Joe: Hi, everybody. Welcome to the Blood Bank Guy Essentials Podcast. This is episode 105CE. My name is Joe Chaffin, in case you've forgotten. It's been a while. It's been a bit of a long extended hiatus and I'm just thrilled to be back with you and releasing new episodes again and to reconnect with all of you here on the podcast as well as through social media and through my website, bbguy.org.

So before we dive into today's content, which I think you're going to really enjoy, I have some great news for you. Many of you are aware that in the past I've offered free continuing education credit for episodes of Blood Bank Guy Essentials. And that, my friends, is going to be true moving forward as well. So all the old episodes ending in the letter CE, that credit has expired. So starting today, April 29, 2026, episodes of this podcast ending in the letters CE will be available for free continuing education credit sponsored by the AABB.

And that's just great news. I'm so happy about this. AABB wants you to know that continuing education for physicians and non-physicians for this episode is provided at no charge through AABB, the Association for the Advancement of Blood and Biotherapies. To claim credit for listening, it's really simple, just visit BBGuy.org/CE or AABB.org/BBGuy and follow the simple instructions that you'll find there. Credit is available for each episode for two years after the date it was released.

In other words, as long as you're listening to this episode before April 28, 2028, CE credit will be available. And just so we're clear, AABB has no editorial input into this podcast. In other words, they don't tell me what to say or who to interview, but what they do is all the background hard work for the free continuing education. The process is very self-explanatory and again, completely 100% free. No kidding. So thank you to the AABB for working with me on this and especially to Jackie Thomas at AABB.

All right, onto today's episode. So today we're going to talk about one of the most intense high stakes situations in transfusion medicine, and that is obstetric hemorrhage, especially postpartum hemorrhage. If you've ever worked in a blood bank, you probably know the feeling. The phone rings. You hear OB and your heart rate just doubles before they even finish the sentence. Sometimes these cases are planned, and sometimes in fact, maybe just as often, they feel like they just came out of nowhere, a routine delivery that just becomes a nightmare and a massive emergency requiring lots and lots of blood. And it happens really, really fast and the consequences are so incredibly high.

I'm joined today by Dr. Kerry O'Brien, who's medical director of the Blood Bank at Beth Israel Deaconess Medical Center in Boston, and also an assistant professor at Harvard Medical School. Dr. O'Brien has spent years working and teaching and publishing in this space, and she's widely recognized for her expertise and really just improving how we can all react to these super dangerous situations.

Kerry's worked to help build systems that run like a well-oiled machine from the early warning signs through transfusion workflows to practical strategies that actually work. That's really cool, right? That's a good thing. So in this interview, Kerry and I are going to talk a ton about a lot of different things and give you lots of practical steps on how to

deal with these situations. And most importantly, from my perspective, what we're going to talk about is how to prepare for these situations because I think that's 100% the key to this.

So whether you work in a major academic center or maybe just a small hospital or a blood center, there's something in this episode for every one of you regarding obstetric hemorrhage. I really believe that. I'm very, very excited to be back with you. I'm very grateful that you're listening and very happy that you're here for this episode today. So hey, let's get going.

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Joe: Hey, Kerry. Welcome to the Blood Bank Guy Essentials Podcast.

Kerry: Thanks, Joe. It's a pleasure to be here with you.

Joe: Man, I'm so glad that we're able to do this. This is a topic that's been burning around in my brain for a while, and honestly, from the first time I thought about it, you're the person that I have had in mind to talk about this particular topic.

So today we're going to talk about obstetric hemorrhage, focusing in on the postpartum type of hemorrhage primarily. But what I'm really curious about, you've published a lot about obstetric and postpartum hemorrhage, and you're involved in a lot of different things in this area. How did you get involved in this? Why are you so passionate about it?

Kerry: I fell into it as a resident and a junior attending back in the Army. I trained at a level two trauma center that had an OB service that had a NICU. That's where my own kid was born way back when, and he was a NICU baby as well at our training hospital. So it was Madigan Army Medical Center.

And one of the things that was instituted at Madigan was when a Massive Transfusion Protocol was activated, the blood bank resident or attending, whoever was on call, came in and actually went to the bedside. So getting that experience as a trainee and junior attending was very helpful to see different situations where there was massive protocols activated.

And the cases where there was a female giving birth were amongst, I felt, the most important because there was no expectation that anyone would die. Everyone in the room knew the only acceptable outcome was a mother and one or more babies leaving that room.

Joe: Absolutely.

Kerry: It was so high stakes. I got to witness everyone work together as a team for that one goal, and it just was very meaningful. And it was so important that it stuck with me. And when I left the military and did my fellowship, it was at Puget Sound Blood Center, which

is now Bloodworks. I was lucky to work under Terry Gernsheimer, who was my program director at the time. And I know she's an ITP guru, and that's her main focus of interest, but she's also very interested and focused on women's bleeding, so obstetric hemorrhage. So she really made that a point of her training with me.

She knew I was interested in it, and she shepherded me to pay attention to those cases, to get me involved in cases where that happened at University of Washington. So that nurtured the interest in that area. And then when I was able to get a position at Beth Israel in Boston, again, I just fell into it. Lynne Uhl is my mentor here and she was interested in it as well. And I just was lucky at the time where we had a burgeoning OB department that was collecting... I don't know if you call it collecting, but we were having patients with abnormal placentation coming to our hospital and we ended up having a bunch of interesting cases.

And after a few of these cases built up, it turned out that they were going to create their own center. So it was called the New England Center for Placental Disorder. So one of my friends is the head of that. Dr. Scott Shainker is one of the obstetricians or maternal fetal medicine specialists at BI. And because I became friendly with him when he was a junior attending at BI and I was as well, we said, "This is a good collaboration, let's get involved."

And it helped me get involved in that team, the multidisciplinary approach. And from the beginning creation of that center, blood bank was part of it. It was an important part of it. And it's been that way since I got there in 2012. And even I remember the case that I will never forget, I know the patient's name because even though it was in 2013, I remember this case and I will tell my residents about this case. We had a placenta percreta case in 2013. I wasn't on call, but I believe I was the medical director of the blood bank or the assistant medical director at the time.

I'm now the medical director, but a friend of mine, a junior attending, was on call and this was a placenta percreta that we knew was a probable percreta. So the multidisciplinary meeting already had happened. So when our OB hospital or our OB department is aware of a patient who has potential for abnormal placentation, they bring them into their clinic, they do all the studies, and then they have a multidisciplinary meeting.

And when they have the meeting, we have all of the stakeholders that you would think should be there are there: blood bank, nursing, the ICU, anesthesia, NICU, social work. I'm trying to think if I'm missing anybody. Oh, cell saver, someone from the perfusion department.

Joe: Got it. Yeah.

Kerry: Urology potentially, if they're going to have to put stents in, and occasionally interventional radiology. So at that point, we're all prepared for this case, this placenta percreta. And I don't know, you probably don't know this because not many people do. It's weird. Our hospital has two campuses separated by a block.

Joe: Oh, boy.

Kerry: It's the old Beth Israel Hospital, we call it the east campus. That's where OB is. That's where our OB is. And then the west campus is the old Deaconess Hospital. So Terry, my old program director, she trained at Deaconess, so I always would hear about the Deaconess from her. And that's the west campus where we have a larger blood bank, and we have a small blood bank on the east when that's unfortunately where OB is.

So we have a small blood bank, we have OB, we have the NICU, we have heme-onc, a small ICU. So then there's a need for blood banks on both sides. But when we know ahead of time, we can plan and have an extra person over there working, we can have extra cryo brought over to the freezers there, extra plasma brought over. And in that case, it was amazing. The patient ended up... Because I kept calling in, even though I wasn't on call, I kept calling in to see what was going on.

And she used 75 red cells, maybe 45 plasma, maybe 10 platelets. I can't remember the number of cryo, but they told me they were amazed because she almost passed away three times. It was such a hard case, but they never had to wait for blood, they said. And I was like, "Well, I think because we knew." So we knew about it. We had extra hands and we were shuttling products from the larger campus to the smaller campus the whole time. So that was a success story.

So that woman ended up being able to leave the hospital with a baby, success. So she left healthy, her baby was healthy and she even came back to visit. That solidified, "This is great." And after that, these multidisciplinary meetings just kept getting better and better. They were honing it. So occasionally people, certain departments didn't have to come to the meeting. So everything was getting better or more efficient, I would say.

Dr. Shainker's still here. So he was a junior attending and now he's in charge. And I was the assistant director and now I'm the medical director. So it's just a well-oiled machine because the trainees that come in for blood bank rotations and OB, I don't know, they're just very interested in it. So we keep having people that are interested in the success. The only thing that is acceptable is success in that kind of a case.

Joe: That really helps, I think, set the stage for a lot of what I want to talk to you about today. And I think that one of the things that really just zeroed into my brain when you just said it is the fact that at your institution right now, you consider things to be a well-oiled machine. I think I'm quoting you correctly when you said that. And that's awesome and wonderful.

I'm not sure everybody feels that way. And my hope is today that when we get a chance to pick your brain about some of the lessons you and your team have learned, that we can give people some tools to try and get them on the way towards feeling better about their preparation. Because I think my personal perspective is one of the scariest things about this hemorrhage is when they happen and people are surprised. You talked about the case that you guys knew something was coming.

Kerry: This was known. Right.

Joe: Exactly. But the ones where you get, and it always is, a panicked call from obstetrics with someone who is bleeding unexpectedly, those are the times that, man, I really want people to have a better feel for how to approach these things and what steps to take. So we will absolutely get to all of that. But I wonder if first you could just talk us through a little bit, what's the scope of this problem? The issue of obstetric hemorrhage, postpartum hemorrhage, how often is this a big deal?

Kerry: Yes.

Joe: Is this something that we should be spending a lot of time worrying about?

Kerry: I think we have to, and it's because of what you just said, that we don't know when it's going to happen. And wherever a woman is going to have a baby, and in America, that could be a rural hospital, it could be at home, a small hospital, a clinic, this can happen. That's what makes it so frightening. And that's why it makes me mad when there's not a lot of attention paid to it, because like I was telling you before we started, in Boston, there's five or six large academic centers in Boston. But I know in parts of Massachusetts, like the western part, we have a Baystate Medical Center and we have UMass, but after that, there's smaller hospitals. And I know New Hampshire is very rural. I know Maine is very rural. Our old blood bank manager is now at a blood bank in Maine.

Just a quick aside, he was actually there when they had the unfortunate shooting incident in Maine, and that's a small hospital. And because he had the experience, he actually helped them deal with how do you get products out quick when you don't have a large inventory. So everything has to be adapted to the size of the blood bank and hospital that you're at. And everyone who's working at these places has to know what's available to them. So I think that's key.

And I try to stress that to the OBs that we have when we give lectures because they could get used to at my hospital, "Oh, we have red cells, we have plasma, we have platelets, we have cryo." I say, "You have to know what is available to you when you get your first job because you may not have platelets. What are you going to do? You may not have thawed plasma. We have thawed plasma routinely available. You may have to wait 40 minutes for plasma to be thawed. You have to know this before the bleeding happens. So you have to go on a tour of the blood bank, make yourself available so that they know who you are, so that they know who's calling and needs help."

Joe: Yeah. Can we clear up one misperception that I think it's definitely not true among obstetricians? They certainly know this, but I'm not sure all laboratorians realize that it's really easy to think, "Hey, we're the United States of America. By God, women don't die from postpartum hemorrhage here." And that's far from the truth, right?

Kerry: No, we've had it. Unfortunately, we've even had it at these level one hospital or maternal fetal medicine specialty centers. And unfortunately, sometimes there's nothing you can

do, but if you're unprepared, it's going to happen more often. And yeah. No, it is a tragedy. And like I said, it can happen anywhere.

And we have these early warnings, or not early warning, but we have ways for the obstetricians to triage based on risk factors in a laboring woman or a woman coming in to be induced, but a lot of the times there's nothing. And we actually had a case of that not too long ago that was transferred to us from one of our sister hospitals. Woman was laboring. This was, I think, a second baby. She was laboring and just seized. She came out of the... They were able to revive her. She seized again. Then she started hemorrhaging.

Joe: Oh, my goodness.

Kerry: So they had to deliver the baby right away, and she was basically in DIC. So we had our sister hospital activate a Massive Transfusion Protocol, give her numerous, numerous products, then finally stabilize her enough to get her to us where we had ECMO, for instance, and they didn't have ECMO. So sometimes there is no risk factor. This woman had a prior pregnancy that went fine. It wasn't a C-section, so wasn't any kind of risk factors.

It wasn't a big baby. It wasn't like a macrosomia case. It was just sometimes bad things happen and you have to be prepared. And in this case, it helped us that it was a sister hospital because they called us ahead of time. They told us everything she had gotten. So we were ready to go. And for once, I was glad we had Epic. And I have to say that because we just went live with Epic in June and it was not a catastrophe, but it was a scene. It was just difficult.

Joe: Difficult. Yeah.

Kerry: But in this case, it actually helped because the patient was already... we could locate her. We knew all of her prior tests. So that was one of the good things about Epic, I have to say.

Joe: Yeah, there you go.

Kerry: But unfortunately, no matter what you have available to you, sometimes there's nothing you can do, unfortunately, and the patient will pass away. But you have to at least give the clinicians the tools, give them the blood products, have them available so they have a shot. If we didn't have anything available, they wouldn't have a shot at trying to save a person and the baby. And luckily, in this case, the baby survived.

Joe: Thank goodness. So let me clear up one other thing, because I want to talk about some of those risk factors and those warning signs. I've danced around this a little bit, and I've sometimes said "obstetric hemorrhage," sometimes said "postpartum hemorrhage." Is there a preferred term? I know most of the hemorrhage in OB settings is postpartum, but should we be calling all this under the big umbrella "OB" or is "postpartum" hemorrhage okay?

Kerry: I think it depends. I myself call it OB hemorrhage, but I know most of them are postpartum hemorrhages, but you can still have antepartum or intrapartum, but I just call them OB hemorrhage, at least when I'm talking to people.

Joe: Yeah, that makes sense. All right. Fair enough. Kerry, before we get into some of those specifics, are there organizations or coalitions or groups in the United States or around the world that are dedicated to developing resources and tools for this?

Kerry: Oh, yeah. So it's great because part of my role, I'm actually a liaison from the AABB to a couple of these organizations. So American College of Obstetricians and Gynecologists has set up this Maternal Early Warning System. So they've published a Maternal Early Warning System that my hospital uses to try to guide the clinical bedside staff to help guide them to see when there's a problem or a risk for a hemorrhage.

The California Maternal Quality Care Collaborative is excellent. They put out great information and it's available. I think you just have to sign up for an account and you have access to all of these lectures that are online and all of these toolkits. So there's the third version of their toolkit available on their website. So it's CMQCC. It's very helpful. I have to say, the information they have there is very, very helpful.

Joe: Okay, that's awesome. And everyone listening, I will have some links on the show page for this episode, certainly to CMQCC and some of these resources that Kerry has mentioned. So be sure to check that after you listen to the podcast. So we need to get into a little bit some of those. You mentioned the early warning criteria, the early warning signs.

So let's just say that we have a scenario where a mom, as we said, most commonly has delivered a baby. What are the things that the obstetricians should be looking for to be concerned that maybe something might not be going right with this patient?

Kerry: Right. So what they do actually is they have the nurse. So they're training the nurse because they're usually at the bedside right after. Once the baby is delivered, the obstetrician is sewing up or doing whatever they have to do. So it's usually, at least our hospital has, they published an SOP based on these, they call them MEWS notification protocol. So the Maternal Early Warning System protocol. So it's abnormal vital signs is the first thing they're looking at. So if anyone has a heart rate less than 50 or more than 120, that's a risk.

Respiratory rate less than 10 or more than 30. If their systolic blood pressure is less than 90 or more than 160, diastolic greater than 110, and temperature fluctuations, SpO2 less than 95, or if their urine output has dropped less than 30 for two hours. So those are some vital signs, things they're looking at.

And then lab abnormalities. So new lab abnormalities: crit less than 25, platelets less than 100; fibrinogen at my hospital, they look at less than 200 as a warning for them, for this population only, of course. And then confusion or agitation. So that can be alone, which is hard because when you just have a baby, you are confused sometimes and

you're like, "This is awful." But maternal confusion or agitation may be the first sign. And that case I described where the poor woman seized, she was confused before. She just was staring into space and then seized. And I think they noticed it right away. They were right there and still.

Those are some of the early warning signs. And it's important for the nurses at bedside to feel like they can, at that point, they have to notify somebody. So a lot of cases that go bad, it's when the bedside staff don't feel like they can tell someone. They feel like, "Oh, you're bothering the doctor." No. And at least in my place, they want them to bother the doctor. You have to. Basically, they've empowered that bedside staff, whether it's an intern, a resident, a nurse, or a nurse's aide to actually call the front desk and say, "MEWS activation in this room right now."

Joe: Wow. Wow. Okay.

Kerry: So then the unit coordinator will get notified and they'll page the doctor right away. So whoever is closest will come and look at the patient.

Joe: Okay. Fair enough.

Kerry: Yeah, I think it's important to empower everyone taking care of that patient to do that, to be able to do that because time is of the essence.

Joe: So in the big picture, when that is activated in your hospital, does that result in immediate communication to the transfusion service, to the blood bank?

Kerry: Not yet. So it's when the obstetrician will do their eval, then they'll call the blood bank.

Joe: I see.

Kerry: If they want to activate the massive protocol, then it goes basically on autopilot.

Joe: Okay. And we will definitely talk about those details of the massive protocol. I interrupted you, Kerry. I'm sorry. What were you going to say?

Kerry: Oh, no, I was going to say, there was an article recently by some colleagues of ours. Let me just see where... Oh, Rob DeSimone, I've worked with him on some of the AABB committees. He's at Cornell in New York, and he published an article a few years ago now in Transfusion Medicine Reviews about caring for patients who have these placenta accreta syndromes.

And one thing that they do that we do, it was funny because I'm like, "Oh, we do the exact same thing." So when we have a known patient who has an accreta or percreta, so a known case, we prepare four red cells and two plasma for those cases upfront where we don't do that for other patients per se.

Joe: I see. Yeah.

Kerry: And that's just normal. That's what we give when we know ahead of time. And then if anything is needed beyond that, we have them activate massive.

Joe: I see.

Kerry: So that's how it goes.

Joe: Gotcha.

Kerry: So if it's an unknown case, obviously we wouldn't have the four and two ready per se, so we would just have them activate the massive.

Joe: So that actually brings me to what I wanted to ask you. We've gotten into a little bit how some of those early warning signs... and that's super important, obviously. I want to just quickly step back and ask you, what are some of the known risk factors that might put someone at higher risk to move into one of those early warning signs?

And you've mentioned, and I want to make sure that we cover this for the learners. You've mentioned a couple times two of the different abnormal placentation issues with placenta accreta and placenta percreta are the two that you mentioned. And obviously there's a third one called placenta increta. Just for the learner's sake, Kerry, could you just go over those real quickly?

Kerry: Yeah. So placenta accreta is when the placenta is adherent to the myometrium of the uterus so that when the baby is trying to be born, the placenta won't easily separate and can cause bleeding. And then increta is when the placenta invades into the myometrium, and then percreta is when it goes through the myometrium. And the case I described with percreta, the placenta went into the bladder.

So that was why it was hard to get the placenta out, and that's why patients bleed. If it's not known ahead of time, you don't know the extent until you get in there and look. But if it's known ahead of time with ultrasound and MRI, sometimes they can plan what they're going to do, their approach to delivery.

Joe: Are those seen very often? Are we seeing those at an increasing rate in recent years or is there any difference?

Kerry: We are seeing more, thankfully not yet of percretas. But accretas, yes. And I think that it may be attributed, at least in Rob DeSimone's article, they mentioned through the increase in C-sections, it could be-

Joe: I see.

Kerry: We have been seeing the more also... I don't know if it's more people are having babies later after instrumentation of their uterus too. So I feel like we see a lot of... I don't want to say a lot, but we see an increase over years past of IVF pregnancies. So sometimes the women have had several types of procedures in their uterus, different kinds of biopsies, different kinds of implants, D&Cs, just to try to make it a more hospitable

environment for a fetus to develop, and sometimes that instrumentation of the uterus can put people at risk for accreta as well.

Joe: I see. Okay. So that's the abnormal placentation stuff. What are the other big picture, biggest risk factors that we look at?

Kerry: The main cause of the OB hemorrhage or postpartum hemorrhage is atony. So uterine atony where it doesn't contract. And things that predispose to that are previous C-sections, multiple gestation, so twin or more pregnancies. Anyone who has fibroids, especially large fibroids, will make it harder for that uterus to contract down.

And then also another thing is doses of... or I guess prolonged inductions. So when oxytocin is given and it's just a long labor, it's almost like the uterus isn't ready to go. You're forcing it, so it's not happy. It doesn't want to contract down, doesn't want to push out the baby and then contract down because it's just not feeling ready yet.

Joe: Yeah. Because it's been a while, it's been a long time since I've done OB, but if I'm remembering right, the basic physiology is that once the baby is delivered and the placenta is also delivered, then basically the whole idea is that the uterus clamps down and essentially tamponades the bleeding itself in a way. Is that accurate?

Kerry: Yeah, the spiral arteries constrict down that are supplying it and it constricts down. Yeah. And one thing that the obstetricians do to try to reduce the risk of atony is to have what they call an active third stage of labor. So when the placenta is delivered, they're trying to perform manual massage of the uterus, of the fundus. They massage from above in the [inaudible 00:28:18]. They try to put traction on the umbilical cord to try to help the placenta come out. So there's techniques they can do to try to make it so that the uterus contracts, but sometimes even with them doing that, it still doesn't work.

Joe: Oh, boy. Part of the problem that I think blood bankers sometimes have understanding postpartum hemorrhage is that it's pretty obvious if somebody gets blasted by a gun and they come in and they're bleeding like crazy. Okay, I get that. There's going to be a lot of blood loss. But it's a uterus! How could you lose so much blood from a uterus?

Kerry: There's a lot of vessels. Yeah.

Joe: But it's crazy how much blood can be lost so fast. Is that your perspective as well, that it's like, "Wow, how could this happen?"

Kerry: Yeah. No. And there's another article I could send you too, that I think it's really good. It's more recent from New England Journal. Well, actually not more recent, more recent than Rob's, but it talks about how at full term, blood flow to the uterus is 600 mL per minute. So that's a lot that's contrasting to 60. So 600 versus 60 in a non-pregnant state.

So that's a lot of blood flow trying to go to that baby, keep that baby happy, nourished. But then if something goes wrong, you got all that blood flow down there. So what are

you going to do? And it's like an arm, right? You can amputate an arm or tie it off with a tourniquet. You can't do that because a baby's still in there. And sometimes you're trying to save the uterus too. It may be a first baby, maybe IVF, they waited, I don't know, 10, 15 years and they want to try again. So you don't want to just go and hysterectomy right away. There's ways they approach it.

Joe: Yeah, understand. And that's probably a little deeper than you and I will be able to go in this podcast, for sure.

Kerry: Right. Because that's very complicated, right?

Joe: Absolutely, for sure. But I'm curious, has there been a definition? You mentioned that the obstetricians evaluate the patients and look to see whether or not they're going to activate the Massive Transfusion Protocol. Is there a specific definition, I should say, of postpartum hemorrhage or are they varied?

Kerry: Yeah. No, that's a good question because the way I was taught is one way, now it's slightly different. So what I was taught was if it's more than 500 mLs of bleeding for a vaginal delivery and more than 1,000 mL for a C-section, but now ACOG has recently changed it. They're using 1,000 mL with continued concern is what they're using.

Joe: I see. Okay.

Kerry: Yeah. From any delivery.

Joe: Okay. And my assumption would be that most of these would occur right after birth, but is there a version that happens later on?

Kerry: Yeah. So they call it primary postpartum hemorrhage, is anytime within 24 hours of delivery. And then after, it can go up to 12 weeks, so secondary postpartum hemorrhage.

Joe: Wow.

Kerry: So I think those are more for retained placenta. So if the placenta is not all taken out and the woman just starts bleeding on the postpartum floor or they come back a day later after they've been discharged with continued bleeding. So yeah. But most of them are within the 24 hours.

Joe: I see. Okay. So the obstetrician evaluates the patient and tries to quantify the hemorrhage. I'm guessing in some cases, it obviously would be silly to say, "Hey, it's only been 900 mL of blood." You obviously are going to use your judgment, but how do they make the call? And obviously I'm asking you to read someone else's mind, but you have enough experience with this. What triggers them to say, "Okay, we got to go. We got to call this Massive Transfusion Protocol now"?

Kerry: I think it's just their experience. I think it's experience and the knowledge that there's nothing bad that's going to happen if they call it. So there's no penalty. So if they call it,

we just start getting products ready. So the way we do it at my institution is with a call. So anyone on the team, they can say, "Call the blood bank." So someone calls the blood bank and tells us who the patient is, where the massive is, and then we start preparing coolers. That's all.

That's all they have to do. Tell us who it is. If we have a sample and it's an electronic cross-match, we'll give them type specific blood. If we don't have any sample on them, which is rare, but occasionally will happen, we'll give them O-negative and that. The other thing we have our guys do, and I'm just saying this in case people have Epic, is they place an order in Epic, the initiate order. So we have an initiate order for massive, but then my techs go in and actually order the products in our blood bank system, which is called SOFT.

Joe: I see. Okay.

Kerry: So that's the way we do it to alleviate the clinical team from having to order each cooler. So we actually order the coolers.

Joe: I see. Okay. And that's where we need to dig in just a little bit because I think this is an important question. And let's big-picture this for a second. Is a postpartum hemorrhage that leads to massive transfusion different than a trauma injury that leads to massive transfusion or are the Massive Transfusion Protocols similar, the same? How do you or do you separate them out?

Kerry: Yeah. So I think it depends on your institution. So our institution, for the most part, has one massive protocol, and I'll explain why it's slightly different. And that was the choice of the obstetrician. So when I came to BI and then when I became the medical director, I mentioned to the physician who was in charge of quality for OB, she's now a CMO somewhere else. But I mentioned to her, I said, "Do you want to change the protocol for the OB hemorrhage, the OB massive hemorrhage? Because I'm more worried about fibrinogen for your patients versus a GI bleeder, a cirrhotic with GI bleed."

And she's like, "Well, no, I think they decided amongst themselves, they thought they were happy with what we were giving them." So I was like, "Okay." So basically our protocol is the same, whether it's a GI bleed or an OB bleed. The one caveat is we do give more plasma upfront when it's a trauma for the first cooler. And it's because what we've seen is a lot of our traumas are coming from other places or the field. So they're getting red cells in the field so that when they come to us, they're already up with red cells so they're behind with plasma.

Joe: I see. Gotcha.

Kerry: So we're not a one-to-one place. That's just not what our protocol is, but we want to give it closer to two-to-one. And that wasn't happening with the traumas when they were getting red cells in the field.

Joe: I see. Okay.

Kerry: So yeah, that's the only difference. But if our obstetricians want to switch, I am happy to switch to give them cryo earlier in the protocol.

Joe: Yeah. And I wanted to explore that for just a second, Kerry, because you've mentioned a couple times the fibrinogen issue. Just again, for the learners, why is fibrinogen more a concern in OB hemorrhage? And what's the difference in pregnant ladies with fibrinogen levels that might make that important?

Kerry: Yeah. So pregnant ladies, their baseline fibrinogen is much higher than a non-pregnant person. A non-pregnant person's fibrinogen, I don't know, they might be walking around with a fibrinogen of 100, 150, 200 [NOTE: mg/dL]. But pregnant women, it's 300, 400, 600. It's just higher in the pregnant state.

So if you were to look at a pregnant woman who just had a baby and is bleeding and her fibrinogen is less than 100, that is much, much worse than a non-pregnant person with that same fibrinogen. It's not good in either case, but that's almost catastrophic for a woman who just had a baby. So they're looking at a threshold of 200, the obstetricians, when they're resuscitating. If the fibrinogen goes below 200, they know they have to replete versus our institutional guideline is 100 to 150 for the non-pregnant person.

Joe: Yeah, I see. Okay, that makes sense. So somebody in a massive setting and you get the fibrinogen back and it's 150, if it's a regular trauma patient, quote-unquote, you'd be like, "Oh, pretty good."

Kerry: Yeah. Yeah, that's alright...

Joe: If it's an OB patient, you'd be like, "Oh, crud, I got to do something."

Kerry: Right. And like, "Oh, my God, what happened?" I've seen it sometimes where it gets to 80 and I'm like, "Whoa, you are behind. We have to just keep thawing for you."

Joe: Okay, got it. And we'll talk about how we supply that here in just a second.

Kerry: That's a good question too.

Joe: Okay. So the Massive Transfusion Protocol gets called. And what I'm wondering is I've seen some of the stuff that you've written before, Kerry, and what I really hope that you can give us is some practical just on-the-grounds tips for people that work in hospital blood banks and transfusion services or people that are trying to set up how we do this in our setting. What are some of the things that practically we can do in the blood bank transfusion service or in the laboratory to help make this process more efficient?

Kerry: Okay. So one of the things we did was to have some plasma thawed. So we have plasma pre-thawed on both of our campuses. So we do it for traumas on our west campus and for the pregnant ladies on our east campus. That'll give you a head start because it's going to take 20 to 40 minutes to thaw plasma in a water bath. If you can

do that, keep the plasma, the thawed plasma, the five-day thawed plasma, that is very helpful. And if you're somewhere that you're going to have patients who have traumas or who have OB hemorrhages, it's worth the time.

It's worth it, I believe. We even did that at Madigan. So my level two hospital, we went and thawed plasma near the end of my time there just because you start from so far behind when you don't have that. So I think that's helpful. And I think having a point of communication. So I think at my place, it's key and it works well now, but to have one point of communication with the blood bank, because whenever you have a massive, you know this and blood bankers know this, if we have phone calls from all over the patient care area calling us, it gets confusing.

So basically, once they activate the massive, we go on autopilot. And what our techs do is they keep making coolers and they just line them up. So how we do it here is someone comes and picks up the cooler. So we don't have staff to deliver them. As you know, the technologists are in short supply. I can't have them running around to deliver. So we just prepare the coolers until they tell us to stop. So that discontinued call is important. And until we get it, we keep making coolers every 20 minutes. That's the guideline, but we're basically just making coolers until we see them pick them up.

Joe: Just keep going. And just so we're clear, the coolers... And obviously this will vary from place to place. So whatever recipe you come up with in agreement that there'll be a certain number of red cells, a certain number of thawed plasmas, and whether or not there'll be an apheresis platelet unit in there and/or some cryo in there, all that's decided in advance. And so your team is just following that recipe.

Kerry: Yep, exactly. Just follow the recipe. And it's helpful when the recipe doesn't change. Occasionally it'll have to, depending on certain patient care needs, but ideally it's not changing because that's when things slow down or get confused.

Joe: Which clearly requires that you plan in advance. I tell residents all the time that the time to have tough conversations or conversations about protocols is not in the heat of battle that you've got to do all this work beforehand, right?

Kerry: Right.

Joe: Yeah, for sure.

Kerry: And another thing that's important is if we know a patient has an antibody, it's important. If we know ahead of time, we will tell the OB and OB anesthesia ahead of time. If we don't know until they start bleeding, we'll let them know. That's when the medical director gets with their anesthesiologist or obstetrician and says, "Look, there's an antibody present. This is what we're going to do. And it depends on the antibody, how we're going to manage that." So every antibody will be different. But yeah, it's ideal when you know ahead of time that you can tell them so they're not surprised.

Joe: You gave one tip that I also want to make sure that we mention because I think it's cool and it's really practical. And you mentioned letting other areas of the laboratory know that this is going on. Can you expand on that a little bit?

Kerry: So when the call comes to the blood bank to activate the massive, the person who gets the call writes the name of the patient. We have a sheet. It's basically a photocopied sheet. We call it a Massive/Heart Transplant/Liver Transplant Form where we get all this patient information. One of the things is a prompt for the blood bank techs to call the heme lab. So they call the stat lab, they have to write the time they called them where they tell them this is a massive so that they prioritize those specimens.

And in the heme lab, they actually go and there's a whiteboard in the stat lab area where they write the patient's MRN down and they go and they pull those samples and make sure they get prioritized. Before we had that prompt for them, when we didn't notify them, those samples you could just get, they would be with the other stats. There's a lot of stats in the hospital. We want them as a super stat. One of my OB friends call them a "super stat." I'm like, "We really don't call them that," but they kind of are a super stat. We put them to the front of the line.

Joe: And it's a fun phrase. Come on. That's a great phrase.

Kerry: I'm like, "I don't want it to get out," because then everyone will be ordering super stats of like, "You guys are a super stat, but don't tell anyone."

Joe: That's awesome. Okay, that's a great tip. Super practical. Okay. There's a few more things that I want to cover in the time that we have left. I want to circle back around to fibrinogen and how we supply that. And again, I know this is going to vary from place to place. Of course, traditionally in the United States, we have primarily tried to supply fibrinogen using cryoprecipitate.

There's a product called Fibrinogen Concentrate. I'm curious, in your exposure with all the work that you do with the different organizations, is anybody actually looking at using Fibrinogen Concentrate in this type of setting or are we just sticking with cryo?

Kerry: I think it depends. It depends on where you're at. And it depends what your clinicians want too. So we've had conversations with different departments at our transfusion committee. Actually, there's the three. So you have the regular cryo. We use standard cryo now, but you also have the pathogen-reduced cryo, which has the five-day shelf life. That's why I like that. I like it because once you thaw it, you can keep it for five days. But then the Fibrinogen Concentrate, which I don't like as much because the clinicians don't have as much experience dosing it and things. So I think it would be more teaching on their end because they're the ones that would be dosing it at the bedside.

Joe: Sure. Because it would come from the pharmacy, not from the blood bank, right?

Kerry: Right, right. Exactly.

Joe: I see.

Kerry: So we would be like, "I guess, order it if you want, but we don't have it." And there's a cost difference between the three of them. Now, if one was proven much better, much more efficacious than the other two, I think your transfusion committee could make a case to get that. But I think right now there's still an equipoise amongst the three of them depending on your site. So I think about this when I was in the Army, I think about it back to being in the Army, that kind of environment, because we had some small outposts where people had babies.

So small labs in the desert, actually there's one in California in the desert where people had babies. And I'm like, "There could be an OB hemorrhage. They don't have cryo. I know they don't have cryo." So that's where Fibrinogen Concentrate might be very helpful because it's stored in the pharmacy, have it on consignment so you can trade it in and out, but the providers just have to be trained how to use it.

So I think it's whatever will work best for you and your facility as long as your providers know how to use it. And because of the cost difference right now, we haven't made the move, but as wastage of cryo happens, we're thinking more of the pathogen-reduced cryos. So it's like a moving target. And I'm not opposed to any of them. It's just trying to get enough data to convince the institution to get you to pay extra.

Joe: To increase costs. Sure. Because again, just for the learners, if somebody thaws, cryoprecipitate from most blood centers now comes pre-pooled in pools of five and sometimes 10, but most commonly five. When those units are thawed, you've only got six hours to get them in as opposed to the pathogen-reduced, which as you said, gives you five days. Understandable, the wastage of cryo has always been a sore spot. And frankly, between you and I, I've never understood why it's only a six-hour product myself.

Kerry: Yeah, it kills me, but it's like I'd rather thaw it than not have it. It hurts me more for platelets though. I got to tell you, wasting a platelet hurts me more than cryo just in general...

Joe: I've spent most of my career in blood centers, Kerry, so it KILLS me when platelets get wasted.

Kerry: Oh, my God, I know. I wish we could just have a platelet... I told the residents, if they can find a platelet tree, we'd be good to go, but they can't find it.

Joe: There you go. Well, let's talk about a couple of other things, some of which are either controversial or they've been discussed and it's not clear where to go. There's one thing that I really want to talk about, and that is the use of an antifibrinolytic, like tranexamic acid. Could we talk about that and where we are with that nowadays?

Kerry: Yes. So I actually looked on our portal, which I laugh because one of my colleagues, he's like the encyclopedia of papers, but he always tells our residents, "Look on the

portal. That's where all the policies are." And he's right. So I checked our obstetric portal to find all their policies, and they have a tranexamic acid policy in place. So I thought this was great. When the WOMAN trial came out a few years ago, it showed that tranexamic acid can be very useful when people are having a postpartum hemorrhage. So people have started to use it when there is a postpartum hemorrhage. And TXA is a relatively safe drug. It's an old drug.

Actually, it's funny because he's now retired. Our hematologist-oncologist walked around with a little bottle of it from years ago. It was one of those amber bottles that you'd see in a science lab and it was tranexamic acid from years and years ago, just showing how old this drug is. But it's pretty safe. So what our providers do here is they have a policy, and basically, their policy says to consider it for prophylaxis with patients at increased risk of bleeding, but just to consider it. And they say you have to discuss it at a briefing or a team meeting ahead of time.

So it can be just right before the deliver. It's like a huddle. They have frequent huddles. Or for therapeutic use, consider when the patient is having a hemorrhage and there has to be team agreement. And they recommend it be started within three hours of hemorrhage and not to use it after that. Three hours after the hemorrhage, not worth it to them.

Joe: I see. Okay.

Kerry: So that's what our guys do at our hospital. So I think it's something that should be used. I think there was a recent WOMAN-2 trial that was published trying to see if it actually was useful for women who came in with anemia, moderate and severe anemia. And they didn't show that it made a difference in those women in terms of blood loss.

But I think the WOMAN-1 trial was very, very important. I think it was very good data. I think it's relatively safe and I think it should be considered. And I think it can be very helpful, especially for these hospitals that may not have all the blood products that other hospitals may have. So I think it's key.

Joe: Okay. The last thing that I want to discuss with you, I'm going to assume that you're going to tell me that there's no proven role for things like recombinant factor VIIa or prothrombin complex concentrate at this point. Is that accurate? And we don't have time to go into it in detail, but...

Kerry: Yeah. No, I would not recommend PCC, for instance, for sure. Factor VIIa, we only have used it extremely rarely as a very, very last ditch. And it's probably less than five times in the 10-plus years I've been at BI.

Joe: Okay. Okay. Fair enough. The last thing that I want to circle back around to, Kerry, we have alluded to the fact that when you have a patient who has some of these risk factors that we outlined, that multidisciplinary meetings to have these discussions about, "What are we going to do with this patient? How are we going to manage this patient?" that those should be a regular part of what people are involved in. How about after

event meetings? Do you guys circle back around and say, "This went well, this didn't go well"? Is that something you recommend?

Kerry: Yeah. So our OB group does that. They have an after-action meeting and we don't go to every one of them. They bring us in if there's any issue with labs. Occasionally there was issues with labs coming back what they perceived as slowly. So they would invite us and I would be the rep and I would go back to the lab manager and say, "They felt like the labs were not coming back quick enough."

So then they would go and get the actual data of when they would call like, "What time would they call? What time would they receive?" stuff like that. So I think it's very important. And even if everything works out well, it's nice to hear, "Good job." The very difficult cases, sometimes the blood bank techs, I'll send them a message like, "You guys did everything you could. You were working like crazy. Everyone was appreciated. And if we didn't have you guys, the clinicians would not be able to take care of their patients."

So giving feedback to the frontline, which is the techs who are actually doing all of this, I think is very important, especially in a field right now where we're losing techs. We just don't have enough and we have to encourage them and make them realize that they're an integral part of our teams. And if we didn't have them, we couldn't do what we do.

Joe: Well, I totally agree. And I think the thing that scares me the most, Kerry, is the idea of, you mentioned smaller hospitals because it can happen anywhere and it can happen without risk factors, as you made clear, where it's 2:00 in the morning and you've got one lab scientist working chemistry and heme and dashing back and forth to the blood bank, something like that happens. Man, if you're not prepared for that possibility, that's a big, big problem.

Kerry: Yeah. And it's incumbent on the lab directors at these smaller sites to train, to teach the techs that this could happen and we're going to do drills. We're going to do drills and this is what's going to happen.

Joe: Love it.

Kerry: And your actions are going to help save somebody. So if you were not here, this person could not survive. So just make them understand that your role is so important in saving someone's life or to someone, a mom and a baby. So I think drills are very important. I think with the advent of Teams or Zoom, I think even these smaller sites could have multidisciplinary meetings or have meetings with the larger sites in their network too. If we had a smaller hospital, they could converse with us and say, "What do you suggest? Should we send this patient in?"

So it could be multidisciplinary within a network even. And to use the experts in the separate fields how you can and just to help the patient, because sometimes the patient can't come to the city. They live too far away, they have kids, they have to work, but you want to make it as safe for them as possible. And one other thing I want to mention too

is sometimes we have shortages. If you're at a blood center, you know we have platelet shortages, and sometimes we don't want to send our platelets anywhere because we need them. But if someone is in trouble and needs product where they're at, it is better for you to send them the products than to send a patient who is in extremis.

So be willing to ship products to help a patient and just with the acceptance that that will happen to you too. Sometimes you'll need people to send to you. So I think sharing your products to the actual hemorrhaging patients who are in extremis is important because a lot of our transfusions nowadays are prophylaxis. And I always get nervous. I'm always nervous because it's usually platelets, but I'm always nervous because we have so many people demanding prophylactic transfusions and I know I need to save some for my patients who are going to bleed at any moment. And that's any pregnant woman, just until that baby's out, I'm nervous. And then even a little bit after. But yeah, it's just constant nervousness.

Joe: Understand. Well, Kerry, this has been just enormously helpful. I think there's a lot of take-homes that we can get from our conversation, Kerry, but I wonder if you would just bring it home for us. And is there anything else that you'd like to share with us just as the last big picture? How should we all be looking at this type of thing?

Kerry: I think it's just important for everyone to remember that not one person can save a patient's life. So it's a team effort. And I think you have to work with your obstetricians, your nurses, your ICU docs, your social workers, your lab managers. And the techs are an important part of that team.

And we need the techs to feel empowered to ask for help when they need help, to call in more people if they need help, and to call your medical directors too. If you need help from your medical director too, our techs know this, but at some places they feel like they can't talk to their attendings. They're like, "Oh, no, I'm afraid. I don't want to bother them." Call them.

Joe: Call them.

Kerry: We want to help you.

Joe: 100%.

Kerry: Yeah, call them so they can help you. We can call people in to help you. So it's a team effort and nobody wants anything bad to happen to a mom or a baby or babies that she's having. So we only want success in these cases. So everyone should work as a team and practice. Do drills. Drills are important, especially in the smaller hospitals where this doesn't happen routinely because you may be the one who is saving a patient out at these smaller hospitals.

Joe: Yeah. For those pathology residents, future pathologists that are listening to this, I think I can speak for Kerry when I say that my philosophy has always been I would far rather have my techs over-communicate with me than under-communicate.

Kerry: Yes.

Joe: I don't want to come in the next morning and find out, "Oh, this went wrong during the night, but we didn't want to bother you."

Kerry: No.

Joe: No, that's not it.

Kerry: No. No. I have all of my lead techs and many other techs on my cell phone. I have my OB, my OB friend, Dr. Shainker's on my cell phone. So he can text me if there's a problem. I text him. It's just whatever way of communication you have, it's for the best.

Joe: Agreed, for sure. Well, Kerry, thank you so much for doing this. I really, really appreciate your time.

Kerry: Thanks, Joe, very much. It's a pleasure.

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Joe: Huge thanks to Dr. Kerry O'Brien for hanging out with us today and teaching us so much about obstetric hemorrhage. I hope that you learned something really valuable. And you know what? If you did, you might as well get credit for it. So don't forget, this is a continuing education episode. Head over to AABB.org/BBGuy or BBGuy.org/CE to claim your completely free continuing education credit for listening to this episode.

So one of the things that I'm trying to give the people the opportunity to do, if you've taken the time to listen to this podcast, I hope that what you'll do is just reflect on it a little bit. In other words, just pause for a minute and regardless of your role in this process, whether you're heavily involved in obstetric hemorrhage and its management or whether you're just only peripherally involved, I hope you'll just take a second to think about what's the current status where you work on how you manage these stressful situations and what steps can you take to help make it better?

Whether that's requesting a meeting, whether that's talking to somebody about this, whether that's talking to your medical director, if you're someone that works as a technologist in one of these blood banks or blood centers, all these things are super important. And really, as Dr. O'Brien emphasized, planning is the key, and that is really absolutely the best thing that we can do to try and prepare for these things rather than react to them.

So again, I want to thank you for listening to this episode. If you can, it would really help me if you'd give this podcast a subscription and a rating wherever you listen to it, whether that's Apple Podcasts or Spotify or YouTube or wherever it is, I want you to know I listen to and look at all the comments that you make, whether they're positive or negative. I love all of them. I'm happy to hear whatever you have to say.

Further, if you give it a rating, that actually helps more people find the podcast. And again, it's been a while. So hopefully if you can let people in your sphere know Blood Bank Guy Essentials is back, that continuing education credit is available as well. Maybe some people have forgotten, and I hope that we can get some more folks learning, and that's what I'm really excited about.

So thank you as always for listening, for what you do every day for patients and for being a part of this little community around the Blood Bank Guy Essentials Podcast. So take care, stay safe, and above all else, never, ever stop learning. Thanks very much for listening. I'll catch you next time on the Blood Bank Guy Essentials Podcast.