Advancements in Diabetes Seminar
CVD Risk Assessment in Patients with Diabetes

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Well, thank you Jan and thanks everybody for logging in today. As Jan said, I'm a member of the Oglala Sioux Tribe from Pine Ridge and I am a Board Certified Cardiologist. I am currently working at the Phoenix Indian Medical Center in Phoenix, and I am serving as the Indian Health Service Clinical Consultant for Cardiology.

So, today's title is "Guidelines and Instincts." So, what we're going to do is some real-life cases, and this is my first time doing cases via a webinar, so we'll see how this works and just bear with me on this because this is new for me. The objectives today are to describe cardiovascular risk factors and the equivalents, to outline some key elements of cardiovascular risk assessment that should be considered when making a clinical decision, explain what test should be ordered in evaluating cardiovascular disease, and describe what test warrant referral to higher level of care.

I do apologize I have a little bit of a cold so excuse me for coughing. Before we go through it, I just want to go through the classification recommendations that are used by the ACC, American College of Cardiology on their guidelines and you've all probably seen this before, but just to refresh your memory, Class 1 is a procedure that should be performed and has evidence to back that up. Class 3 usually should be avoided as it can cause harm. The level of evidence goes from level A to C. A being the highest level of evidence, C is usually just expert opinion and usually very low level of evidence. You'll often see the icons that represent the level of evidence. So again, the level of evidence Class 1A, that's the highest level that we can get. 3C, that's just -- you should not do that, there is no evidence to back it up.

So, our first case is a 37-year-old female with diabetes and high blood pressure, presenting for a routine med refill. She comes in stating that she feels well but she does ask to have her heartburn pill renewed because she's been having more heartburn in the past few weeks. Her vital signs are blood pressure 123/72; pulse of 67. Her hemoglobin A1C is 6.3 with an LDL of 100 and an HDL of 60. So the MA decided to go ahead and get an EKG, and the EKG showed this -- I'm not sure how well this is projecting but I just want everybody to kind of take a look at this. Nobody needs to be an expert EKG reader. The findings on the EKG, normal sinus rhythm with the non specific ST-T waves.

So the first question is, should an EKG have been performed? We're going to talk about that a little later in the presentation. I just want you to think about that. Second, does this patient need further testing? So, here we have a little poll. I don't know if anybody wants to go ahead and answer, you can have a few seconds for this.

Okay. So, it looks like the majority of everyone is saying yes, we need more testing with about 21% right now saying we need more info and 8% saying no. So on this, we need more info. We don't have enough information on her clinical history, we know nothing about her. So we talked to her a little more and she denies any chest pain or pressure. She denies any shortness of breath. She overall states

that her heartburn is mostly in the evening right after she eats. She describes it as something in her throat and when she belches, she feels better. As we continue to talk, she does mention that when she cleans or walks around, she gets a twinge in her chest every once in a while but it's just a twinge. She's not really concerned about it and she's not really able to give more details other than it's just a twinge.

In terms of her past medical history, she was diagnosed with diabetes at age 30 and hypertension at age 30. This all occurred during her last child birth. She's married and she has three children ages 12, 9 and 7. She's a non-smoker. She owns a house cleaning company but she does most of the cleaning alone. She also walks two miles in approximately 30 minutes every morning. Her father who is 70 has heart problems, she's not sure what type. But she knows her mother had a valve surgery last year at the age of 67.

So now that we have more information, does this patient need further testing? Does this change your previous answers? Okay. So everyone pretty much – online that she needs further testing. Well, for us, no, she does not need further testing. Why? She has a good functional capacity and she's asymptomatic and she has a low 10-year CVD risk.

So now, how did we come to this clinical decision? First of all, she is a pretty good historian. She was able to give her history regarding her heartburn symptoms. They follow eating in the evenings, she's very active, she cleans the house and she walks two miles every morning in 30 minutes. And so once you get to kind of think about that, that's a 15-minute mile, that's a pretty good pace. I think when I first started running, I was running maybe like a 12-minute mile. So that's a pretty good exertion level.

And so, we also use other tools in deciding whether or not patients need further testing. So, we look at pretest probability which is based on clinical history, age and sex and risk factors for coronary disease. She does have diabetes and she does have hypertension albeit well-controlled. Her hemoglobin A1c was 6.3 and her blood pressure was 123/72.

So, looking at that, we also use risk-scoring systems. The most popular being the Framingham Risk Score. Ours is the Strong Heart risk calculator for a Native American population and also the ASCVD Pooled Cohort Risk Calculator which will help us get an idea of this patient's overall cardiovascular risk. Using the Diamond and Forrester Pretest Probability and I think you guys have probably, if you've heard me talk before you've probably seen me use this. So this patient has nonanginal chest pain. She is less than 39 years old. She's 37 and she is female, so she actually would have very little pretest probability.

When we're using the Appropriate Use Criteria from 2013 for cardiac testing, you'll see here on the first box, she has low global CHD risk. Regardless of her EKG and her ability to exercise, it is rarely indicated to have a stress test. So R stands for rarely, M maybe and A is appropriate. So, based on this presentation, it would be inappropriate to move forward with further testing. In terms of the -- from the learning points on this for this abnormal EKG case, history is extremely important in her clinical decision-making. We talked for quite a bit regarding her activity and I felt very confident that she was indeed able to walk two miles in 30 minutes. She's very active in her business and with her family and so that was something that I trust in her clinical history.

Assessing her functional status is a priority in our patient population. I think that one of my examples of when I first got to Navajo, sheep herding is very common. And I would have some of my elderly patients go, "Oh, yes. I herd sheep all day." Until I actually went out and visited a patient and realized that herding sheep is not as intense as I thought it was. So, getting that true history is very important. Using multiple tools to assess functional status. I think we're used to doing the "can you walk a block" but when you grow up on the reservation there, it's not necessarily the block is not the same as the city block. So really understanding their ability to exercise and that's how we really assess whether or not they're symptomatic.

And then the EKG changes must be in context and she had some non-specific changes. And that does not mean she has coronary disease. That does not mean that we need to rush her to the cath lab. She has some non-specific changes and she is very active so putting the EKG in context.

And then again, back to the risk calculators. The risk calculators are not only helpful for patients and providers but they help us to determine what we can do in terms of lifestyle modification and risk assessment or risk factor modification moving forward. So, I really like to use my risk calculators with the patient sitting in front of me so that we can go over things together and talk about potential changes to improve risk assessment.

So that's it, the last point on this is that the ACC 2013 Guidelines on risk assessment doesn't recommend as a Class 1A as 1B indication is to get -- to use the 10-year risk calculator which is their Pooled Cohort Equations Calculator. Like I said, in our patient population, the Strong Heart calculator is age and risk specific for the Native American population and it's -- on occasion, you do have to get the urine albumin to use that, but either way, this is a good tool. That's case one. Any questions, we'll take at the end of today's presentation.

Case two. So, this is a 62-year-old male with diabetes and morbid obesity presenting for preop risk assessment prior to hip replacement. He's asymptomatic. He denies any chest pain or pressure. He has short of breath but he says that that's normal for him, he's always short of breath. He's unable to walk more than a hundred feet due to hip pain but he's very confident that if he got his hips fixed, he can walk a mile. And then he's a very pleasant gentleman, he's very jolly and a very nice patient but he's adamant that once his hip's fixed, he can do any kind of exercise.

Past medical history is significant for osteoarthritis. He has diabetes which was diagnosed in 1999. He's on CPAP machine for sleep apnea. He has hypertension and hypothyroidism. He's currently living with his wife and one adult son. He's on disability for his hip issues. He does not smoke and never has been a smoker. He does not use any alcohol and has never used any drugs. For activity, he uses his little scooter and wheels around the yard and picks up trash with a little hand clipper device that he explained to me. And he said he doesn't have to do that daily but when it gets real windy, he usually has to go pick up some trash. In terms of his family history, he tells me that his whole family has heart problems but he's not able to give me any specifics on that.

On his physical exam, his blood pressure is 143/82 with a pulse of 101. His BMI is 52. He has very distant heart sounds. His lungs are clear and he has large edema bilaterally. His repeat blood pressure was 133/78 with a pulse of 91. So, does this patient need more testing, further testing?

Okay. So yes, this patient needs more testing. So, his cardiac risk factors are diabetes and hypertension and possibly a family history of coronary disease although we don't know. He's unable to give that history. Other risk factors that we typically assess include tobacco use, hyperlipidemia and peripheral arterial disease. We did not get that full assessment with this gentleman.

I've talked about functional capacity and we always talk about how many METs and we all know the magic number for METs. Anything less than that is a very poor functional status, moderate four to six, good seven to 10, excellent greater than 10.

So let me go back to it quick -- so how do we actually assess METs? Well, can we just ask the patient, "Can you walk a flight of stairs?" And this patient, he's going to say, "Well, I think I can but I don't do it because it hurts." And we've all heard that from our patients. "Can you walk a block?" "Yes." "When was the last time you walked a block?" "Well, I don't ever need to walk a block, so I can't." So, what I'm getting at is how do we assess METs?

One of the tools I like to use is the Duke Activity Status Index (DASI). As you can see, it's a list of 12 questions and these are pretty basic questions of are you able to take care of yourself. Eating, dressing, bathing, most people are able to do that. Walk in doors around your house, walk a block, climb the stairs, or walk up a hill, run a short distance. The way to figure out your METs from using that is you add up all your DASI points, you take your points times it by .43 add 9.6, you get the total divided by 3.5 and that's your METs.

So, based on that scale, the maximum number of METs is 58, 10 METs. 4.5 is the lowest number and that's 3.4 METs. So this gentleman is around the 3.7 area in terms of his METs. So we definitely would like to get further testing. But what is needed? EKG, Echo, stress test?

The indication and recommendations for a preoperative EKG are pretty soft. Our best indication is at 2A, so we don't have any class 1 indications here. They are 2A and 2B. In this patient, it's reasonable to get a 2A indication. He has diabetes which is a cardiovascular equivalent, so he would meet criteria for 2A. The Class 3 no benefit is in a low risk patient who's undergoing low risk procedures. So, asymptomatic patient. So, those are the two basic levels, I mean recommendations for EKGs. So, we would get an EKG on him.

Assessment of LV function. So, this gentleman stated that he's short of breath and it's all the time. It is likely because he's morbidly obese. However, we do not have a true etiology for that. So, in him, it would be considered reasonable at Class 2A indication to obtain LV function prior to surgery.

Non-invasive stress testing. For this gentleman who's not able to complete more than four METs, who has multiple cardiovascular disease risk factors, it is a Class 2A indication, if it will change management. So, this is an elective surgery. So, if we found coronary disease, we would cancel the surgery. So obviously, it would change management. So it is a Class 2A indication to move forward with cardiac testing in this gentleman.

Some of the cardiovascular risk tools that can be used for preoperative risk assessment include the Revised Cardiac Risk Index, the NSQIP, and the MICA.

I have these on my desktop and they're very easy to use. I pulled up an example here and I actually meant to put that he was preoperative treatment with insulin, yes, and I put his creatinine was greater than two but let's pretend that his preoperative treatment was yes.

Overall, it gives me one point. His risk of major cardiac event based on this calculator is 0.9%. So, again, just based on these six questions, he's a low- risk but we've talked to the gentleman and he cannot exercise. He cannot complete four METs. So, based on our recommendations, he would get a stress test.

Using the NSQIP, as you can see, there are several other questions. This is a much more detailed risk calculator. Obviously, it takes a little more time and it's kind of hard to do during clinic. Sometimes, I do this afterwards. But here, functional status is an important part of this risk calculator where it is not on the last RCRI risk calculator. It also takes into account their BMI, diabetes, insulin use, dialysis. So, this calculator is a little more in depth. Again, on here, his cardiac risk is pretty low. I may not have put his information correctly but this will give you an overall of all complications. So, these risk calculators really help in preoperative risk assessment.

So, this slide here is a summary of the recommendations regarding preoperative risk assessment. We've gone through the top three, the EKG, LV function, and stress testing.

Preoperative coronary angiography is never recommended before surgery as the first choice test. So, that's just, you just don't. I mean, I tell patients, "If you come in to see me for a cath, you're probably not going to get your surgery anytime soon."

So, the are learning points for the pre-op eval. Number one, assess for symptoms. Again, you have to have a reliable patient to give you the symptoms and you have to have functional status in which you can assess symptoms. So, you got to look at their METs. If you were not able to assess their METs based on their activity and the patient is just saying, "Yeah, I think I can but I don't actually do that." You should use the DASI calculator to help with that.

And then, you need to ask yourself if testing is really going to change management. And that is the key question here because if it is, then you should proceed with a further workup. And then, use the risk calculators. That's always important. It helps, again, not just the patient, I mean, not just the provider but it also helps the patient.

Okay. So, case number three is --

Okay. So, case number three is a 37-year-old female with diabetes, hypertension being seen from routine med refill. I think you're all probably recognizing this case from earlier. She feels well, but asked to have her heartburn pill renewed because she has been having more heartburn.

Her blood pressure is 152/92 with a pulse of 67 and her hemoglobin A1C is 9.7. Her EKG is performed and it shows this. This is the exact same EKG as before. Does this patient need further testing?

Okay. So, again, I kind of led you into this one before. We need more information. We need to get her clinical history. So, this time, she's describing her heartburn as a burning in her chest. She's not sure when she gets it. It's sometimes after eating but it's sometimes before she eats.

She still complains of this twinge in her chest but she doesn't really -- I don't know. She just doesn't really -- she's not able to give good history here. Her past medical history is pretty much unchanged from previous. Her social history, she used to do all the cleaning on her own but she stopped three years ago after an injury. So, she's not doing much around her house and she leaves most of her household chores to her husband and her children. Her family history has not changed.

So, going back to what we've talked about earlier in the last case. So, in that case, we said, "No, the patient did not need any further testing." We were pretty convinced she had low pretest probability using all of her risk factors. Now, we have uncontrolled hypertension and uncontrolled diabetes. And we're not able to get clinical history on her.

So, she's somewhere now from nonanginal chest pain to maybe atypical, maybe probable somewhere in the -- she's still considered very low but she's still --we just don't know, we can assess her symptoms.

So, when we talk about angina, we talk about angina is defined as three things. It's substernal chest pain that's provoked by exertion or emotional stress and relieved by rest and/or Sublingual. Atypical anginal chest pain that lacks one of the characteristics of typical angina. And non-anginal chest pain meets none or maybe one of the above.

So, let's say that we're now convinced that maybe she's having some anginal chest pain, atypical chest pain. Either way, we're considering this patient as being -- she's now symptomatic. We cannot assess her exercise level, so therefore, we cannot really assess her symptoms. She's not able to describe them. So, she is in the category of -- she has an interpretable EKG but she's not able to exercise. So, she could -- it's appropriate to get a stress test on this patient.

The things that changed this -- and this is one of my slides. The risk of cardiovascular disease increases with her increasing hemoglobin A1C. So, initially, the first time she came in, it was 6.3. This patient now -- it's 9.7. It's uncontrolled. The same applies for her blood pressure. But this comes from the EPIC-Norfolk trial where they looked at 10,000 patients with hemoglobin A1Cs. And as they increased, so did their cardiovascular risk. So, we put a little more weight into that patient.

I think that we're going to have time to do this case four. So, case four is a 73-year-old obese female with diabetes and hypertension. She's presenting same day clinic with complaints of palpitations. Her symptoms have been present for about a year but in the past few months have gotten worse. She's now having symptoms daily. She does not deny any dizziness or syncope but she's worried and she can't sleep. Her CPAP machine broke a few months ago.

In review of her chart, it says she's had a stress test six months ago that was normal. Her EKG showed sinus rhythm with LVH and two premature atrial contractions. So, does she need further testing? Yes, no, or do we need more information?

So, yes, I'm going to agree with this. We definitely need more -- we need further testing on this patient. We chose to get a Holter monitor and it showed atrial fibrillation with her longest episode lasting four minutes. Her symptoms corresponded to the atrial fibrillation. We went ahead and got an echocardiogram which showed normal LV function and moderate LVH and left atrial enlargement.

So, why was it important that we do further testing on this patient? Well, first of all, atrial fibrillation is extremely common in patients with diabetes and uncontrolled hypertension especially as their age increases.

So, with her not to -- we could've been misled that the premature atrial contractions on her EKG were the cause of palpitations. But because of her multiple risk factors for atrial fibrillation, it's important to go ahead and do some further assessment there. So, atrial fibrillation is commonly seen in structural abnormalities and specifically that of the left atrium. And the left atrium can enlarge in multiple disease processes including sleep apnea. Notice she had a broken CPAP machine, also in hypertension, obesity, hypothyroidism. And as with diabetic cardiomyopathy, we're also seeing an increase in the amount of atrial fibrillation that we see.

Why is this important? What do we do? Well, we need to treat it. And with her, she was rate controlled. That wasn't the big issue. The big issue for her would be to do anticoagulation. I do apologize I do not have the anticoagulation slide in here. I must have hidden it.

So, anticoagulation is important to reduce the rate of stroke risk in this patient. And so, with her, she's a female greater than 65 with hypertension. She would have a CHADS2 score of three and she should be on anticoagulation despite the fact that she is rate controlled and the fact that she was in sinus rhythm during the office visit. She has paroxysmal atrial fibrillation. She's in and out. She needs to be started on anticoagulation.

So, that one is done. So, I'm going to go through case five. And then, we'll open it up for a few questions before we're done. So case five, 55-year-old male who's being seen for routine evaluation. He was diagnosed with diabetes about five years ago but he was not starting on medical therapy. He was lost to follow up but returns today because he figured it was time. He denies any symptoms but he states that he does feel different than he did before, but he thinks it might be because he's sobered up.

This is a pleasant gentleman, who's just as jolly as all he can be. He loves to laugh throughout the visit and tease and joke. And he tells me that he is diagnosed with diabetes five years ago after he got in a fight and got hit by a crowbar. He was having surgery and they told him he had diabetes and high blood pressure maybe. He's also had a couple other surgeries but he doesn't ever go to the doctor. He said he doesn't need the doctor.

He's currently living with his sister. He's been sober for a year. He's not smoked for a year. He's never used any drugs but tried marijuana in the distant past. He's currently working some odds and ends jobs usually manual labor. He doesn't do any routine exercise but he walks to the bus stop everyday back and forth. He also walks to the grocery store and the convenience store, which he said is about three blocks from his house.

On physical exam, blood pressure is 176/82 with pulse of 89. His BMI is 27. He does have a slight systolic murmur and some mild edema bilaterally.

His labs, his hemoglobin A1C is 14. His creatinine is 1.6, and LDL is 78, and HDL is 90. His triglycerides are 390. Got an echocardiogram that showed he had some aortic sclerosis without stenosis and Grade II diastolic dysfunction.

This is his EKG. So, this EKG is a little different from our previous EKG. We still have sinus rhythm. But we see this deep T-wave inversion kind of in the anterolateral leads.

So, what's next? Shall we tell the patient that he has highly abnormal EKG and that he may die and place a referral to cardiology and follow him up in three months? Shall we tell the patient that this is all his fault that he's in this situation? Put him on a bunch of medications and tell him he's going to end up on dialysis if he doesn't take them? Or, should we discuss hypertension and diabetes? Discuss medical therapy and lifestyle modification. After prescribing appropriate medical therapy, place a referral to the cardiologist, explaining to him that there are some abnormalities and that treatment is medical therapy and lifestyle modification.

So, I didn't have you vote on this because obviously, that's the correct answer. This case is important because we do have patients who come in and they have everything wrong with them. And it is highly frustrating to try to deal with all of this in one visit. And we shouldn't try to do that.

The important thing about this EKG is that -- this is LVH and his history is consistent with that. He has Grade II diastolic dysfunction on his echo and he is hypertensive. So, he might die but we shouldn't scare him and tell him that. Because a lot of times when I see patients coming to me saying, "Well, my doctor told me that I could have heart attack or --" which is all obviously true. But at the same time, it may take a week or so to get in the clinic. And in the meantime, they're highly stressed over this abnormal finding on their EKG and what to do about it. And so, one of the things is, when we do see an abnormal EKG, it's important to make sure that patient is aware that it is abnormal. But we're taking the steps to do what we need to do to make sure that they're safe and to get them on board instead of fear. The other thing I often see with patients who are afraid is that they don't show up for their appointments because they're afraid to be told bad news. And we don't want to miss patients because we've scared them. So, that's not our answer.

In terms of -- we do get tempted to just put patients on all the recommended therapy that first time we see them, but that's overwhelming. When you have a patient who's not been on any medications and walks inside of your clinic with eight different medications, what are the chances of the patient is actually going to be compliant with those medications? Pretty small. How do you remember like what is all this stuff I'm taking -- what's this for? Four of them are for diabetes and three of them are heart pills, and they all sound the same. So, starting patients on one or two medications and bringing them back is what I would recommend doing. Yes, it does take more time and it does take a little more effort but it does increase our rates of compliance and it gets patients on board for their own healthcare.

Part of the thing that is important is to discuss what is hypertension and what is diabetes. Many patients don't know. They know what they've heard from their family member or their friend or TV. So, getting them to understand the disease process and how it affects their body really gets them on board for how to later treat that. And so, lifestyle modification, obviously, is what we would like to see. This

gentleman started making his first attempts at lifestyle modification by stopping smoking and alcohol use. So, he's ready. He's ready to make a change and we have to be there to help him make the changes he needs and help him understand what he needs to do. By throwing a bunch of medications at him and giving him the threats, we're not helping him.

I actually have seen this happened. I've had patients tell me, "Well, I was told that I'm going to die and this is all my fault." And so, we got to make more conscious effort. So, I did go through that a little fast because I wanted to spend some time answering some questions.

Jan Frederick:

Dr. Wilson, thank you so much for all of that clinical information. It's really helpful and it's helpful to have your perspective too on balancing all of that information with a patient. We do have one question so far. And for the participants, if you have questions for Dr. Wilson, be sure to enter them in the chat box. The question we have so far is in regards to case study number four. What meds would you choose for anticoagulation?

Dr. Dena Wilson:

Excellent! So, nowadays, if you've all heard of the NOACs, the New Oral Anticoagulants, Novel Oral Anticoagulant. And so, those medications are great in terms of they do not need INRs to be monitored. They're a once a day medication. And so, as long as patient does not have valvular heart disease, they can go on the NOACs.

I usually have a conversation with the patients and let them know that the NOACs are very different and that right now the reversal agents are limited but they are short-acting. And so, you have to have the bleeding risk conversation with your patients, but really, it's the same as with the Coumadin and I see that in our patient population, patients are doing much better on the NOACs than with the Coumadin when transportation is an issue.

That being said, not all patients choose the NOACs. I've had a few patients tell me that they're much more happy to know what their INR. They want a way to monitor themselves. And so, I put them on warfarin.

I don't see any other questions popping up. So, I do want to go back to the first question I asked. Was the EKG appropriate in case one, the asymptomatic 37-year-old female who presented with heartburn?

So, the question I get a lot is, "Well, how often do we get EKGs and when should we get EKGs?" So, we don't really have guidelines on that. That's kind of where the clinical instincts come in. If you have a concern, you should get an EKG. Now, in that case, the medical assistant got the EKG without a physician order and it may have been that it was discussed between the physician and MA that when patients have chest pain and -- that was chest pain. But otherwise, hearing her full history, I would not have got an EKG. She was a reliable patient. I didn't see the need for one. But I also don't fault that one was performed. She does have cardiovascular risk factors and she was presenting with a chest pain type of complaint or heartburn. So, I don't fault that at all. But we don't have the guidelines to say, "Hey, that's a Class 1 indication there."