**MARTIN VAN ZYL:** Greetings. I'm Martin van Zyl, cardiology fellow at Mayo Clinic. Today's recording we will be discussing blood pressure guidelines. I'm joined by my colleagues Dr. Sandra Taylor in nephrology, and Dr. Randal Thomas in preventive cardiology, who are both experts in this area, and were actually involved in the writing committee of the recent guidelines. Thank you for joining us and welcome.

Dr. Taylor, what is different about the 2017 guidelines?

**DR. SANDRA TAYLOR:** Well, I'm glad you asked because I think it's been confusing as far as all the different guidelines that have come out in recent years. And so this guideline, the 2017 American College of Cardiology American Heart Association Guideline is actually the new US guideline. It was approved by 11 different organizations, and it replaces JNC. So there is no longer a Joint National Committee, JNC guideline, and the 2017 guideline is the current guideline for the United States.

**MARTIN VAN ZYL:** Excellent. And Dr. Taylor, what is the best way to measure blood pressure?

**DR. SANDRA TAYLOR:** Well, I'm glad you asked that because it's-- part of the ability to reach new lower targets has to do with the accuracy of a blood pressure measurement. So if you just randomly take a blood pressure measurement, it's likely to be quite a bit higher than that person's actual blood pressure measurement, and it will be difficult to reach targets.

The ideal blood pressure measurement in 2019 is an automated office blood pressure measurement. So an automated machine that can measure the blood pressure, typically, between three and six times. There are different algorithms that are used. And it will let the person sit without anybody in the room. Take multiple measurements, average those measurements, and give you a measurement that's much more reflective of home measurements or measurements by ambulatory monitoring.

**MARTIN VAN ZYL:** And Dr. Thomas, what is the role of out of office blood pressure measurement, and the diagnosis and management of high blood pressure?

**DR. RANDAL THOMAS:** Yeah, that's a key part to the guideline as well. As Dr. Taylor mentioned, the more measurements we have of blood pressure, the more accurate we will have for the assessment. So if we only measure in the office, we will miss many patients who have too high blood pressure.

On the other hand, we may overestimate some people's blood pressure. There is about a between 10 and even as much as 50% of patients who have either what we call white coat hypertension or masked hypertension. So either higher in the office or lower in the office than we would get at home. And so it's important to know what is happening at home over multiple times if possible.

So for example, we may ask a patient to measure their home blood pressure readings, say, three days a week, morning and evening, and take a weekly average of those measurements so we have a better picture of what's going on. A more typical approach maybe a 24 hour ambulatory monitor, which now appears to be getting some traction for coverage by Medicare and others.

That would be a way of at least getting a 24 hour monitor of a patient's blood pressure. But very important to really decide does a patient truly have high blood pressure, or do they have normal blood pressure in the office and normal blood pressure at home.

**MARTIN VAN ZYL:** Dr. Taylor, what is your approach to a person with newly diagnosed hypertension?

**DR. SANDRA TAYLOR:** Well, so first it's important to confirm that they actually have hypertension. And the diagnosis is based on at least two readings on at least two different occasions. So if somebody comes in with an elevated blood pressure on one visit, then you would want to schedule another visit for them to come in and get it checked again before actually deciding that person has high blood pressure.

Then, it depends on the severity. So if somebody has an elevated blood pressure. So high blood pressure would be 130 over 80 or higher, then it would depend on other aspects of that person's overall cardiovascular risk whether you would start with lifestyle alone, or whether you would use medication and lifestyle approaches.

So when I see somebody with high blood pressure, there are several different things to think about. First is why. Is this familial. Do they have a strong family history of hypertension. Is it circumstantial, weight gain, high sodium diet. Is it unusual. Somebody who is very young or has more severe high blood pressure, then I would be thinking, already, about a secondary cause. So the amount of testing that you do would really depend on that presentation.

There are some basic labs, some basic parts of the physical exam that you would want to do on everybody. And then, there are more in-depth questions that I ask about diet and lifestyle, exercise, as well as looking at other cardiovascular risk factors.

And it's really putting all of that together. The cause, whatever you think is the cause, the risk profile for that individual person, that would help you to decide timing. Do you start with lifestyle and then see them back? Is it severe enough that you would want to start medication and lifestyle right away? Or do they need some testing done before you do anything else because there is something unusual about this presentation?

**MARTIN VAN ZYL:** Does systems-based care help to improve the detection and management of high blood pressure?

**DR. RANDAL THOMAS:** Absolutely. We, as physicians and as health care providers, we probably tend to overestimate the quality of our care sometimes. So if you were to ask us what percentage of our patients have blood pressure that's under excellent control, we'd probably overestimate that. Particular if we don't have a system based approach, which means there's a protocol-driven, evidence-based approach that involves a team, that involves evidence-based approaches to identify patients with high blood pressure. Put the treatment program in place, and then monitor their progress over time.

There's a few parts to that. A few components that we should all consider. I mentioned a team-based approach. So that involves nurses, it involves pharmacists, it involves a team that can help with each step along the way. Identifying patients, monitoring them, making sure they're getting treated appropriately, and making sure they're adhering to the treatment appropriately.

There are some other things including electronic medical record and information technology tools that can help us connect with patients and monitor and follow-up as well. We can also track the progress of our practice. There is a good study at Kaiser Permanente in northern California that actually showed this. In using an EHR approach, they could actually show improvement in the blood pressure control of their patients.

The other things you may want to consider would be quality improvement steps. So things like performance measures, quality report cards, how are we doing in helping our patients be identified with high blood pressure being treated, and having their blood pressure controlled.

**DR. SANDRA TAYLOR:** And I just want to reinforce where system-based care can be extremely helpful. Because when a patient comes in and they may not even be coming in for their blood pressure, it's easy to dismiss a high reading as they're rushed, they're uncomfortable, and not have it followed up. And this systems-based approach is where it's flagged. There may be somebody other than the provider who then gets on it and says we need to schedule another visit, we need to get a nurse involved. Something else so that it's not missed.

Other things such as when you enter a blood pressure reading and it's abnormal, it's red. And then, you see it. And it's harder to miss that and say, well, everything's fine. I'm just going to ignore it because it's sitting in front of you in red. So there are systems approaches that can really help bring you back to the importance of getting the blood pressure controlled.

**DR. RANDAL THOMAS:** Another point to that is even something as relatively simple as making sure patients know how to check from blood pressure at home. To make sure they are given instruction so that they know the steps to take, the size of the cough, et cetera. So even something as basic as checking the blood pressure does much better if we have a system approach that is standard for all the patients that we see.

**MARTIN VAN ZYL:** Excellent. Dr. Taylor, what is your approach to a patient who has hypertension that's not well controlled despite two or three blood pressure medications?

**DR. SANDRA TAYLOR:** Right, and that is actually not unusual. So I think as we have patients who are more complicated, more obese issues, it's difficult to get blood pressure down. And it's not unusual to see somebody on two drugs not controlled, even on three drugs. So at three different medications, if the blood pressure is not controlled, then that's where the term resistant hypertension comes in. And that is a good point to think about whether you might be missing something.

So if you started that patient on medication, maybe they were well-controlled, and now they've lost that control. There might be a new condition that's developed, or something that's gotten worse that you missed. So I would go back to think about secondary causes. That's the time to work them up. If you can find a treatable or reversible cause, then you may get the blood pressure back under control without adding multiple additional medications.

Another common cause is high sodium intake. So I will ask them, not just if they eat salt, because everybody will say, no, I don't add any salt. I don't eat salty food. But you need to ask them how often they eat processed food, eat out in a restaurant, any kind of prepared foods where it's prepared before they get to it. It's likely to be quite salty.

And so when we get to that point and get to reading labels, then they realize that there's a lot more salt to have to deal with or think about than just salt or the salt shaker. So I think about sodium. I go back to lifestyle issues. And another problem is adherence to medication. And that is surprisingly common. And especially, I think, the more medications someone is prescribed, the less likely they're taking all of those medications, or taking all of them on schedule. And I do see people who are labeled as resistant, but really they're not adherent. They're not taking their medication.

And so you need to go back and say, does this medication bother you. Look at the schedule if they're on a complicated regimen. Very difficult to follow that. So those are some of the issues involved. Secondary workup, review the regimen, think about adherence, sodium, and then volume. So volume kind of goes along with sodium. But if the person's not on a diuretic as one of those two or three agents, it's likely that that would improve their control. Or it may be an inadequate amount of a diuretic. Either the wrong agent or the wrong dose.

**DR. RANDAL THOMAS:** Just to re-emphasize too. The impact of sodium on a diet, it can have as much impact as one medication, really, in lowering the blood pressure. And often, patients will sometimes think if they're on the medication, they don't need to worry about sodium anymore, right? It's like when lipid control as well. A patient on a lipid agent thinks they can eat whatever they want. And it's important to reinforce that for patients.

And then, actually, another point along that same line with medications, is looking for other medications that might be interfering with the blood pressure control. So pain medications and immunosuppressive agents, and a number of others and we may see pretty commonly in a cardiology practice that could actually cause the blood pressure to go up a bit as well.

Now, we may not be able to get rid of those medications, necessarily, but it's good to know about those and identify those.

**DR. SANDRA TAYLOR:** Right. And along the point of NSAIDs, Non-steroidal anti-inflammatory agents. If you look at someone's medication list, they're often not there. So I will specifically ask, what do you take for pain? What if you get a headache? What if you get a pain? What do you go for? Because that often will bring out the fact that they're taking you know high doses of NSAIDs three times a week before golf, that's been one recently, where I've been amazed at how freely people do use NSAIDs.

**MARTIN VAN ZYL:** Now, blood pressure targets and goals are a big part of the guidelines. When do you consider a blood pressure of 130 over 80 too low for a certain individual?

**DR. SANDRA TAYLOR:** And I think that's worth thinking about. That I think many providers are worried about, especially older individuals, getting well-controlled and then falling or passing out and breaking a hip or something like that. So I think that the guidelines are set for, first of all, for free-living individuals who are living independently, not in a care situation, assisted living or a nursing home population. There are no good data to support the lower targets for that group of people.

So if somebody is frail, elderly, unsteady on their feet, or not tolerating their medication. They're lightheaded, they're feeling weak and tired, then I would absolutely back off on the target, and see if adjusting the medication helps that. Now, some people will feel that regardless of their blood pressure. It may not be blood pressure related. But I think that one of the helpful things about the current guideline is that, for somebody who's more frail, institutionalized, has multiple comorbidities, the target is really up to you.

And it's not 80, by the way, it's just the 130 in that group. And if that's too low, it's perfectly appropriate to use a higher target. So I think age is a big factor. But if somebody is living independently, very vital and active into their 70s, 80s, I would still try to get it to 130 or just under 130.

**DR. RANDAL THOMAS:** Another point to bring out is, of course, in the acute care setting, like after a stroke or when a patient is acutely ill you wouldn't apply those guidelines, especially after a stroke. Just to reiterate that is the free-living patients who are out and stable clinically.

**DR. SANDRA TAYLOR:** Right, even in a hospitalized patient I wouldn't feel the need to go that low. You want to keep them from being too high or too low, but that's not the time to perfect their blood pressure control. And the guideline does have detailed information about post-stroke, and that's really one that it's important to know those thresholds for treatment. So that is all available as an excellent reference in the 2017 guideline.

**MARTIN VAN ZYL:** Dr. Thomas, are there any unanswered questions that require further research?

**DR. RANDAL THOMAS:** Well, there's always new things to discover and new populations to test things in. I would say one thing that the writing group recognized is we don't really know how much prevention and early treatment help compared to later identification and treatment. We would assume the sooner we identify high blood pressure the better the outcomes will be. That's really never been tested.

So that would be an important thing to look at, and there are a number of studies to look at a natural study to see what's happening with early detection and does that help. We assume it would. It may surprise us how big that improvement would be. That would be one area, I think, to consider.

**MARTIN VAN ZYL:** Dr. Taylor, are there any lifestyle changes that are effective at controlling blood pressure?

**DR. SANDRA TAYLOR:** Yes, so I alluded to lifestyle earlier, but I think it's worth highlighting, again, that lifestyle can be equivalent to one or two medications. And there are different options. So I wouldn't have a patient take all of them on at once, but there is a very nice table in the guideline that gives the estimated effect of each different lifestyle change. It's about five to 10 systolic, and two to three millimeters diastolic that you would expect reduction with a lifestyle change.

So that could be regular exercise. That could be limiting sodium. It could be weight loss, relaxation options, increased potassium intake in the diet, as well as reducing sodium. There are a number of them listed. So I would strongly encourage patients to follows those guidelines, or take on one or two at a time in addition to medication if they need medication. And for some people, they wouldn't need medication if they adopt a guideline change or a lifestyle change.

**DR. RANDAL THOMAS:** It is important to point out for patients with the potassium issue. I'd like to point out that lowering the sodium will help lower the blood pressure, but increasing the potassium with more fruits and vegetables, for example, can help lower the blood pressure. Also decreasing intake of alcohol. Many patients, especially, are very sensitive to alcohol. But I would encourage them to decrease or discontinue alcohol if the blood pressure is difficult to control.

**MARTIN VAN ZYL:** Thank you, Dr. Taylor and Dr. Thomas, for these very important insights. And thank you for joining us on theheart.org Medscape Cardiology.