonsillectomy or steroids. And make sure that-- a number of these patients will resolve if you take care of the snoring.

The other associated cause is, of course, ADHD. And in these children, you always want to treat the ADHD. Because in a percentage of patients, when you do that-- using medications for the ADHD-- you will see a resolution of the nocturnal enuresis. When you do have ADHD you should also watch for constipation. Now Dr. Hodges already talked a little bit about constipation, but if you do treat the constipation in children, about 20% will improve. Why is that? Well when you look at the KUB it's very obvious. Because you're seeing this child with a nocturnal enuresis, and you can see the entire colon filled with feces. All the way to the top. But I also want you to note the feces present in the area the bladder. It's really pushing on the bladder, reducing the capacity of that bladder at night when the child needs to be holding that urine. so if you treat the constipation, about 20% will go away.

There are other causes. Psychological. Now if it's primary, it's usually just isolated. As we mentioned, genetic. If it's secondary however where you do have a period of dryness, then you really are looking at other things going on. It could be psychological, it could due do to medicines. They may be on anti-depressants. Or just psychological issues. Just anxiety or depression alone may lead to nocturnal enuresis. Now about 70% of children with bedwetting over age seven do see this as a problem, in terms of psychological stress. As you can imagine, some of them do see this as impacting their social activities-- poor self-esteem. So the main thing here, is to make sure the family gives the child reassurances that this is not a problem. And they don't punish their child for this condition, as you well know.

Now one of the things that we do in terms of social activities, we do tell them go ahead and do sleep-overs. It's perfectly OK. One of the things that we tell parents is go ahead and have them wear a pull-up. But over the pull-up, wear a pair of boxers. So they'll never know. Children will never know that they have a pull-up under their boxers. And so that's a way to get around it. And then we also give DDAVP for sleepovers, as we'll see in a second. Now some children may see this is a way of getting attention, but that really not the rule. That's the exception rather than the rule.

OK what do you do for assessing these patients? First a history is very important. Is the bedwetting primary or secondary? That's going to affect how you manage the child. How many nights per week? This is a good indicator because you want to see what the trend and has been. If they're bedwetting six, seven night per week, chances are the bedwetting is still going to be around for some time-- if it's familial. If however they're down to two to three nights per week, you can reassure the parents that the bedwetting is about to resolve. Sooner rather than later.

Past treatments are important. What has worked, what has not worked? Because as you know, by the time you see them they've already seen their primary care provider. So you're going to do the next step in terms of the treatment. What are the daytime symptoms? If daytime symptoms are present, then a totally different work up. That's not the topic for discussion today. But now you're going to be dealing with an unstable bladder, or other things that may be going on. Is there a history of UTI? Very important. If the patient does have UTIs, it's amazing to see-- Dr. Hodges mentioned bacteriuria-- but bacteriuria can in fact lead to an nocturnal enuresis. So even though the majority are fine with bacteriuria, there is that minor percentage of patients who do have a positive urinalysis. Where that does in fact lead to enuresis because of the irritation in the bladder wall.

As I mentioned, is there a history of ADHD? You're going to treat the ADHD. Seizure medications, depression medications, you may need to work with your other provider to make sure that you modify their medicine regiment to avoid nocturnal enuresis. And of course also a dietary history. Why is a dietary history important? I mentioned urinary retention. If those children have a high salt intake, they're going to retain more urine. And they're going to mobilize more urine at night when they're asleep and laying down. So you may want to restrict salt intake.

So in terms of the assessment, what do we do? We look at the history of constipation. We look at the family history. This is usually a good indicator. How old was the parent when they outgrew it? How old was the grandfather? Very important. That again reassures the child-- when you do that history. And then a diary of what they're doing during the day in terms of voiding. What are they drinking? At what time? What is the bladder capacity? You can judge that by a voided volume. Because the medications that you give may or may not work, depending on the bladder volume. if the bladder is less than 70% of the estimated bladder capacity, chances are the DDAVP won't work for example.

OK for the assessment at the office it's very simple. We just do three things. A urine test, the physical exam, and the KUB. That's all we do. And the KUB is important because of the constipation. The urine to make sure there's no UTIs or bacteriuria, and the physical exam just to make sure there are no other abnormalities present. We don't really do an ultrasound or a functional test unless there's something else that we're suspecting. We want to treat the underlying cause. So if there's an infection 15% will resolve on their own. Constipation as I mentioned, 20%. Sleep apnea for snoring, about 30% will resolve if you manage the sleep apnea. And ADHD, you can manage the meds, and at least 20% of those resolve after that as well.

If you look at the primary causes that may lead to enuresis and you're dealing with those, then that's a good thing. But if you're not able to do any of those things and none of those things are present, then things that you can do-- as you know is fluid restriction. That still works very well. Remember salt restriction as I mentioned, and a voiding reward calendar works very well. It really allows children to be motivated to make sure that they have a higher level of arousal at night. If they're over seven years of age, you want to treat the underlying cause. And if you've tried everything else, that's when the wet alarm can really play a role. And then medications, if there are other things going on. That's your discussion that you have with the parents and what you want or do not want to do.

DDAVP as you know, it is vastly overused in my opinion. Because really, they go to the primary care providers, and they just give them the DDAVP. They're not really addressing any of the other issues we just talked about. So really that's when we have to step back, assist the child, and go back to square one. If in fact they could benefit from DDAVP, then I really weigh the pros and cons with the family. Because daily DDAVP does lead to changes in sodium in-balance that can lead to seizures. So it's very important that you do a sodium test on these children which is mostly not done. So really I try to reserve DDAVP for sleepovers, or for children who are having major issues with bedwettings. And large response, of course you can go up in the dose. And you do a dose trial before you give the full dose.

If there are other things going on like bladder instability, then you can use Ditropan, Detrol, other anticholinergics. This may also help if there's a small bladder capacity. Which you're able to obtain that information by the voided diary, by having them measure the volume, or by doing an ultrasound PVR. Just a post void residual with an ultrasound. One of the-- not a full ultrasound, but your ultrasound PVR that you do at the office.

OK the other medication that you can consider is Imipramine. We seldom ever use this anymore, but it is still part of armamentarium. As you know this medication has both anticholinergic and alpha agonist blocker effects. So what you really want to do with this, is you really want to use this medication as a last resort. Because this can lead in fact to cardiac side effects. And you definitely do not want to use this medication combination with DDAVP. It however may enhance arousal in patients with a wet alarm.

With a bedwetting alarm, motivation is key. Do not do it unless the child is really motivated. Because you can tell whether this is really a parental issue-- that they're tired of changing the sheets-- or the child really wants to be dry. And do not give a wet alarm unless the child really wants to be dry. Because it's not going to work otherwise. It really requires a lot of work from the child itself. But they have to be really motivated to do so with reward systems, et cetera. But really the success rate is very high, especially if the child's motivated.

You can also-- I mentioned arousal. And as you know, as a child gets older they'll actually be less-- the deep sleep that they have as a child will actually get better over time as the hormones start kicking in. But also acupuncture has been shown to be helpful in this regard. When nothing helps-- again you're looking at all the other things that are going on. This should be a direct suspicion to you that there are other things going on that you need to address. And for those where nothing works-- and the family's really insistent enough that something needs to be done-- you may consider Botox for those patients who have a poor bladder with compliance. This is rarely done. And also the Tibial Sacral nerve stimulators have worked well. There's a whole series of patients as you know-- especially in the adult literature that was led several years ago with patients with instability. It also works in children with nocturnal enuresis that have an element of instability.

So to summarize then, before age seven you're just going to really watch this through behavioral training. After age seven, you really want to be more aggressive with this. You want to treat the underlying cause, you want to add medications or the alarm, and observe if necessary. I do want to plug Steve Hodges website, homepottytraining.com. He has his book as well-- he's a machine I tell you. But he also has a book that addresses some of these issues. And at this time I'd like any comments that you may want to have.