



ALLIANCE FOR INNOVATION
ON MATERNAL HEALTH

Video Transcript: AIM Clinical Refreshers: Sepsis

Meg Sheahan [00:00:00] Hi, everyone. My name is Meg Sheahan, and I'm a TA specialist at the AIM TA Center. And thanks for joining us for our first of four webinars in the clinical refresher series. Today's webinar is on sepsis in obstetric care. A few quick housekeeping items. First, due to the large number of participants today, everyone will be on mute, but please feel free to type any questions or comments that you have into the chat. We will do our best to address as many of them as we can at the end of the session. And any questions that we can't get to, we will follow up with you. Next, please take a minute to open this link to our quick evaluation survey. And please complete this survey at the end of the webinar. Your feedback is really valuable to us. We have three sessions after this one in the clinical refresher series and we will use your feedback to improve those sessions. And speaking of links in the chat, please keep your eye on the chat throughout the webinar. We'll put links to key resources that we discuss throughout the webinar in the chats. This webinar is brought to you by the Alliance for Innovation on Maternal Health Technical Assistance Center as 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. To learn more, a whole lot more about improving the processes of care and patient outcomes related to maternal sepsis, please check out the AIM Sepsis in Obstetric Care Patient Safety Bundle. The link is in the chat.

Meg Sheahan [00:01:48] By the end of this session, we'll hope you'll be able to describe at least one strategy for early recognition and timely management of sepsis, integrate clinical guidance into your practice, and describe at one strategy of implementing the AIM sepsis and obstetric care patient safety bundle. The AIM Clinical Refresher Series really does have an all-star cast of expert speakers, and I am so excited to introduce to you today's star, Dr. Melissa Bauer. Dr. Bauer is a dual fellowship trained, she is dual fellowship-trained in critical care and obstetric anesthesiology and is an associate professor of anesthesiology and population health. In the Health Sciences Department at Duke University Medical Center. She's independently funded by the NIH through the Eunice Kennedy Shriver National Institute of Child Health and Human Development, where her work focuses on reducing maternal mortality and morbidity due to maternal sepsis. Her research centers on the early identification and treatment of maternal sepsis and the use of patient and community engagement strategies to improve maternal care. Dr. Bauer served as Chair of the National AIM and ACOG Sepsis in Obstetric Care Patient Safety Bundle Workgroup, and she's led statewide implementation efforts of the Maternal Sepsis Safety Bundles in Michigan, 67 hospitals, huge, and serves as a consultant for multiple states on maternal sepsis bundle implementation and QI initiatives. So it's hard to be more qualified to speak on this than Dr. Bauer. I am very pleased now to pass it over to you, Dr. Bauer.

Melissa Bauer [00:03:38] Thank you so much, Meg, and thank you to AIM for the honor to speak here today. We're gonna go ahead and get started because we have a lot of things to talk about here. So today's agenda, we'll be going through the definition of sepsis, the incidence, and we'll talk about why mothers die from sepsis and how we can improve

those common pitfalls. So let's go ahead, and get it started. I do wanna acknowledge that a lot of this work today that I am discussing was funded by the NIH. And so my views expressed here in this presentation do not necessarily reflect the official views or policies of the NIH. Sepsis is the first to lead in cause of maternal death in the United States since the CDC started keeping track of maternal deaths in 1987. It's really been one of the very top causes. And if you look over time, you'll see that there really hasn't been any noticeable improvement. And certainly you can see the huge spike during COVID. But in other types of maternal deaths, if you look at the data, there have been a decrease in deaths due to hemorrhage and hypertension. And just with sepsis, it really remains right about the same without improvement. As far as the incidence goes, I just wanna share with you that there are a number of studies out there that highlight trends and the incidence. And the challenge with that is that many of them have different definitions. As you all know, the definition changed in 2016 for sepsis in that patients need to have end organ injury with an infection to be considered to have sepsis. So if you're looking at data that are before that, they might have a different definition and also some of them are only looking at one point in time. And the challenge with that is that it's going to look more rare to you than it actually is. So when you look at studies, when I put together all the studies that I could find looking at that, and I wanted to see across the whole spectrum of pregnancy, so: antepartum, delivery, hospitalization, postpartum, readmissions, it's right about one in a thousand. And so that is usually about what rings true. The concern about that is mortality is right about 10%. And that's in someone with end organ injury, not someone who just has some abnormal vitals, has an infection. That definitely means that they have to meet those criteria of end organ injury to have that level of mortality, which is really concerning because we don't see those levels of mortality with other conditions.

Melissa Bauer [00:06:12] In three, in two state maternal mortality reviews, in our recent study in the CDC, looking at 27 maternal mortality review committees, they found that deaths are due to three common delays. And we highlighted this in Michigan. It was found again in California. And these themes also were the same in the CDC data, but the delays are due to delays in recognition. This is the most important. And so if you're following along here, most of these slides are going to be related to recognition. Probably 90% of this talk is gonna talk about recognition because we can't have treatment. If we don't have recognition. Recognition is at the level of the provider in recognizing the signs of sepsis so that you can give early treatment. And then also it's at the levels of the patient. And I'm not blaming the patient here, it's something that we all need to work on to give patients the resources that they need to know when to seek care in those signs of sepsis. Also delays in treatment. This usually is related to delays in appropriate antibiotic treatment or appropriate antibiotic treatment that is delayed within that after that first golden hour. And then also delays in escalation of care. When we looked at this data, we found that many patients died at home. So unfortunately they did not seek care or they sought care very late. The other part is that there were some patients that were admitted that the signs of critical illness were not recognized and that those patients were the next thing they were seeing, they were either an extremist or had been deceased. So we need to make sure that we're recognizing when patients need a higher level of care. So let's go through how to avoid these common pitfalls. And you'll see here that deaths are preventable up to 86.4% of the time. And that was from the CDC data looking at 29 states. Let's go through recognition. What you'll see here, I get asked this quite a bit about risk factors. People wanna know which patients are at risk, which ones should I focus on? And I do wanna highlight that these are associations and that these from retrospective databases. And so we can't really consider them to be the be all end all for risk factors, but taking a look here, you'll that common associations across all studies and I pulled all the studies to take a look at where you would see what the risk factors are. So some of these studies don't have the

capability to look at what other studies looked at. So I wanted to give you what you would across all studies. There are definitely more risk factors than what I'm listing here, but these were very common across all study. So I think that they're the most important because they've been shown time and time again. Those are cesarean delivery, reliant on public or Medicaid insurance, multiple gestation, bias. The reason why that is there is because we know that there is no biological reason that anyone from a particular race or ethnicity would experience sepsis more commonly, but we do know that that occurs. Additionally, postpartum hemorrhage and preterm delivery. I do want to caution you that because these are retrospective databases, we're not really able to identify which came first. So a couple of these could be implicated by reverse causality such as cesarean delivery. Hemorrhage or preterm delivery. So you don't know if the cesarean delivery came first or let's say mom came in very, very ill, needed to be delivered. And then cesarean delivery is just an innocent bystander in that standpoint, or if the patient had cesarean delivery and then subsequently developed sepsis. So I do wanna highlight that, that that makes it a little bit challenging.

Melissa Bauer [00:10:13] But one of the most important things that when we looked at data a number of years ago was that we found that sepsis actually often occurred in patients with no risk factors at all. So we need to develop surveillance systems to identify patients who have sepsis. So how can we do that? What you'll see here is these are a number of early warning systems. There's so many out there. I just put them here in a word cloud so you could see how many there really are. And I don't want to get into the details of which one you should use, at what point in time, because I think that that... I think that it needs to be adjusted for what your hospital is trying to do. So I've had a number of people come to me and they say, you know, I really don't want to use just a sepsis screening system. I want to use a maternal morbidity screening system because I want it just do one. I don't wanna have multiple different screening systems going on at once. And I completely understand that. So I wanna just share that the most important thing is to use one. It's been shown that using in early warning. System does reduce severe maternal morbidity because it reduces the amount of time that it's recognized from the time there's abnormal vital signs to the time of intervention. So that's really key. The other part is to couple alerts with protocols. And this is really key. This was a study out in California that looked at a very large hospital system and they implemented the maternal early warning trigger tool. And this warning system was paired with protocols. And so in the hospitals that had the mute system, the maternal early warning trigger tool, they actually had reduced their severe maternal morbidity by 20% compared to the hospitals that weren't using it. So it's really key to help people identify what to do if they're confronted with some very abnormal vital signs. And so that's what that study did. So please take a look at it, it's very helpful.

Melissa Bauer [00:12:23] So here's the California Maternal Quality Care Collaborative Sepsis Flowchart and the CMQCC update was released in September that has a very large toolkit that goes through just about every detail of what you need to do to help implement this at your institution. But I'll share with you that. You can actually get just about every detail of that large toolkit on this flow chart. This is your Cliff Notes. So if you take a look at this, this has just about everything that you need. And so I wanna look at this a little bit closer with you so that we can go through the steps. So starting at the top, what you'll see is the very first thing that you wanna be doing is what you're already doing. You're already checking everyone's vital signs. And so, and usually when patients come in, They get a white blood cell count with their CBC when they're arriving into the hospital. So that's part of it. If you're using the CMQCC serious infection screen. So you'll take a look at that here. The other part is, and that's a part of your routine screening. So every

few hours, you're checking the vital signs and you also wanna make sure to take a look at those vital signs to see if they're abnormal and they meet any of these criteria. The other part is that if a patient has some concerning maternal signs and symptoms. And I will share this a little bit later, but that's looking at the urgent maternal warning signs that is supported by ACOG. And it has a number of warning signs that help patients know when to seek care. So in either of those circumstances, you would start down that pathway. So looking at that, if a patient has two or more of those warning signs, then that would meet the criteria for a serious infection screen. They don't have sepsis, but there's potential and they're at risk for a serious infection. The next step is to do a bedside evaluation to assess that patient for any symptoms and concerns, to assess for an alternative diagnosis. So that is looking for hemorrhage or something like that because hemorrhage, their vital signs are very similar to a patient who is experiencing sepsis. So taking a look at how to do the bedside evaluation. So bedside evaluation really is to evaluate for end organ injury. And what you wanna do with that is take a good look at the patient. There's a whole lot that you can't see just from the chart, but do your bedside of evaluation looking for hypotension, hypoxia, oliguria, and mental status changes. So that's your overall look. Have them repeat the vital signs all over again. And then you'll also want to send labs for a laboratory evaluation if there are some concerns. I will be honest with you that a lot of these screening tools, there is a high false positive rate that I'm sure if you've implemented, you've seen that. And it can be 5%, it can even more than that. And some people just have some abnormal vitals and it's not that there's something going on. But if you see that a patient... They have some signs of infection and they have abnormal vital signs. That's something to be very concerned about. They're definitely at risk. So then you'd send off a complete blood cell count. That would be checking for the platelet count for sepsis-induced coagulopathy. Sepsis-induced coagulopathy does occur. And so that's one way to check for end organ injury. A comprehensive metabolic panel will help you look for renal injury as well as liver injury. Lactic acid does help us with evaluating for the severity and maybe helping with resuscitation a bit. And then a coagulation panel, that's usually reserved for the second round. Like if a patient has a sign of end organ injury, they may be more likely to have coagulopathy. And so you'd certainly wanna send that or if they're experiencing signs of clinical illness or critical illness.

Melissa Bauer [00:16:16] Moving on, but one of these things I do wanna share with you, even though we were pretty intentional about choosing thresholds here, I do wanna highlight that there is no international consensus about what those end organ injury signs are in pregnancy. For the sepsis three definition that there a consensus on that is not for pregnant patients and having a SOFA score of two or more is for patients that are adult and is not related. It is not adjusted for pregnancy. So if you're using that criteria, you can miss patients actually because some of those thresholds are extremely high. We were very intentional about that, but so there's a lot of variability in what you might read out there. But I do wanna stress, do not wait until these criteria are met. If a patient has a signs of infection and also has any sign of end organ injury, even if it doesn't totally meet that threshold, you really need to move forward with urgent treatment, making sure they've had their antibiotics, that they're getting resuscitated as needed, and that there's restoration of perfusion of their blood pressure, if their MAP is less than 65. So looking here, this is the pathway that you'll go through after you've done your bedside evaluation. Even if everything's negative, they remain at high risk. And so you wanna increase your monitoring. If the elevated lactate is that's the only sign and it's during labor, do want to be cautious. We published a meta-analysis a few years ago that showed that many patients can have an elevated lactic acid and not actually, there's nothing wrong with them. We looked at only healthy patients and they can have very high levels, especially around the time of delivery. So you'd want to increase your surveillance on those patients too.

Additionally, if they do have one or more of those criteria, that defines sepsis. And so you want to make sure that they're getting fluid resuscitation, escalation of care. They're getting blood cultures, antibiotics, and then following up their lactate. Septic shock is the definition of that is that after they've received fluid resuscitation that they have a vasopressor requirement to keep their map greater than 65 and they have lactate greater than two in the setting when infection. Those patients, we definitely need to be working on sending them to a higher level of care, whether that's the ICU or a different institution that has those capabilities. A couple of recognition pearls here. I do want to share with you that your alert system should alert you if there are missing vital signs too. One of the challenges is that when patients have sepsis, they might be so clamped down that you're not able to get a pulse oximetry reading. You may not be able to get a temperature reading. There are a lot of things that can happen. Maybe the blood pressure cuff is not reading very well and they're thinking that it's malfunctioning. You're not gonna get that from the chart if it's missing because they're having trouble getting that vital sign. So you wanna make sure that you get alerted if there are missing vital signs as well. I also wanna stress that no fever, and this is the top headline of this entire talk. If this is only thing that you take away from this, let this be the pearl. If there's no fever, that does not equal no sepsis. Fever is transient, and we've published now a number of studies, including in patients that died, that up to 20 to 25% of the time, they may not have a fever or even hypothermia. Pregnant patients also during pregnancy may be taking fever-reducing medicines for pain, such as Tylenol and postpartum, Motrin and or Tylenol, and so they may experience that fever. Also be aware of co-occurring maternal morbidity. And I've seen some of the sickest patients I've ever seen had two different things going on. Preeclampsia and hemorrhage or preeclampsia and sepsis. Remember, they have very similar vital signs. One of the challenges is, is that with preeclampsia, they may be on medications such as libidolol and they may not have that tachycardia. They might have a heart rate of 70. And so it may not alarm anyone. Additionally, they may have started at a higher blood pressure and now they're within the normal range and it also doesn't alarm anyone, so it's important to follow trends over time as well.

Melissa Bauer [00:20:40] Additionally, a couple of other, um, things to be aware of is normalization of deviance. This is probably one of the most important things in, um medicine is that when you start to look back on cases, you can start to see where things started to go, um go wrong. And I've seen it where, you know, I'll, I will go and look at a patient, their heart rate might be 140 and you wonder, gosh, how did it get like that? And then someone might say, you know, that's normal for her. The concern is, is that if you actually look back, it wasn't. And so maybe the first shifts they're right around one 10 and then the next shift it's one 20 and that was one 30. And then it's not that much off from where it was, but now you're way outside of the range of normal. And it's just been, you know, kind of passed off as that's kind of normal for her. So I really would question that and looking at trends over time, like I mentioned is really important and the normalization of patient concerns, asking people really. What they're experiencing is really key. Patients will have a lot of non-specific complaints with sepsis. And so really assessing what their severity is, like a lot patients will complain of being tired, and that's really normal for postpartum, right? And so we may not ask a whole lot of questions, but it's important to ask, you know, what are you not able to do? Because in my working with a number of patients with patient engagement, we found that they weren't able to do their activities of daily living. And that's really something that's important to find out rather than reassurance. We want to make sure that we're identifying all of those things.

Melissa Bauer [00:22:15] So now moving on to patient education. How can we educate patients? Because this is key. If they don't come in, we can't help them. So taking a look at

the urgent maternal warning signs, this was a cornerstone resource that was created by the counsel for patient safety in women's healthcare. It's been translated to 90 languages and it provides standard advice, patient education. So patients can understand what are the warning signs to seek care during pregnancy and postpartum. This is more than just sepsis, this is for all just about every type of severe maternal morbidity. And I just wanna highlight postpartum warning signs, this is a resource that was created with AIM as well.

Melissa Bauer [00:22:57] So now moving on to response. So this is key here. Giving antibiotics within that first hour is really important. We did a seven center case control years ago. We found that patients who got antibiotics, these are all pregnant patients, not just general population patients, they got antibiotics within one hour, their mortality was 8%. It was after one hour. It was 20% and the new CDC study, all of these patients died. Only 11.8% received antibiotics within the first hour. This is definitely something we can all improve on. If you QI your timing from antibiotics order to the time administered, you'll see that you're probably not meeting the mark unless you're intentionally doing so. A couple of things that you need to do to meet that mark is take a look at these three resources. They have specific antibiotic therapy suggestions that are available. Having that order set so someone can just click through without having to look up anything is really key. So have some decided upon antibiotics with your team. So that we can order those antibiotics very quickly. Some systems-based solutions to support timely treatment would be having these antibiotics in your PIXIS so that you don't have to wait for them to be given to you by pharmacy, having that order set, and then also getting some IV access to run more than one antibiotic. Many of them are compatible, but if we have three antibiotics and we give two hours for the first, two hours the second, and the one they really needed is the third. Even though you might've met the metric, you won't be doing the absolute right thing for that patient. One of the other keys, there's some survival data associated with giving the beta-lactams first. That has been shown in a couple of studies now that if you give that antibiotic first, that can make a difference with mortality. Also talking about fluid resuscitation, if a patient has sepsis, SMFM recommends giving a liter of fluid at that time. CMQCC also says one to two liters. People want to ask about how much fluid to give. Make sure you're using ideal body weight. It's really sad when you take a look at what ideal bodyweight is for certain heights, but it's based on height. It's not based on how much someone weighs. And even if someone's six feet tall, they're only going to get two liters, so take a look at that chart. This is available in the sepsis review as well, CMQCC. Moving on to vasopressors. If a patient has persistent blood pressure is less than 65, that you really need to help get that up for those patients. The new surviving sepsis campaign does recommend that we do start vasopressors peripherally without a central line to make sure to restore that perfusion early. There is a peripheral protocol available in this study written by Pacheco, and I can make sure that that reference is there for you, but that has one for obstetric patients.

Melissa Bauer [00:25:53] Now moving on to escalation of care and we're gonna finish right on time is the sepsis and obstetric score is something that I recommend. This was retrospectively created, prospectively validated to identify patients who need an ICU admission that are at risk for sepsis. And this has a number of criteria that are based on vital signs as well as laboratory criteria to help you identify these patients. It's really hard for me to remember all those criteria. So I'm gonna give you a little shortcut here. You can take out your phone right now and look up perinatology.com and search for a sepsis calculator. It will pop up. If you click on that, you can pull in the dropdown menu what each of your patient has and it will give you score. And if that patient score is six or more, that was associated with an ICU admission. Now, if you have some concerns beyond that... That maybe their score is four and you have some really serious clinical concerns, I would

encourage you, don't wait till they're six. I would work on getting that patient transferred to that level of care. Remember we talked about escalation of care as one of those delays that leads to maternal deaths. Moving on to key strategies here, allowing your hospital to adapt for their facilities, level of care and population serves. So there are a number of recommendations out there, but it's important that you adapt it to how your workflow is, as well as how your institution does warning systems. As far as recognition, make sure to spend that time teaching your patient about warning signs and listening to their concerns. Having an alert system and doing a bedside evaluation if patients set off that alert system. As far as treatment, making sure to have order set availability so that you know exactly what to give very quickly for those patients and having systems-based solutions, such as having it in the PIXIS and in a number of other ways that you can get the antibiotics in quickly. And then for escalation of care, having established criteria before you have a patient sick to transfer them to the ICU or to a level of higher care. And I just want to highlight a number of resources here, the AIM resources, as well as a consensus statement and a clinical expert series, as well the consult series from SMFM and the updated CMQCC toolkit. And with that, I am happy to turn this back over to Meg. Thank you so much. All right, thank you.

Meg Sheahan [00:28:29] Thank you, Dr. Bauer. So, we've gotten so much great information and insight today, and unfortunately, to get you all back to it on time, we don't have time to answer questions. But if you do have a question, please enter it into the chat, and we will make sure that we follow up and answer it for you. All right, so please join us for the rest of the clinical refresher series. It'll be every Wednesday, this month, the month of May, at 12:30 Eastern. Upcoming topics include cardiac conditions and obstetric care, that's next week, severe hypertension and pregnancy, that the following week, and then finally safe reduction of primary cesarean birth. If you registered for today's session, just remember you're registered for them all, so look out for the invites on your calendar or in your inbox. You don't need to register for every session. 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 recording and slides will be archived on saferbirth.org within the week. Finally, thank you so much for joining us. Thank you for your work in addressing maternal mortality, and thank you, Dr. Bauer, for sharing your years of expertise. If you have questions, please feel free to email us or put them in the chat, like I said. And then finally, last slide, please complete the very short evaluation form. If you are not signed up for the newsletter, please sign up on saferbirth.org. Thank you everybody. Have a great day.