



*ASHP Official- Codes that make you Tachycardic
Transcription*

Speaker 1:

Welcome to the ASHP Official Podcast, your guide to issues related to medication use, public health, and the profession of pharmacy.

Dave Zimmerman:

Hello. Thank you for joining us for Therapeutics Thursdays Podcast. This podcast provides an opportunity to listen in as members sit down to discuss what's new and ongoing in the world of therapeutics. My name is Dave Zimmerman, and I'm an Associate Professor at Duquesne University, an Emergency Medicine Pharmacist at UPMC Mercy Hospital. And I'll be your host for today's ASHP Therapeutic Thursday Podcast. With me, I have two of our legendary EM pharmacists, Chris Edwards, who's an Assistant Professor at University of Arizona College of Pharmacy, and Nicole Acquisto, Associate Professor, Department of Emergency Medicine at University of Rochester Medical Center. Let's get started talking about today's topic, codes that make you tachycardic. This was presented at the ASHP midyear clinical meeting.

Dave Zimmerman:

Chris, I really enjoyed your review of etomidate's controversy for induction in pediatric rapid sequence intubation. For the listeners that could not attend, could you recap this for us?

Chris Edwards:

Absolutely. But first, I want to say thanks for having me on and thank you for your kind words. I don't know about legendary, but if there are any legends, I hope they're for good reasons and not bad. I'd like to apologize in advance in case my voice is a little bit scratchy. I was at showcase this morning. It has nothing to do with a late night out at the piano bar with the residents or anything like that. But yeah, jumping into the pediatric RSI (rapid sequence intubation), controversy, so I like etomidate. I use it really frequently in adult patients and it's actually the only sedative that my institution has in their RSL box. So when I learned about the controversy surrounding etomidate's use in pediatric I was really curious where that recommendation came from. So there was a strong statement that came out in 2010 basically saying etomidate should not be used to resuscitate any pediatric patients with septic shock.

Chris Edwards:

And when I looked at the articles that the guideline that made that recommendation had used to make that fairly strong statement, the evidence wasn't very good. There was essentially a 31 patient case series looking at pediatric patients with meningococcal meningitis and in that study, 23 patients were [inaudible 00:02:22] etomidate, patients received something else and they showed a pretty high rate of mortality in the etomidate group, about 30% compared to 12 and a



*ASHPOfficial- Codes that make you Tachycardic
Transcription*

half percent who got something else. Now with these retrospective studies, particularly when you're looking at something like this, there's a huge potential for selection bias, right? So if the patient has the potential to become hemodynamically unstable, it makes sense that the physician is going to probably reach for something that's not going to cause hemodynamic instability, which is why etomidate's great. But if there's something that's concerning the physician about that patient, they're probably also [inaudible 00:02:59] so again, that selection bias makes this study interesting but not particularly powerful.

Chris Edwards:

The other study that was cited in that guideline was the CORTICUS trial, which was a huge study looking at hydrocortisone use in adult patients with septic shock. But in that study they did a post hoc analysis of the subgroup that received RSI (rapid sequence intubation), and that included 96 patients that received etomidate. Again, all [inaudible 00:03:22] adults, and they found a pretty high rate of mortality, 42% but again, it was basically subject to that scene selection bias. And so when you really start digging into this recommendation to avoid the use of etomidate in pediatric patients, there's not much there. And then when you look for other studies to either support or refute that, there is a bunch of other really small studies of poor methodologic quality that don't really help answer the question. So my take away from this, is that the use of etomidate in pediatrics is potentially controversial.

Chris Edwards:

I think that it's probably not the best first line agent, but if for whatever reason you can't use ketamine, etomidate's probably a pretty [inaudible 00:04:09] second [inaudible 00:04:09].

Dave Zimmerman:

And when you are using etomidate, would you recommend a standard dosing?

Chris Edwards:

Yeah, I actually do 0.3 mgs per kilo for etomidate, that's kind of my standard [inaudible 00:04:20] dose. And then there's also a recommendation that exists to consider adding hydrocortisone supplementation, again, based on no evidence at all. But it's something to consider if you do decide to use [inaudible 00:04:34].

Dave Zimmerman:

Okay, awesome. So switching gears a little bit, one of the roles an emergency medicine pharmacist plays is not only which agents to use but also how to administer it. And this can be



*ASHPOfficial- Codes that make you Tachycardic
Transcription*

tricky with our little tykes. For someone like myself that doesn't have a big pediatric population, but you never know when somebody might come to your e d.

Dave Zimmerman:

Could you explain the push pull method for fluid resuscitation and why it should be used compared to other fluid resuscitation methods?

Chris Edwards:

Yeah, absolutely. So the push pull method is really the way that I like to give pediatric fluids. And there's a few different reasons for that. When you think about your other options, they're either going to be really slow or really difficult to measure. So you could just hang a bag of fluids and let it run to gravity. But again, you don't really have a lot of control over the volume that you're administering. You don't really have a lot of control over the rate of flow. You can hook it up to an IV pump, but those are pretty damn slow. So you can run it at a max rate of a liter an hour. But if you're trying to give it fairly big volume, like 500 mls it's going to take a half an hour to get that in.

Chris Edwards:

So you can put it in a pressure bag. But again you lose that control over the amount of volume that's being infused into the patient and you don't really have that feedback that you would if you were pushing it through a syringe. So there are other options. But the thing I like about the push pull is sort of negates some of the downsides to other administrative strategies that you can use. So the push pull method, I think it should be called the pull push method, but the way it's described in the literature is the push pull method. But basically you use a three way stop, you hook up one side of it to a bag of fluid, the other side goes to the patient and then you hook up a syringe, usually 30 or 60 mls. And what you do is you pull the fluid out of the bag, you measure up the volume in the syringe that you want to get.

Chris Edwards:

And then you turn the stopcock so that instead of pulling from the bag, you're not pushing into the patient and you go ahead and push in whatever volume you've removed from the bag into the patient. It's a little cumbersome to set up, but once you're familiar with how to set it up, it's actually pretty straightforward. And again, a little bit easier to measure specific volumes. You have that instant feedback in terms of line patency as you're administering the fluid bolus, you know if there's any major change and get an idea of whether or not you've lost your IV access or something along those lines, and there's actually some data to support it. So compared to other methods for administering fluid boluses, the push pull method is pretty reasonable. You can get a 500 ml bolus



*ASHPOfficial- Codes that make you Tachycardic
Transcription*

into a patient, assuming they've got a really great IV line in, you can get it in in about two and a half minutes.

Chris Edwards:

Gravity generally takes about five minutes to get the same volume in. A pump set to 999 will take about 30 minutes to get that same volume in. So it's essentially equivalent to using a pressure bag with all those extra advantages of having that feedback on the line and more accurate volumetric measure.

Dave Zimmerman:

Awesome. And in then Chris you had an excellent analysis of lidocaine versus amiodarone for shockable V-fib V tach in pediatrics. Could you touch base on this a little bit? It seems like you may be favoring one agent to use here.

Chris Edwards:

Yeah, and it's really weird. So, in adult patients, I'm a little bit more of an amio guy. And then for kids, I think I'm favoring lidocaine after doing this review. So book in the [inaudible 00:07:54] guidelines they say that when you get to the point that you're considering an antiarrhythmic that you can use either amiodarone or lidocaine. Compare that to the ACLS guidelines where it's pretty clear they say use amiodarone and then maybe use lidocaine if for whatever reason you don't have amiodarone available. In kids it's different. They say amio or lido.

Chris Edwards:

And I was curious, where did that recommendation come from? So I pulled those studies that were cited for that recommendation for one of them. So it was pretty easy literature. And basically that recommendation came from one study that was written in 2013 by Valdez et al. And in this study they looked at 889 patients who had in hospital cardiac arrest with pulseless vtach or vfib as their presented rhythm. And in this study they looked at the rate of return of spontaneous circulation and then as their secondary outcomes, they looked at 24 hours survival and survival to hospital discharge. When they were looking at 24 hour survival, they showed a clinically meaningful and a statistically significant increase in 24 hours survival with lidocaine group, 47% of those kids made it through the first day, compared to 30% in the amiodarone group. And then looking at survival to hospital discharge, the lidocaine group had a trend towards improved survival to hospital discharge, 25% of those kids left the hospital compared to 17% in the amio group.

Chris Edwards:



*ASHPOfficial- Codes that make you Tachycardic
Transcription*

So it didn't reach statistical significance, but if they would have been powered for it, I'm sure they would have. So again, it makes lidocaine look really compelling. There are some limitations in this study, it's retrospective. They didn't look at neurological recovery because they didn't have the data for it and a relatively low number of patients receiving antiarrhythmics, but it's compelling enough that if I don't have something really nudging me towards amio, I'm probably going to go lido first line for kids.

Dave Zimmerman:

Awesome. Now we're going to switch gears and talk to Nicole. Now. Her voice sounds very good. So I'm going to assume she was not at the piano bar last night, but you discussed management of unstable pregnant patients. You started off discussing the old FDA pregnancy category with the new pregnancy and lactation labeling final rule or PLLR from 2014 and its application to rapid sequence intubation meds. So what are your go to meds for RSI (rapid sequence intubation), for a patient that is pregnant?

Nicole Acquisto:

Yeah well, thanks so much for having me today. I do want to talk a little bit just about the FDA pregnancy category changes [inaudible 00:10:16] in lactation labeling rule [inaudible 00:10:19] 2014 from the FDA and what they're doing is basically phasing out the five letter system, they felt that there is confusion and there's kind of [inaudible 00:10:28] lettering system. So what the new labeling is each drug will now have a risk summary that really describes more of the pregnancy and lactation data that's available and also using pregnancy registry data as well. And so any drug that... The risk of phasing out the pregnancy category is for all drugs, but any drug from 2001 and newer will then have this risk assessment. So when thinking through drugs that we're using, obviously in high acuity situations it does make looking for the best drug a little more difficult since it's going to take a little more time for the information that's there.

Nicole Acquisto:

The long and short of it though is with any critically ill scenario in pregnancy, you're going to use the best drug for the pregnant patient that you would as the non-pregnant patient. And we'll talk a little bit later about treating the mom. The mom is your main patient and if you can keep mom stable, maybe will hopefully remain stable. So thinking about RSI (rapid sequence intubation), there's obviously several sedative drug options and an example of this is that propofol for instance, is a category B drug. So that would be the safest drug if you're looking at the five lettering system. But if you have a pregnant patient who's hypotensive, you wouldn't necessarily want to lose the higher pregnancy category rate drug therapy because the patient will be at such risk for



*ASHPOfficial- Codes that make you Tachycardic
Transcription*

hypotension and we don't want to cause hypotension because the uterine placental vascular blood doesn't auto regulate on its own.

Nicole Acquisto:

And what happens is when the mom becomes hypotensive, the blood flow gets shunted away from the uterus and from the placenta and it goes to the mom's vital organs to save the mom. So the mom doesn't favor that other compartment or the baby compartment either. So in that case, even though propofol has the highest pregnancy category or the best pregnancy category, you would choose ketamine or midazolam, sentinel or something like that instead, it's a sedative agent in that particular situation. So really just use what you would normally use in that scenario based on the patient's injury or critical illness.

Dave Zimmerman:

And follow up to that, anything from a dosing perspective that we should know? I guess if you go from first trimester all the way to the third.

Nicole Acquisto:

Yeah, no, not really. So obviously teratogenicity's going to be more of a concern in that 4 to 12 weeks and after that second and third trimester you're really looking more at drug toxicity follow for adverse event that happens.

Nicole Acquisto:

I do want to mention with the paralytics there is a little bit, so the dosing would stay the same. You're still going to use really from a sedative standpoint you're still [inaudible 00:13:05] use the appropriate weight based drug like you would in a non pregnant patient. For the paralytic agents there is a little variability. So with succinylcholine specifically during pregnancy modifies [inaudible 00:13:18] is decreased if by about 25% so what happens in the setting of succs is that the drug is going to [inaudible 00:13:26] longer. There's going to be more risk of prolonged apnea. So in that case, that would be a reasonable setting to either modify your dose to like a 1 mg per kg dose instead of 1.5 mg per kg dose, or instead of using actual body weight use more of a dosing body weight. Now rocuronium can be used for pregnancy as well.

Nicole Acquisto:

If you look, a lot of this data is with cesarean sections, and I think you do have to be mindful of is if the mom is delivering at the time you're doing the RSI (rapid sequence intubation), would be a reason to not use a non depolarizing neuromuscular blocker just because the length of duration does cross the placenta. There's still a reasonable concentration in the baby after and that there's



*ASHPOfficial- Codes that make you Tachycardic
Transcription*

with using rocuronium for RSI (rapid sequence intubation), in that post delivery, the Apgar scores are really low for that first five minutes or more of life. So just being cognizant of that. But if your mom's not delivering at the time of RSI (rapid sequence intubation), then whatever agent you feel is best to use.

Dave Zimmerman:

Awesome. And staying on the dosing side of things. So let's say one of our listeners is on a rapid response team and responds to a cardiac arrest of a patient that is pregnant. What pieces of advice or recommendations can you give us based on our ACLS algorithm?

Nicole Acquisto:

Yeah, so I really made out here. Chris, obviously talked a lot about different specific data and there's really no data in pregnancy, so and especially for a critical illness and RSI (rapid sequence intubation), or cardiac arrest, the answer's pretty simple that we're going to continue to do what we're doing with meds that we would in a non pregnant patient. So as far as the ACLS algorithm, you would still follow, again your same dosing recommendations that you would in a non pregnant patient and you would still use the same drugs that are recommended without concern for a potential downstream effects. You also have to remember for pregnancy too, a lot of when we're talking about RSI (rapid sequence intubation), or cardiac arrest, a lot of times we're giving one or two doses of drug and there's not going to be the prolonged exposure where you really worry about after.

Nicole Acquisto:

Some of the differences just from an ACLS algorithm or when you're thinking about BLS really have to do with kind of the physiology changes in the pregnancy. So for instance, when moms are about 20 weeks or more, there's pretty significant [inaudible 00:15:49] changes from uterine contents when you're in a supine position really compressing and very being [inaudible 00:15:55] reducing your venous return and ultimately reducing cardiac output. So a lot of what's mentioned is that it's a lot of manipulation to the pregnant patient [inaudible 00:16:07]. So in a non cardiac arrest situation, if you have a hypotension doing a left lateral tilt to try to move the uterine contents weight off of your large vessels and in a cardiac arrest patient, doing a left uterine displacement, which is basically cupping and kind of pulling up the uterine contents and moving them to the left and kind of off the large vessels to improve cardiac output.

Nicole Acquisto:

As far as just on the BLS track too, as far as placement for compressions. Again, patients in the supine position with this left uterine displacement but hand position stays the same. There used



*ASHPOfficial- Codes that make you Tachycardic
Transcription*

to be a recommendation for slightly higher but that's not recommended anymore. So hand placement's the same, this left uterine displacement is the only big thing. And then as far as drugs, same doses, same drugs and just making sure that you do have IV access above the diaphragm so the diaphragm is moved about four centimeters up. Making sure that, again, because of this compression you want to make sure that you're delivering any IV meds above the diaphragm to ensure circulation of the drugs.

Dave Zimmerman:

And I really liked one of your key takeaways of give the best maternal care for the best fetal care. Can you expand on that?

Nicole Acquisto:

Yeah of course. So it's really, you have two patients, right? You have the mom and you have the baby, but whatever you do for the mom is going to affect the baby more or less. So if the mom has poor oxygenation ventilation, the baby is going to have poor oxygenation ventilation. And if the mom has poor [inaudible 00:17:38] and hypotension, the baby is going to have that as well. So it's just really important, you have to remember mom's your primary patient and things like the teratogenicity of certain drugs or these downstream potential toxicities really aren't the concern of [inaudible 00:17:57]. Most of the time, the best place for the baby to be is in the mom. And if you can continue to provide the best care to keep the mom healthy, that'll help keep the baby healthy downstream. And I do just want to clarify that point because during ACLS, just going back to cardiac arrest, part of the treatment is to do a peri mortem C-section if the arrest is going on before prolonged, even a short period of time, four or five minutes to do a peri mortem delivery just to help improve the mom's cardiac output and reduce the likelihood of the baby having anoxic injury as well. So just wanted to clarify that statement.

Dave Zimmerman:

Absolutely. So that's all the time we have today. And I want to thank Chris Edwards and Nicole Acquisto for joining us today to discuss codes that make you tachycardic. You can join us here every Thursday where we'll be talking with ASHP member content matter experts on a variety of clinical topics.

Speaker 1:

Thank you for listening to ASHP Official, the voice of pharmacists advancing health care. Be sure to visit [ASHP.org/podcast](https://www.ashp.org/podcast) to discover more great episodes, access show notes, and download the episode transcript. If you loved the episode and want to hear more, be sure to subscribe, rate, or leave a review. Join us next time on ASHP Official.