ALLIANCE FOR INNOVATION ON MATERNAL HEALTH

Video Transcript: Clinical Refreshers - Cardiac Conditions in Obstetric Care

Meg Sheahan [00:00:03] Hey, everyone. My name is Meg Sheahan. I'm a certified nurse midwife and a TA specialist at the AIM TA Center. And thank you so much for joining us for our second of four webinars in the clinical refresher series. This one focused on cardiac conditions in obstetric care. One quick thing as we start, please open this link in the chat to our very short eval survey. Your feedback helps us provide better support for you in the field. Finally, feel free to put questions in the chat. We'll do our best to follow up after the webinar. This webinar is brought to you by the Alliance for Innovation on Maternal Health Technical Assistance Center, which is supported by the Health Resources and Services Administration of the U.S. Department of Health and Human Services. The contents are those of the authors. They may not reflect the policies of HRSA, HHS, or the U S government. This series is part of our mission to support best practices that make births safer, improve maternal health outcomes, and save lives. And we thank you for your work in this shared mission. Please check out the AIM Cardiac Conditions in Obstetrics Care Patient Safety Bundle to learn more about this topic. By the end of this session, you'll be able to describe strategies for early recognition and management of cardiac complications in pregnancy, integrating clinical guidance into your practice, and implementing the AIM Cardiac Conditions Patient Safety bundle. It is truly a pleasure to introduce to you today's speaker, Dr. Diana Wolfe. Dr. Wolfe is a maternal fetal medicine specialist and attending physician at Montefiore Medical Center and Albert Einstein College of Medicine, where she serves as a professor in the departments of obstetrics and gynecology and women's health and medicine within the Division of Cardiology. Her clinical and academic work center on cardio obstetrics, bridging her expertise in maternal fetal medicine with cardiovascular care and pregnancy. Dr. Wolfe established the MFM Cardiology Joint Program at Montefiore, creating a multidisciplinary cardio obstetric program. She also developed the Cardio Obstetrics Postgraduate Course at the Society for Maternal Fetal Medicine and serves as faculty for the International Congress on Cardiac Problems in Pregnancy. We are so fortunate to have you with us today, Dr. Wolfe, and I pass it over to you now.

Dr. Wolfe [00:02:41] Well, thank you, Meg, and the entire AIM faculty for inviting me to speak about this subject that is so dear to my heart, and that is cardiac conditions in obstetric care. As many of you know, the AIM patient safety bundles have five components, readiness, recognition and prevention, response, reporting and systems learning, and respectful care. Each component has recommendations within and associated tools for implementation at each facility. I'm going to focus today on readiness and recognition and prevention and highlight a few tools for your use.

Pregnancy-related mortality in the U.S. Has been on the rise, and I'd like to highlight this publication from 2015 in our very own Green Journal, where when cause was looked upon, it was surprising for many to find that cardiovascular disease was the number one cause. And in the past it was hypertension, it was pulmonary embolus, it was hemorrhage. But in 2015, it was found to be due to cardiovascular disease conditions in pregnancy. And

from this point, this was a pivotal point in my mind where stakeholders across the country came together from cardiology, from obstetrics, from anesthesia to try to do something about this. More recent data shows that in data from 2018 to 2022, there's still an increase in the maternal mortality rate by about 30%. And it's affecting mostly American Indian, Alaskan Native, and the highest rate non-Hispanic Black patients. Furthermore, it's been noted that cardiovascular disease remains the leading cause of overall pregnancy-related deaths. Most recent data from the U.S., published in February 2025, showed a slight decrease in the overall maternal mortality rate, but the impact remains mostly on Black, non-Hispanic patients compared to Asian, white, and Hispanic patients. I'd like to highlight what's happening in New York State. This is maternal mortality rate within New York state between 2000 up to 2020. And what I'd you to focus on is the green line and the purple line. The green line is New York City. You can see that there's been a decline. The purple line is the rest of the state. And you can see that there's clearly a gap between New York City and the rest of New York State. And to me, what this implies is that there are maternal deserts everywhere. And we really need to try to change that and create ways to transfer patients to a higher level of care or coordinate a team wherever we are to care for the most complex patients, including our cardiac obstetric ones. This publication from 2024 looked at patients from within the US that gave birth between 2010 and 2019. And when the authors from UCLA looked at over 33,000 births, they found that over 132,000 were delivering with known cardiovascular disease. And when they looked at the odds of having a Major Adverse Cardiac Event, otherwise known as MACE, or an adverse pregnancy outcome such as stillbirth, preterm birth, and maternal mortality, the odds compared to patients without known cardiovascular disease was much higher, significantly higher. And furthermore, the implication on hospital costs was significant. And you can see at least $2,500 per patient per hospitalization. So this is clearly a burden.

This illustration here from 2025, these are trends in the prevalence of maternal cardiovascular disease within the US between 2001, 2019, and you can see that it's on the rise for all age groups, not so much the younger patients, those aged 18 to 25, but very much so in patients over age 40. So we need to be prepared. Why, what's the challenge? Why is this so difficult? Now, for the patients who come into pregnancy with the known cardiovascular disease, we have time to counsel and to help patients make informative decisions. We have time coordinate care. But what about the patients who have acquired heart disease where pregnancy and the peripartum period unmask disease? How do we differentiate? How do do we better in identifying these patients? Well, this is a nice table from the Practice Bulletin produced by the American College of OB-GYN. And what it shows, it breaks down the symptoms, vital signs and the physical exam findings in patients. It's a guide to triage these patients from normal cardiovascular complaints and real ways of alarm. So for example, most pregnant patients complain of shortness of breath, I have palpitations, I feel tired. So when do we know to just chalk it up to pregnancy versus it needs further investigation? Well, if your patient describes that they're short of breath at night while they're resting and they require more pillows to sleep comfortably, that's an indication where more evaluation is indicated. Furthermore, if their heart rate is in the 120s, 130s, needs to be looked at further.

Physical exam findings, most pregnant patients have a bit of an elevated jugular vein. Most of them have a systolic flow murmur from the increase in cardiac output. But if the murmur doesn't sound right, if it sounds abnormal to the obstetrician, if there are crackles in the lower lung bases, further evaluation is recommended. We know that there are normal hemodynamic changes that affect the cardiovascular system in pregnancy, namely an increase in cardiac output, which for some patients peaks as early as 22 weeks, and for some as late as 32 weeks. We know the peripheral vascular resistance declines in the

second trimester, and so when our moms come and tell us that they almost passed out when they went to the gym, where they feel dizzy, It's likely due to a drop in blood pressure from the drop in the peripheral vascular resistance. And then this changes in the immediate postpartum period where the placenta separates from the uterus and the entire circuitry changes drastically. There is hemodynamic dilution of, excuse me, there is physiologic anemia from dilution due to an increase in the plasma volume. We know that iron supplementation helps with this. And I like this illustration because you can really see how the gravid uterus, how that fetus is sitting right on top of the inferior vena cava. When your patient is laying supine, what happens? You have a decrease in venous return to the heart, decrease in stroke volume and decrease in cardiac output. The result is the patient feels dizzy. They feel like they're going to pass out. Easy to fix, have your patient lay in the left lateral position and that relieves that cable compression and restores cardiac output. Intrapartum changes, there are many, but just to highlight the second stage of labor, that is when mom is pushing and there are two real main concerns specifically with patients with known cardiac disease, namely those with connective tissue disorder who are at risk for aortic dissection. We know that there's an increase in arterial shear stress. There's fluctuations in preload. So for some of our select, very at-risk patients, we might wanna shorten the second stage of labor with an assisted operative delivery. Doesn't end there. There are EKG and echo changes in pregnancy. So the EKG changes are really due to the change in the orientation of the apex of the heart because of the gravid uterus displacement and or the gravid uterus displacing the orientation the heart. And oftentimes you'll see shortening of the PR interval, a prominent Q wave, flattening or an inverted T wave. The echocardiogram is different in pregnancy. It's normal to have an increase in the left ventricular mass, but the ejection fraction should not change. The aortic root diameter should not change.

So in 2023, we published, along with the help of the Alliance for Innovation on Maternal Health, AIM, we publish this safety bundle on cardiac conditions in obstetric care. And I'd like to highlight a few of the components. Readiness. The first R, one of our recommendations was to train all obstetric care professionals to perform a screen for cardiac conditions. From the second component, recognition prevention, similarly, one our recommendations, was and still is, use the standardized cardiac risk assessment tools to identify and stratify risk. So I'd like to walk us through the story of cardiovascular screening in pregnancy. Well, the California Maternal Quality Care Collaborative, this is a committee of physicians, public health professionals, government folks, and others who came together and reviewed 64 cardiovascular deaths, maternal deaths from cardiovascular disease that occurred between the years 2006 and 2010. They carefully reviewed every patient's chart and they came up with an algorithm that was a combination of the most common risk factors, vital signs, and symptoms that these patients reported. And when they retrospectively implemented this algorithm among these 64 patients, 93% of them would have screened positive and potentially their death could have been prevented. So when this publication came out in 2017, the proposal was a system-wide implementation of this algorithm. In 2024, I partnered with my colleague Dr. Hameed of University of California to promote and advocate for universal cardiovascular disease risk assessment in pregnancy and postpartum.

This is what the algorithm looks like in paper. And in 2018, together with UC Irvine, we performed a pilot study that was on paper. And basically, for a patient to screen positive, they need to have one positive symptom, vital sign, and risk factor. So if you look at this algorithm in the form of three buckets. Also, one can screen positive if they have any four of any. So a patient, if they complain of chest pain, dyspnea, dizziness, and palpitations, those are four positive symptoms, they screen positive. Apart from the three buckets,

there's the physical exam. So every patient who's being screened for a cardiovascular risk should have a cardiopulmonary exam. And if there's an abnormal sound from the heart, abnormal lung exam, then they immediately screen positive and this should allow the healthcare team to perform further evaluation and a consultation with a cardio-obstetric team, or at least a cardiologist and a high-risk obstetrician.

In 2021, along with UC Irvine, we received a grant to perform a validation study. And it took us a while, but we were successful in implementing this algorithm into our EMR. And this is what it looks like in the EPIC system. So this is a generic patient. When you open the chart of a pregnant patient, There's a red banner, Cardiovascular Risk Assessment Required. So you click on that. And then it navigates to the three buckets. You click on the pull data from chart. And it imports the vital signs and the risk factors that are in the chart. Sometimes you have to double check it, but most of the time it's pretty accurate. And the last part is to look at the symptoms. You can click on all symptoms negative or you click on what they report as yes. And then you calculate the risk score. If it's positive, it'll turn red and then it navigates to the order set. So this is what the order set looks like at Montefiore, the cardiac testing, and the referral to our cardio-obstreetric office. So between 2020 and 2024, a validation study consisted of four healthcare networks. We were involved. We screened 19,000 patients total, and the healthcare networks represented the U.S., more or less New York, California, Tennessee, and Missouri. And out of 19,000 patients, 385 screened at risk. And of those, 60 were confirmed to have cardiovascular disease. This is a summary of our findings, which are in the process of being published, but just to give a highlight here, 2% of the entire cohort screened positive, 2.3% were confirmed to have real cardiovascular disease. The positive predictive value was 15% and of all the elements of the algorithm, what was most predictive was the physical exam. So, there's more work for us to do. We have to refine this tool, but it's a start.

Moving to the next recommendation, establish a multidisciplinary pregnancy heart team or consultants appropriate to the facility's designed level of maternal care to care for people experience cardiac conditions in pregnancy and postpartum. This diagram on the right is from 2025, the European Society of Cardiology endorses this recommendation as well. I'd like to highlight what was found in the New York City Pregnancy Associated Mortality Review from 2016 to 20. When the committee looked at deaths from cardiovascular disease, they found that continuity of care and care coordination contributed the most to the deaths. So to me, that implies that if we have coordinated care, we can prevent these deaths. This is what a team looks like, ideally. You have folks from the labor floor, labor and delivery nursing, obstetricians, high risk pregnancy physicians, the anesthesiologists, the cardiologists, and other folks to be present, depending on the specific case. And most importantly, the patient is at the center. And your trainees, very important for them to be a part of the team. This is what a checklist example looks like, where it reminds us all to go through the history of present illness, go through the cardiovascular testing, even look at the echoes together, go through plan during pregnancy, the delivery plan, mode of delivery, and really how we're gonna monitor the patient, what medications on the labor floor we wanna avoid, what lines do we need. What kind of nursing do we need and what are we going to do in the immediate postpartum period?

This is just an example of a patient that came to Montefiore just this year. This is a 40-year-old IVF pregnancy, 36 weeks pregnant, who presented to an outside hospital, associated hospital, but not at our main campus, presented to the emergency room with left arm tingling. After a very rapid workup, she was found to have an aortic dissection. Given the hemodynamic instability of the patient that was concluded based on a lack of pulses felt in the radial and brachial blood vessels, she was considered hemodynamically

unstable and therefore needed cardiothoracic surgery. So we had to gather our team very, very quickly. The considerations, the cardiovascular, cardiothoracic team wanted her blood pressures to decrease very rapidly. Was she preeclampsic? We needed to make her hypotensive because of her aortic root dissection. Her systolic were in the 200s in the field. They were dropping her to 90. How was that going to affect the fetus? Mom needed to have a cardiac bypass to have her aortic root replaced. How was that going to impact what we did? And the delivery considerations, she was going to be fully anti-coagulated. So very high risk for postpartum hemorrhage. And what was our surgical approach going to be? So very quickly, in minutes, patient was transferred to our facility, to a facility where we have the cardiothoracic team and where the obstetric team and the neonatal team normally don't do deliveries, but we mobilized our team to this hospital. We decided on a skin incision and we decided on an uterine incision, low transverse. After the delivery of this 36-week fetus, the patient was at very high risk for postpartum hemorrhage because quickly the cardiothoracic team took over, fully anticoagulated the patient and replaced her aortic root. So, in order to prevent hemorrhage, we had tamponade tools, Bakri Balloon, oxytocin... And the neonatal team was there to resuscitate the fetus who had some hypoxia in the initial birthing period. This is really a diagram, had we known this patient had risk factors for an aortic dissection, had we made a diagnosis beforehand, this is a guide for how decisions are made on replacement of the aortic root, depending on whether the patient has known connective tissue disease and the size of the aortic root. Furthermore, the mode of delivery depends also on the dilatation of the aortic root, but for this patient, she was a patient receiving routine prenatal care without complication and just arrived in the emergency room with these subtle findings that led to our diagnosis and decision making. So just to emphasize, interdisciplinary team is key. We can't take care of these patients in silos or by ourselves. We need everybody to join hands in the emergency department, on the labor floor and in the outpatient setting. The European Heart Journal endorses this message. A multidisciplinary team is required. The American Heart Association also endorses this recommendation. And thank you so much.

Meg Sheahan [00:26:30] Dr. Wolfe, thank you so much. There is just so much to learn in this. So please join us for the rest of the clinical refresher series. They take place every Wednesday in the month of May this month at 12:30 Eastern. Upcoming topics include severe hypertension and pregnancy, that's next week, and safe reduction of primary cesarean birth the following week. And just remember, if you registered for today's session, you're registered for them all. Look for the invites on your calendar or in your inbox, and please share the link in the chat with your colleagues who may want to jump in on this. It's not too late to register. Also, the webinar recordings and slides will be available on saferbirth.org within about a week of each session. And if you like this content, and you would like to learn more about this and all of the AIM topics. Join us at the AIM annual meeting June 15th to 17th in Arlington, Virginia. That's the D.C. Area. You can use the QR code or click the link in the chat to learn more. And thank you so much for joining us and thank you, Dr. Wolfe, for sharing your years of expertise. Again, everyone, please complete the very short eval form and check out saferbirth.org. Sign up for the newsletter. If you put questions in the chat, we'll do our best to follow up with you. Thanks, everybody.

Dr. Wolfe [00:27:59] Thank you so much. And please email me for any questions. I'm really, really happy to talk about this subject.